Response to Comments Received During Public Comment Period
Beginning on February 15, 2017, and ending on April 6, 2017

Permit No.: 5264-W

Applicant: C&H Hog Farms, Inc.

Prepared by: ADEQ Technical Staff

The following comments were received regarding the draft permit number above. The response to comments was developed in accordance with APC&EC Regulation 8, Administrative Procedures.

Introduction

The initial draft permit was submitted for public comment on February 15, 2017. The public comment period ended on April 6, 2017, after the Director granted a twenty (20) day extension prior to the original end of the comment period. The Arkansas Department of Environmental Quality (hereinafter "ADEQ" or "Department") conducted one (1) public meeting and hearing on March 7, 2017.

Acronyms

ANRC Arkansas Natural Resources Commission
APC&EC Arkansas Pollution Control and Ecology Commission
API Arkansas Phosphorus Index
AWMFH Agricultural Waste Management Field Handbook
BCRET University of Arkansas Big Creek Research and Extension Team
ERW Extraordinary Resource Water
NMP Nutrient Management Plan
NPS United States Department of the Interior National Park Service
NRCS United States Department of Agriculture Natural Resources Conservation Service
TMDL Total Maximum Daily Load
USDA United States Department of Agriculture

This document contains a summary of the comments that the ADEQ received during the initial public comment period. There were several similar issues raised throughout the comments; those are grouped together, with one response from the ADEQ.

People or organizations that submitted comments to ADEQ during the public notice period and public hearing are listed beneath each comment and their original comments are available on the ADEQ website at the web address below.
The Response to Comments are formatted as follows:

**Comment:** Original or summarized content.

**Response:** The Department’s response to the comment as of January 10, 2018.

**Response:** The Department’s response to the comment upon consideration of current relevant data and information available to the Department at the time of this draft permit denial.

**Comment 1:** Jeff Nash, my husband, and I would like the Commission to vote NO to the permit application by C&H Farms, which would again put the Buffalo River and Big Creek in jeopardy of pollution from excess phosphorus. This new permit under Reg. 5 will severely increase the millions of gallons of hog manure being spread on fields near Big Creek, which empties into the Buffalo River. We have been fighting to keep the Buffalo a clean national river that we can all use to swim in, camp along, eat the fish from, etc. We do not want this permit to go through, nor do we want more hogs raised in large commercial feeding operations to go into that watershed. JUST SAY NO: KEEP THAT FARM THE SIZE IT IS. IF THEY WANT MORE HOGS, THEY CAN TAKE THEM SOMEWHERE FLAT AND NOT ON KARST FORMATIONS WHICH DRAIN DOWNSTREAM FOR YEARS AFTER BEING POLLUTED. Thank you for voting NO. We are not against farming per se, just this farm in this place.

Original Commenters: Dina C. Nash and Jeff Nash

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

The number of swine previously permitted under the APC&EC Regulation 6 Permit (Permit Tracking No. ARG590001) was 6,503 while the maximum number of swine proposed under the individual APC&EC Regulation 5 Draft Permit (5264-W) is 4,178. The permit application reduces the maximum number of swine allowed at the facility by 2,325. Because 5264-W reduces maximum number of swine allowed, the potential for the total amount of waste produced is less than previously permitted under ARG590001.
The farm is estimated, based on the animal weight and numbers provided in Section 2 of the NMP, to generate approximately 1.9 million gallons of waste annually. The annual total waste generated, which includes animal waste, wash water, and rainfall, is estimated to be approximately 2.6 million gallons.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen. Neither the Buffalo National River nor Big Creek have been identified as impaired for phosphorus.

ADEQ evaluated total phosphorus concentrations in Big Creek according to the 2016 Assessment Methodology and the 2018 Assessment Methodology. For the 2016 assessment cycle, Big Creek (BUFT06, AU 11010005_020) mean total phosphorus and total nitrogen were 0.026 mg/L and 0.33 mg/L, respectively. The assessment methodology for APC&EC Reg. 2.509 screens the monitoring station’s mean total phosphorus and total nitrogen concentration to the 75th percentile for a given ecoregion for the assessment cycle period of record. Screening values for the Boston Mountain ecoregion for 2016 total phosphorus and total nitrogen were 0.036 mg/L and 0.46 mg/L, respectively. The 2018 screening values were 0.036 mg/L and 0.55 mg/L for total phosphorus and total nitrogen. The mean values for 2018 for BUFT06 were 0.028 mg/L total phosphorus and 0.297 mg/L total nitrogen. All mean total phosphorus and total nitrogen for Big Creek were below the Boston Mountain ecoregion 75th percentile. At this time, neither the Buffalo National River nor Big Creek have been identified as impaired for phosphorus based on the EPA-approved Assessment Methodology.

The permit application proposed the following numbers of swine: 6 boars, 2,252 gestating sows, 420 lactating sows, and 750 nursery pigs. The number of nursery pigs (pigs less than 55 lbs.) given in the Reg. 5 application is less than the number

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of pigs less than 55 lbs. in the applicant’s NOI for coverage under ARG590000 (Expired on October 31, 2016).

**Comment 2:** Considering the unique situation of the C&H farm in the watershed of a protected and prized National River, the ADEQ should help the farm find a publicly acceptable solution for its waste management before continuing the permitting process. In their application for a new permit the C&H farm is not changing their waste management methods, only intending to spread their manure on more acres of land. Public resistance is increasing and will continue to increase against the C&H farm. The State of Arkansas will be involved in expensive legal battles and divisive political battles over the ADEQ permit for years to come. Rather than continue to permit the C&H farm ADEQ should help C&H farm find a publicly acceptable form of waste management. Has the ADEQ advised the C&H farm on innovative methods of waste management, specifically anaerobic digestion? The US EPA in 2015 published the statement, “anaerobic digestion on hog operations shows great promise”. (https://www.epa.gov/sites/production/files/2015) The publication notes economic barriers to implementing biodigestion on hog farms and suggests possible solutions such as assistance with feasibility studies that ADEQ could provide. It also suggests creative solutions for financing such as third party build/own/operate models which might be provided by public or private sources to end the public conflict in this unique situation. Less interesting solutions to the hog waste in the Buffalo River watershed are also available, such as trucking the waste to a different watershed. C&H Hog Farm draft permit 5264 should be denied until a publicly acceptable form of waste management, possibly biodigestion, can be implemented on the farm for the benefit of C&H farm, the State of Arkansas and the general public.

Original Commenter: Jeanmarie Mako

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is the applicant’s responsibility to design their own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 3:** The C&H farm is NOT, in my definition, a family farm. The owners do not live on the farm property or adjacent to it. C&H is a business whose absentee owners do not have to live with the reality of the urine and fecal material their business
generates. Their neighbors do, as do the public who come from surrounding areas and out-of-state to enjoy the beauty of the Buffalo National River. The original permit granted by the ADEQ is suspect. In 2012, the state granted this concentrated animal feeding operation, known as C&H Hog Farm, a permit without allowing adequate public input or consultation with the National Park Service, the U.S. Fish and Wildlife Service, the US Geologic Survey, or local communities. And now the C&H owners are asking for expansion of the area onto which they propose spreading waste. The fact they need to expand the application area is certainly evidence that the original proposal was poorly considered. Runoff or percolation damage may not occur today or tomorrow, but at some point, pond liners will fail, unexpected rainfall will wash litter off the fields into Big Creek and into the porous subsurface karst, and the our Buffalo will be degraded.

Summarized Commenters: Steve Singleton, Fran Field

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The facility had adequate land application acreage under that permit, and was not required to add additional acreage. The Department has made the current permitting decision in accordance with state law and APC&EC Regulation 5.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.
A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

Comment 4: Thank you for opportunity to submit my comments and concerns. I am writing to ask you to deny the C&H Hog Farms, Inc., application for permit 5264-W based on the threat the operation poses to our first national river. The wildlife in the Buffalo National River watershed depends on a healthy ecosystem, and the hundreds of thousands of tourists who visit the region each year to fish, kayak, swim and hike expect clean water. The hogs generate more than 2.5 million gallons of urine and feces annually that has the potential to seep through the porous ground and eventually into the river. As the nation's first national river and a unit of the National Park System, the Buffalo National River belongs to all Americans and its protection now, and for future generations, is important to me. Not only is the waste damaging to the environment, but any failure of containment of waste would decimate a multi-million dollar tourism attraction in our state, as well as lowering property values. The amount of money brought into downstream communities from tourism is immense, and having hog excrement leaking into the country's first national river would be detrimental to the livelihoods of many people, from river outfitters to gas station owners.

Permit No: 5264-W
AFIN: 51-00164


Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management
Systems. It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

Consideration of tourism, revenue, and property values are not within the Department’s regulatory authority.

The Department emailed public notice of the draft permit to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, the Department of Arkansas Heritage, and the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health or Endangered and Threatened Species from the agencies with the jurisdiction over these matters.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.
Comment 5: Because of C&H operation's terrible location so close to the Buffalo National River and the fact that it is in geologic karst (think Swiss cheese), I request that ADEQ deny the C&H permit. The Buffalo National River is the only major national scenic area that Arkansas has. To keep a hog farm there that could potentially pollute the river and affect people and wildlife for miles around would be absolutely terrible. The hog farm's location in a karst formation area should in itself disqualify permitting from the ground water perspective. Its specific location within its local watershed should in itself also disqualify from the surface water perspective. Since we have karst we cannot depend on the underlying soil acting as any kind of water filter. The karst topography therefore greatly amplifies the problem of the nutrient runoff. These are both unacceptable risks to the public's demand for the continued protection of its resources.


Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not
prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 6: Please do not approve the change from a 5 year permit to an extended period permit. I am also opposed to any additional expansion of acres for hog waste application. Has anyone on the board taken a drive through the area even a few weeks after application? The smell is horrendous. The recent heavy rains were a really good time to go observe the erosion and sheeting of the manure into the waterway. As someone who has worked in environmental science and environmental education, I am dismayed that such actions are allowed on highly porous, steep slopes above a major tributary to our nation's first national river. I used to spend a large portion of every summer (with season visits for hiking and canoeing as well) on the Buffalo River. In fact I did this for over 35 years after my first visit in 1980. The river was one of the main reasons I moved from Wisconsin to Arkansas. My children and my grandchildren all learned to swim in the Buffalo. I have not canoed, camped or swam in the Buffalo since the farm was installed. I find the whole idea disguising on a visceral level. I know that local businesses along the river have lost money because I am one of those customers that is not interested in the potential of recreating in hog waste. The initial permit was a huge mistake in my opinion. Please do not allow any more potential for additional expanded abuse of this precious resource.

Original Commenter: Diana Rose Angelo

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.
Consideration of odor from agricultural facilities is generally not within the Department’s regulatory authority; however, in order to minimize odor, the APC&EC’s policy is to encourage permittees to adopt a good neighbor policy and consider the use of chemical or biological additives or other best management practices in the operation of liquid animal waste management systems. The NMP contains recommended measures to minimize odors.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 7: I see this as a health risk. Especially with all of the antibiotics used in raising hogs this really could be dangerous in causing antibiotic resistant infections. Industrialized hog "farms" are not farms at all, they are factories. Overcrowding leads to disease for the pigs and thus the overuse of antibiotics, this leads to disease resistance in people. Raising pigs on small farms would vacate the need for antibiotics. Such farms could also recycle there manure into compost. Pigs, as other farm animals, should be raised as animals, and humanely. And remember environmental health IS public health for your children's, children's, children; your heritage and legacy!

Summarized Commenters: Brenda Hill, Julia Stanton, Wm Davis

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.
The Department emailed public notice of the draft permit to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, the Department of Arkansas Heritage, and the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health or Endangered and Threatened Species from the agencies with the jurisdiction over these matters.

Consideration of the method in which animals are raised is not within the Department’s regulatory authority.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

**Comment 8:** Thank you for opportunity to submit my comments and concerns. I am writing to ask you to deny the C&H Hog Farms, Inc., application for permit 5264-W based on the threat the operation poses to our first national river. The wildlife in the Buffalo National River watershed depends on a healthy ecosystem, and the hundreds of thousands of tourists who visit the region each year to fish, kayak, swim and hike expect clean water. But all of that is at risk. The hogs generate more than 2.5 million gallons of urine and feces annually that has the potential to seep through the porous ground and eventually into the river. As the nation's first national river and a unit of the National Park System, the Buffalo National River belongs to all Americans and its protection now, and for future generations, is important to me.

Summarized Commenters: National Parks Conservation Association on behalf of 16,929 commenters

**Response:** The Department emailed public notice of the draft permit to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, the Department of Arkansas Heritage, and the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health or Endangered and Threatened Species from the agencies with the jurisdiction over these matters.
Consideration of tourism and revenue is not within the Department’s regulatory authority.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 9: Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine waste to prevent water-borne pathogens from leaving the sites.

Original Commenter: Arkansas Department of Health

Response: The Department makes permitting decisions in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Permittees are required to comply with all permit conditions.

Comment 10: First my compliments to ADEQ for conducting its regulatory business based on science and not emotion. I would speak in favor of giving C&H a Reg. 5 permit and all the lands applied for to land apply it nutrients. It should go without saying, the more surface area you have to disperse the waste, the better it would be. It gives occasion to apply at a “lighter” application rate so that nutrients are fully absorbed by the grass, or if you apply based on NRCS “best management practice” rates to get full nutrient absorption to the plant, you could rotate the application with some years no application to designated fields, thereby giving the grass extra time to absorb the nutrients and the depletion of a nutrient “build-up”. It only makes sense that in the event of an emergency or the need, the land permitted would be available.
Original Commenter: Stanley Taylor

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 11: While the commenters want to see agricultural and farming businesses remain a vital part of the Arkansas landscape, the commenters have concerns about the specific placement and practices at C & H hog farm because of how they may affect one of the other economic cornerstones of our state - outdoor tourism. Soil tests from 2012-2015 show that C&H fields have exceeded optimum phosphorus levels in all their hog waste disposal fields. High levels of phosphorus can easily be leaching into groundwater or into nearby streams through the karst topography, which characterizes our Ozark landscape and it is their grave concern that contamination of the soil in and around the hog facility to be an environmental blight on the surrounding water table. This can negatively effect water quality, aquatic animal life, and the attractiveness of a body of water for boaters, swimmers, fishermen, etc. Allowing a long-term permit to a farm that has already had issues with controlling phosphorus levels could have some very negative effects on the landscape and on Arkansas' reputation as a Natural State. According to the 2016 APT report 28 million visitors came to Arkansas, spending over 7.2 billion dollars, and contributing over 512 million dollars in tax revenue to state and local coffers. While not all of this was spent on the Buffalo River or in natural settings, a huge portion of it, as the publication states, was spent on "the state’s pristine outdoor pursuits, its unique highways and byways, world-class museums, emerging nationally acclaimed culinary experiences, and thriving arts and culture venues" (pg 4). Allowing C & H hog farm to have a long-term permit with little oversight will potentially put the States parks and outdoor tourism industries in jeopardy of being unable to fulfill this goal. The wild, pristine beauty
of the Buffalo River is a huge part of what drew these individuals (and their cash) to Arkansas.

As empathetic as the commenters are to the physical and financial difficulties of farming, particularly in a high rural setting with little infrastructure or local markets, we should not put other vital economic components of our State in jeopardy for the sake of this one farm. The commenters implore the ADEQ to do what’s right now and Deny Reg. 5 Permit.

Summarized Commenters: Rachael Schaffner, Stacey Lane, Jan Schaper, Veronica Rosenau, Kelly Olsen, and Dan Sherwood

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

The API is used to develop loading rates for land application based on phosphorus. There are many factors taken into account to determine whether land application on a specific field is allowable. While the soil test phosphorus, referred to as “exceeded optimum” by the commenters, is one of those factors, it is not the determining factor. A field with high soil test phosphorus may still be appropriate for land application. The Department only permits land application when the API value is a low or medium class.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

The Department emailed public notice of the draft permit to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, the Department of Arkansas Heritage, and the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health or Endangered and Threatened Species from the agencies with the jurisdiction over these matters.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other
subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA1029, “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA9516 states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not

3 https://www.uaex.edu/publications/PDF/FSA-9516.pdf
contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 12: Deny the Reg. 5 permit to C&H Farms. Do not allow hog farms, or other polluting farms, on the Buffalo River tributaries. Protect the Buffalo River for future generations. This is obviously no “family farm” to begin with, and the approval process that initially allowed this CAFO was not appropriate in the first place. It is the agency responsibility to protect the environment of this state.


Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

Based on the Disclosure Statement submitted with the permit application by the applicant, the facility is owned by Jason Henson, Richard Campbell, and Philip Campbell.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 13: First, the C and H HOG FARM should be required to relocate away from the Buffalo River watershed at the corporation’s own expense.
Second, The ex-director of ADEQ, who committed the violation against the people of Arkansas and its precious stream should be sentenced to live adjacent to a hog farm for 5 years.
Third, this ex-director should have to apologize to the current director and the other scientists at ADEQ for tarnishing the reputation of this very crucially important agency.
Fourth, every effort should be made to restore and rehabilitate the acreage when the HOG FARM MOVES OUT OF THE AREA.

Original Commenter: Nancy Clark

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

Comment 14: I have watched in five different states: Minnesota, Wisconsin, Iowa, Missouri, Arkansas, swine, chicken, dairy, corn beef, all the family farms were owned by Corn Beef Farms. I don’t think they should be called a farm, this is a factory. It would take the place of 12-20 regular farms. And no one would ever complain. I’ve been here 30 years as a concessioner on this river, never heard anyone complain about a farm. But when you have a place or facility that small that's producing more sewage than the city of Harrison with no sewage or septic whatsoever, I think it’s a concern. I’d like to bring up this is a Brazilian corporation, if you saw the Olympics, they don’t care about their water, why would they care about ours. If the concerned people weren’t here, there’d be ten of them and no one would ever know. Now the river was closed down for E.coli below Carver for the last year or two, first time ever in 30 years that I’ve seen that. This is a stockyard, not a farm we can’t be calling it that. If you had 6,000 immigrants using outhouses, people would be complaining. Thank you.

Summarized Commenters: Larry Olesen and Mary Olson

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

Based on the Disclosure Statement submitted with the permit application by the applicant, the facility is owned by Jason Henson, Richard Campbell, and Philip Campbell.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 15: It appears egregiously arrogant on the part of the ADEQ to set a public comment deadline a week before the National Park Service assessment document (hydrological report) pertinent to the Buffalo River Hog Factory is available. This report will shed light on the REAL DAMAGE YOU HAVE ALREADY ALLOWED TO THIS TOURISM RESOURCE, BUT YOU PERSIST IN REFUSING AN EXTENSION OF THE COMMENT DEADLINE FOR THIS PERMIT IN HOPE OF AVOIDING HAVING TO DEAL WITH THE CONTENT.

Summarized Commenter: Ken Holt, Nancy Baxter, and Duane Woltjen

Response: The permit was public noticed on February 15, 2017. In accordance with APC&EC Regulation 8.208 (B), the public comment period shall begin on the day the notice is published and shall expire on the thirtieth (30th) calendar day after the publication of the notice. Therefore, the public comment period ended on March 17, 2017. The Department received multiple requests for a 20-day extension of the comment period, which the Director granted in accordance with APC&EC Regulation 8.208(C). The extension of the comment period ended on April 6, 2017.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

Comment 16: Please deny the Regulation 5 permit for the C&H swine factory in the Buffalo River watershed. This industrial operation has no business in the geologically sensitive karst environment of our own national river and should be moved to another location outside of the Buffalo River Watershed. Any failures, smells, spills, or long term degradation risks a $62M tourism industry and the health of tourists in one of the poorest areas of our state. Given the controversy surrounding the significant potential runoff of waste from the Hog farm into a tributary of the Buffalo, you should deny it because it makes economic sense. Deny it out of respect for the Arkansans who came before you who fought to protect it.

Summarized commenters: Lacey Vanderpool, Erin Rains, Tamie Walthers, Samantha Farrell, Hari Newmark, Kenny Fry, Eleanor Brock, Terrence Brewer, Jessica Kibling, Kim Lovely, Joan E. McEwen, Pat Riley, Deanne Mayer, Karen Cleary, Douglas K. Barton, Gil Barrera, Bruce Petray, Susan Parker, Alex Burlison, Linda Simmerman, Victoria Marriott, Anonymous email, Billy Jeter,

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

The Department emailed public notice of the draft permit to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, the Department of Arkansas Heritage, and the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health or Endangered and Threatened Species from the agencies with the jurisdiction over these matters.

Consideration of tourism and revenue is not within the Department’s regulatory authority.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

Comment 17: To whom it may concern- I want you to know that I do not want you to issue this permit. As a retired CPA I can not see putting the number of people whose income depends on the river out of business for one CAFO. As a former middle school educator, I taught children in Michigan about a karst plain. Surely people in this State should know what a karst plain is and the hazards that can happen with hog waste.

Also, I am curious as to why our comments are due before your report is made public? Any comments you have would be greatly appreciated, so that I might better understand why anyone would allow a hog farm that close to a beautiful river that I love to float on.

Original Commenter: Joanne Olszewski

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It
is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

The permit was public noticed on February 15, 2017. In accordance APC&EC Regulation 8.208 (B), the public comment period shall begin on the day the notice is published and shall expire on the thirtieth (30th) calendar day after the publication of the notice. Therefore, the public comment period ended on March 17, 2017. The Department received multiple requests for a 20-day extension of the comment period, which the Director granted in accordance with APC&EC Regulation 8.208(C). The extension of the comment period ended on April 6, 2017. The referenced report was published on March 15, 2017.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste
impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

**Comment 18:** I am writing to urge you to save the Buffalo National River from pollution and destruction. Please deny the new permit for the C&H Hog Factory. If the pig factory is producing waste equal to a small town in Arkansas as I have read they are, they ARE polluting not only the BNR but also the whole community around them. No town would be allowed to produce that much animal waste and not have in place a complete sewage system to treat the animal waste. So why and how can they continue to do so?

Once the BNR is polluted, no one will come to float, fish, or hike the river. We will lose another beautiful part of our state. What can take the place of that tourism money? Even if you don’t care about the BNR, you surely care about the tax dollars that the BNR generates for our state. That should be an incentive to stop the pig factory. We are spending thousands of dollars now on tests and loan support for the pig factory, but are destroying the source of many more tax dollars from tourists.

Summarized Commenter: Kriste Rees

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 19:** I’m about to spend my 53rd consecutive trip on the Buffalo River. We’ve camped at Market Right; have for the last 35-40 years. I’ve listened to the last two gentlemen and smoke and mirrors don’t impress me much. What impresses me, he’s talking about how much revenue that C&H Hog Farm produces for this area, how do you compare with $38,000,232 of revenue produced off of the Buffalo River, the people that come to it. You got 1,160,802 people that were on this river, directly related to it. I don’t disagree that C&H Hog Farm is not the only polluter on this river. There needs to be something done with human feces as well.
But if we don’t get a handle on this, and get somebody that’s interested in taking care of this river out here, then it won’t be there for my grandchildren. I’d like to know when it reaches this pump down level, where do they pump it to? They’ve got big tanks they put it in or do they pump it out in the ground and let it run in the river, simple question.

Original commenter: Garry Lilley

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

According to the submitted NMP, waste will be pumped to tanker trucks when the waste storage ponds reach the pump-down level.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 20: The Arkansas Farm Bureau Federation would like to offer the following comments supporting the issuance of C&H Hog Farms Regulation 5 permit. Our organization is a non-profit agricultural advocacy association with more than 190,000 members of whom 50,000 are directly engaged in agriculture production and representing 90% of all farmers and ranchers. We continually work to protect our members right to farm while making sure our states resources, in this case the Buffalo National River, are protected for future generations of farmers and Arkansans.

Farm Bureau's focus is to ensure sound science drives the production practices of our farmers and ranchers, and to ensure that regulatory controls being applied to farmers and ranchers employ the same sound science. With more than three years of data the Big Creek Research & Extension Team (BCRET) has continually shown that C&H has shown no environmental impact to Big Creek or its surrounding streams. These results are a testament to the APC&EC's regulatory requirements, ADEQ's protective permit and the effectiveness of C&H Hog Farm's nutrient management plan and operating procedures.
Although some may have you believe that protection of the Buffalo National River and agricultural practices within the watershed are incompatible, Farm Bureau believes these two can and must co-exist, and that both should be protected. We know this to be true because there have been swine, cattle, and poultry farms in the Buffalo National River watershed for decades without degradation of water quality.

Despite the fact there is no scientific evidence showing that C&H Hog Farm is causing an environmental impact, opponents continue to point fingers at these three young farm families with 9 generations of farming history, while ignoring other potential sources of pollution. Several examples of these other sources are septic tanks, severe bank erosion, wild hogs, increased recreation use, and the National Park Service (NPS) wastewater treatment plants. In addition, to the comments stated above, Farm Bureau would like to reiterate the following previously submitted comments.

Original Commenter: Evan Teague for Arkansas Farm Bureau Federation

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo...
National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

In the April 1 to June 30, 2018 Quarterly Report, BCRET presents data that documents a statistically significant increase of nitrate-N in the ephemeral stream (BC4) since 2014. However, BCRET notes that chloride, a conservative tracer, did not show a statistically significant increase. Four years of data also indicate a steady increase of geometric mean nitrate-N within the house well (W1) (BCRET April–June 2018, Figure 24). Increased nitrate-N in both the ephemeral stream and the house well does suggest that these systems may be hydrologically connected to areas where farm activities take place. APC&EC Regulation 5 requires the design and waste management plans for liquid animal waste management systems be in accordance with the AWMFH. The AWMFH requires a detailed, geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. Detailed geologic investigations are necessary to determine that the ephemeral stream and house well are not influenced by the waste storage holding ponds, on-farm activities, or waste management practices. A dye tracing study may be necessary to understand the movement of groundwater in this complex geologic system.

BCRET data document that nitrate-N is variable; however, Figure 12 of the April 1 to June 30, 2018 BCRET Quarterly Report demonstrates that nitrate-N is higher downstream (BC7) than upstream (BC6). Chlorides and nitrates follow similar seasonal fluctuations in that they are higher during summer and autumn months when stream discharge is most influenced by groundwater. ADEQ reviewed Jim Petersen’s May 31, 2018 expert report, which presents an analysis of temporal trends among nitrate-N and *E. coli* from January 2014–December 2017 at BC6 and BC7. Mr. Petersen’s analysis presents decreasing trends of ammonia and chlorides and increasing concentrations of *E. coli* at BC6. Yet, increasing concentrations of nitrate-N were observed downstream at BC7. The conflicting temporal analysis prompted Mr. Petersen to further review trends upstream to downstream. By analyzing paired concentration data (collected same day) at BC6 and BC7 from January 2014 through December 2017, Mr. Petersen reports significant increases in total nitrogen, ortho-phosphorus, and chlorides, but non-significant changes in *E. coli* and nitrate-N. The significant increase of nitrate-N in the house well and ephemeral stream does correspond to increases of total nitrogen at BC7. Mr. Petersen’s analysis illustrates the complexities of evaluating water chemistry in karst systems.

**Comment 21:** In 1995 Director Randall Mathis and the Arkansas Department of Environmental Quality's (the Department) Environmental Preservation Division initiated the Buffalo River Swine Project. The Arkansas Pork Producers Association, the
Newton County Conservation District and Cooperative Extension Service were also collaborative partners in the study.

The study included a 5-year evaluation of hog farms in the Buffalo River watershed. Full disclosure, at the onset of the study there were issues found, not with the locations of the farms, but with how some farmers were managing their manure. However, after working with and educating these farmers on proper manure management practices in-stream water quality samples collected from an adjacent stream showed initial nutrient load reductions of 90%. The study also included groundwater monitoring around the lagoons and in the application fields. The groundwater study showed that those lagoons "exhibited little to no leakage" and that groundwater showed "minimal impacts from onsite waste ponds.

The participants of this study were awarded EPA's Environmental Excellence Award of 1998. (see Appendix A) Director Mathis applauded these efforts and noted the ceremony in his Director's report during the January 1999 commission meeting. (see Appendix B) The EPA again recognized these efforts by publishing the Buffalo River Swine Study as one of their 2002 EPA 319 Success Stories. (see Appendix C) The study concluded, "Swine farmers in the Buffalo River watershed have successfully changed their waste management practices and are using the fertilizer benefit of the manure generated at their facilities while minimizing their impact on the environment." (Emphasis added)

Why is this important? Those farms were built in the 1970s. Engineering design standards for lagoons as well as the nutrient management plans that farmers are required to comply with today are much more stringent/restrictive than they were 20 years ago when those studies were performed. If those farms were able to minimize their impact on the environment, then what would be the justification for denying this permit to a farm that must meet much more stringent engineering design standards and must follow more restrictive NMP requirements? Denying this permit would be contrary to the very conclusions reached by the Department, then and now, and that EPA has recognized.

Original Commenter: Evan Teague for Arkansas Farm Bureau Federation

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
Comment 22: On April 15-17, 2014, EPA Region VI's Compliance Assurance and Enforcement Division conducted an unannounced inspection of C&H Hog Farms. (see Appendix D) The report stated, "No areas of concern were noted at this facility." The inspection was extremely thorough and included record keeping, lagoons, collection of soil samples from the land application fields, collection of water samples up-gradient and down-gradient from the farm, etc. As is typical with most all EPA inspections, an exit interview is conducted with the permittee. While not part of the official written record, the inspector told Mr. Henson that their farm was one of the best they have ever inspected and that he "nitpicked" them trying to find something wrong and couldn't.

The inspector's report even noted that, "The farm has planted approximately 1,000 loblolly pine trees around the perimeter of the facility. While these trees are only 12"-14" tall they may, in the future, provide a measure of odor control." This shows a good faith effort on behalf of the owners of C&H Hog Farms to address concerns related to odors even though there are not specific permit parameters associated with odors and even though odors from this farm have been minimal, contrary to the fabrications made by C&H's opposition.

The EPA also collected soil samples from the land application fields. The average soil phosphorus level was 13% LESS than the original sample results used to draft C&H Hog Farms NMP. That means their NMP has an additional built-in safety factor. This is just an average and not a weighted average.

ADEQ enforcement has also performed numerous inspections of this facility, the vast majority of which have been based on frivolous complaints. On more than one occasion the inspector was already onsite at the time a complaint was received and it was obvious that the complaint was baseless and fabricated.

Original Commenter: Evan Teague for Arkansas Farm Bureau Federation

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil
Phosphorus: Management and Recommendations FSA1029⁴, “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA9516⁵ states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504(a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 23: The Buffalo River NPS has Agriculture Special Use Permits (AgSUPs) through which it leases fields to local farmers to cut hay.(see Appendix E) These permits require the lessees to fertilize these fields at minimum rates predetermined by the NPS. This has been a common practice since the Buffalo River National Park was created. Opponents have repeatedly stated that the high, excellent, even pristine, water quality of the Buffalo River must be "protected", so there has obviously been minimal impact to water quality as a result of these activities. Therefore, the following comments in no way should be construed to suggest that these activities are detrimental or should cease. With that said . . . these fields represent 1,260 acres and the NPS requires that more than 93,000 lbs of N and 45,000 lbs of P be applied. This is more than C&H Hog Farms generates on an annual basis AND many of these fields are directly adjacent to, some less than 100 feet to the Buffalo River. Many of these fields receive commercial fertilizer which is more soluble if not managed properly than animal manure and can result in more nutrients entering the Buffalo River. On the other hand, the fields that C&H Hog Farms apply to are more than 5 miles from the Buffalo River. So, if it is okay for the NPS to apply nutrients to fields right next to the Buffalo River that are underlain by Karst, why is it not okay for C&H Hog Farms to do the same?

⁵https://www.uaex.edu/publications/PDF/FSA-9516.pdf
Furthermore, the Buffalo River Watershed is not considered a Nutrient Surplus Area as designated by Ark. Code Ann. § 15-20-1104; therefore, the NPS and local landowners are not required to follow Nutrient Management Plans (NMPs) based on the Arkansas Phosphorus Index (AR P-Index). However, because C&H Hog Farms generates liquid animal waste it is required to apply ALL of its nutrients according to the AR P-Index. The landowners that C&H Hog Farms has lease agreements with have fertilized these fields just as the NPS has fertilized theirs. However, now that these landowners have agreed to accept manure from C&H Hog Farms these fields are now subject to the requirements of the AR P-Index. As a result, nutrient application rates will be significantly reduced as compared to historical application rates. So . . . an activity that has been done according to BMPs, but essentially unregulated, is now subject to NMP requirements based on the AR P-Index. The following conclusion will be completely unfathomable by C&H's opponents, but that doesn't change the fact that it is logical and reasonable. The very fact that C&H Hog Farms has located near Mt Judea and landowners are now applying hog manure (organic liquid fertilizer) instead of commercial fertilizer or poultry litter may actually improve the already high, excellent, even pristine, water quality in Big Creek and the Buffalo River. Furthermore, assuming other similar farms locate in the Buffalo River watershed and landowners switch from commercial fertilizer to hog manure, it isn't an unreasonable assumption that water quality in the areas surrounding those farms may also improve. This reasonable and logical conclusion itself should serve as justification and give the Department and the Commission confidence to approve the permit.

Original commenter: Evan Teague for Arkansas Farm Bureau Federation

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Land application of liquid animal waste is regulated by APC&EC Regulation 5.

The Department is not the regulatory authority for the land application of dry poultry litter. ANRC is responsible for regulating the land application of dry poultry litter.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as
required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 24: If opponents are sincere about protecting the Buffalo River, then all "potential threats" need to be considered. Recreation and tourism should not be given a free pass to pollute. Tourism proponents dismiss the impacts of recreation and floating. In previous comments submitted to the Department the NPS touted the collaborative effort between itself and the Department as it related to monitoring at nine sites on the Buffalo River and its tributaries. The NPS in 2013 announced that it was increasing its monitoring at the confluence of Big Creek and the Buffalo River. Hog farm owners in the 1990s subjected their farms to intense monitoring and scrutiny. Now, the owners of C&H Hog Farms have put their farm and livelihood on the line by opening it to even more intense monitoring. Yet, there has been no similar study to evaluate the impacts of recreation and floating on the Buffalo River, even as the number of visitors has grown to nearly 1.5 million with more than 6,000 per day floating the Buffalo River.

Original Commenter: Evan Teague for Arkansas Farm Bureau Federation

Response: Consideration of tourism and revenue is not within the Department’s regulatory authority.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 25: The opponents claim that the Buffalo River is under "threat" from a "potential" massive expansion of swine production. Yet, the they have presented no evidence to support those claims. Over the past decade swine production in Arkansas has declined by more than 85%. The overall number of animals in the Buffalo River Watershed itself has decreased over the last 15-20 years from more than 3,600 to 2,500. Since 2006 there have been only four new farms permitted in Arkansas that
house 1500 sows or more. These numbers do not constitute a massive expansion of swine production in Arkansas. To the contrary, even with the addition of these new farms, hog numbers are still significantly less than ten years ago. The probability of the Buffalo River being populated with hog farms is very low essentially non-existent, especially when considering the amount of controversy, the opponents have successfully generated.

Original Commenter: Evan Teague for Arkansas Farm Bureau Federation

Response: The Department acknowledges the statement.

Comment 26: Much has been made of the location of C&H Hog Farms and the land application of liquid fertilizer on fields next to Big Creek. The National Park Service applies more nutrients through its Agriculture Special Use Permitting program than C&H Hog Farms generates annually. The NPS fields are adjacent to the Buffalo River and are underlain by Karst. If land application to fields underlain by karst is so detrimental then why is it okay for the National Park Service to fertilize fields that are adjacent to the Buffalo River but it isn't okay for C&H Hog Farms to do the same under an actual permit on fields more than 5 miles from the Buffalo River?

Lastly opponents claim that as the public learns of the existence of C&H Hog Farms, it is damaging the public’s perception of the Buffalo River and is hurting tourism. These claims are rather ironic since the opponents are solely responsible for generating all the negative press and publicity surrounding this issue. They have only themselves to blame. There have been hog farms in the Buffalo River watershed for decades and tourism has thrived as evidenced by the nearly 1.5 million visitors to the Buffalo River National Park each year.

Original Commenter: Evan Teague for Arkansas Farm Bureau Federation

Response: The Agriculture Special Use Permitting program is outside the scope of this permitting decision.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

Response: The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 27: Opponents of the hog farm like to compare the amount of waste generated with other cities. One example that is continually repeated, without proper justification, is the hog farm generates more waste than the City of Harrison. Unless opponents preface this statement with numerous caveats, which have never been provided, it is completely false. The City of Harrison is currently permitted to treat 2.6 million gallons per day. Meaning the city treats more waste in one day than the hog farm will generate in one year.

According to Mott 2016 the calculated amount of nutrients generated by the hog farm would compare to 7,000 humans for nitrogen and 23,000 humans for phosphorus without taking into consideration the fields being applied to have received fertilizers in the past. Mott goes on to say that C&H Hog Farms has a significant nutrient load to be managed. However, it should be reiterated that C&H Hog Farms is required to apply all nutrients on permitted fields according to the P-Index. These same fields that in the past have been unregulated and are now subject to NMP requirements based on the P-Index. Therefore, Mott's calculated amounts of nutrients generated by the hog farm may be accurate but they do not truly represent what is going on in the watershed and that nutrient application rates are significantly reduced compared to historical application rates.

Original Commenter: Evan Teague for Arkansas Farm Bureau Federation

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil
Phosphorus: Management and Recommendations FSA1029, “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA9516 states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504(a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 28: Opponents of the Hog Farm are concerned with nitrates increasing in Big Creek downstream from the farm and data collected by BCRET in fact does show nitrates increase as Big Creek passes the farm. However, opponents look at the data without providing proper context. Opponents fail to mention is that nitrate concentrations collected at a monitoring station on Big Creek at Carver, which is 4 miles downstream of the BCRET monitoring stations, have remained unchanged over the last 10 years.

The principle sources of nitrate contamination in surface water and groundwater are fertilizers, population density, woodland to cropland ratio and presence of sand or gravel aquifers. In other words, as land use increases so do in-stream nitrate concentrations. All of the acreage proposed to be permitted and currently being used by C&H Hog Farm is not newly created pastureland. As a matter of fact, all of the permitted pasture land was in existence prior to C&H ever being built with most fields, if not all, receiving dry litter or commercial fertilizer for years prior to commencement of operations at the hog farm. To put the instream nitrate concentrations into perspective, all of the downstream nitrate data collected by BCRET shows a mean concentration of 0.25 mg/L. According to a report prepared for the National Park Service that measured Surface-Water

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7 https://www.uaex.edu/publications/PDF/FSA-9516.pdf
Quality in the Buffalo National River from 1985-2011, there are seven tributaries (Mill Creek, Davis Creek, Brush Creek, Tomahawk Creek, Calf Creek, Mill Creek-Middle, and Bear Creek) of the Buffalo River that have higher concretions of nitrates than reported downstream of C&H Hog Farm in the BCRET reports. With some tributaries having concentrations two times higher. But you don't hear the opposition in an uproar over those other tributaries.

When taking into consideration that the proposed permitted fields were already being fertilized prior to C&H Hog Farm going into operation and the Carver downstream monitoring data shows nitrate concentrations have remained unchanged for the last decade. It is then logical to conclude that even if the hog farm is removed and BCRET was allowed to continue monitoring at the same locations, concentrations would still show an increase. Meaning the hog farm is having no environmental impact. However, this information doesn't agree with the opposition's agenda which is to shut down the hog farm. Maybe that is why they intentionally avoid discussing in their comments.

Original Commenter: Evan Teague for Arkansas Farm Bureau Federation

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

BCRET data document that nitrate-N is variable; however, Figure 12 of the April 1 to June 30, 2018 BCRET Quarterly Report demonstrates that nitrate-N is higher downstream (BC7) than upstream (BC6). Chlorides and nitrates follow similar seasonal fluctuations in that they are higher during summer and autumn months when stream discharge is most influenced by groundwater. ADEQ reviewed Jim Petersen’s May 31, 2018 expert report, which presents an analysis of temporal trends among nitrate-N and E. coli from January 2014–December 2017 at BC6 and BC7. Mr. Petersen’s analysis presents decreasing trends of ammonia and
chlorides and increasing concentrations of \textit{E. coli} at BC6. Yet, increasing concentrations of nitrate-N were observed downstream at BC7. The conflicting temporal analysis prompted Mr. Petersen to further review trends upstream to downstream. By analyzing paired concentration data (collected same day) at BC6 and BC7 from January 2014 through December 2017, Mr. Petersen reports significant increases in total nitrogen, ortho-phosphorus, and chlorides, but non-significant changes in \textit{E. coli} and nitrate-N. The significant increase of nitrate-N in the house well and ephemeral stream does correspond to increases of total nitrogen at BC7. Mr. Petersen’s analysis illustrates the complexities of evaluating water chemistry in karst systems.

\textbf{Comment 29:} Opponents of the hog farm are concerned about Dissolved Oxygen (DO) in Big Creek and point to the hog farm as the cause. Big Creek is located in the Boston Mountains ecoregion and based on APC&EC Regulation 2 has a year round minimum DO standard of 6 mg/L. In an email from Faron Usrey of the National Park Service (NPS) to Sarah Clem of ADEQ dated August 6, 2013, Mr. Faron expresses his concern with low DO levels (5.8 mg/L) in Big Creek (Appendix G). He goes on to say that "dissolved oxygen is being driven down to critical levels in the Buffalo River below the confluence, a reach containing potential T&E species of native mussels." Mr. Faron also included in the email weekly DO monitoring from June through August of 2013 and 48-hour dissolved Oxygen data from July 22nd through the 24th which showed periods where DO dropped below the water quality standard of 6.0 mg/L. Opponents would have everyone believe this is proof that C&H is having an impact on water quality, however, what they do not say is at that point C&H had never land applied any waste and would not perform their first application of swine waste until December of that year. That is over 6 months after Mr. Faron collected DO data on Big Creek and four months after sending the email. If at any time Big Creek is listed on the 303(d) list for DO, opponents will undoubtedly point the finger at C&H but the reality is that any DO issues found in Big Creek were occurring prior to operations commencing at C&H Hog Farm.

Original Commenter: Evan Teague for Arkansas Farm Bureau Federation

\textbf{Response:} The Department emailed public notice of the draft permit to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, the Department of Arkansas Heritage, and the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health or Endangered and Threatened Species from the agencies with the jurisdiction over these matters.

The EPA did not include Big Creek on the approved 2016 303(d) list.
Response: The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 30: C&H has bent over backwards to accommodate opponents of the hog farm in an attempt to show a good faith effort to protect the Buffalo River and its tributaries. Many of which have already been discussed. What shouldn't be lost is that C&H Hog Farm followed every federal and state law to obtain a permit. They passed an EPA inspection and numerous ADEQ inspections with flying colors. C&H has subjected itself to the most intensive monitoring program of any farm in state history. With each modification the owners of C&H requested public hearings to demonstrate their willingness for transparency. After all of that, irrational opponents continued to take shots at the farm in the name of science only to be rebutted at every turn. These groups claimed the ponds were leaking based on house well data collected by BCRET, which were proven false. Once again they tried to claim the ponds were leaking due to a fracture, despite the fact that the BCRET had direct measurements that showed otherwise. These claims of leaking were proven to be false when ADEQ and Harbor Environmental released the results of the drill study.

At the request of environmental groups, C&H submitted an application to modify their permit requesting to install synthetic liners in both ponds to reduce concerns only to receive opposition from the very same environmental groups that requested liners in the first place. In addition, C&H worked with EC Farms to secure additional acreage to reduce application rates and potential runoff risk only to be jeered by the opposition. When will it be enough? But wait, there is more.

At the March 30th Buffalo River Watershed Management Plan meeting conducted in Jasper by FTN & Associates and ANRC, Kent Thornton with FTN proposed to the public a recommended starting point (Appendix H). In his presentation Mr. Thornton stated that streams reflect their watersheds and suggested looking at the tributaries of the Buffalo river using screening criteria. The screening criteria
would systematically and scientifically look at stream biology, water quality, land use, and karst geology using all data available to identify which tributaries need immediate attention. For example, in the water quality screening criteria one of the parameters they evaluated was fecal coliform. Using all of the fecal coliform data that was available each tributary was assessed and the streams listed in the upper 25th percentile were identified as potential candidates for further evaluation. After looking at several more parameters (concentration and load), trends of over time, and biology each criteria was scored and tallied to develop an initial list of eight streams to focus on. Big Creek was not listed as one of the eight streams, as a matter of fact, Big Creek was never listed in any of the sub criteria evaluations. This systematic and scientific evaluation affirms what we have said all along and that is Big Creek is, and continues to be, one of the most pristine streams in the Buffalo River watershed. However, opponents of the hog farm expressed dismay, even outrage at the fact that Big Creek was not on the list even though the science didn't support it and demanded Big Creek be added to the list anyway.

Opponents have shown through their statements at the last watershed management plan meeting, that protecting and preserving the Buffalo is not their highest priority, instead they chose to ignore empirical data and continue with false accusations and illusions of threats in an attempt to facilitate group hysteria just to shut the Hog Farm down. Not because the farm is a threat but because they have an irrational fear of this farm based solely on its size. This irrationality is based on what has been no doubt, hours, days, weeks, months and even years of perusing websites that have an anti- "big agriculture", anti- "modern-agri" bent. The opposition went so far as to distribute anti-CAFO propaganda at a APC&EC meeting. They believe if they call this farm a corporate farm, or factory farm enough times that it makes it so. But this is three young farm families with 9 generations of farming history that demonstrates an exceptional record of stewardship of their farm, their community, and the Buffalo River. Please do not be fooled by this. Issue the Regulation 5 permit.

Original Commenter: Evan Teague for Arkansas Farm Bureau Federation

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for
the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Although the analytical data from the Harbor Drilling Study did not indicate a leak at the borehole drilling location at the time of the sampling, the study does not support the conclusion that there is not any leakage from the ponds.

Comment 31: C&H hog farm is a true Arkansas farm. C&H farm has met, often exceeds, all EPA and Arkansas environmental laws. C&H farm has not negatively impacted the surrounding area. Therefore, the permit should be granted. The commenters support C&H farm.

Wiseman, Glenda Wiseman, Allison Croslow, Chuck McCracken, Cheryl Meyers, Sandra Powell, Steve Hignight, and Gene Pharr

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

In the April 1 to June 30, 2018 Quarterly Report, BCRET presents data that documents a statistically significant increase of nitrate-N in the ephemeral stream (BC4) since 2014. However, BCRET notes that chloride, a conservative tracer, did not show a statistically significant increase. Four years of data also indicate a steady increase of geometric mean nitrate-N within the house well (W1) (BCRET April–June 2018, Figure 24). Increased nitrate-N in both the ephemeral stream
and the house well does suggest that these systems may be hydrologically connected to areas where farm activities take place.

BCRET data document that nitrate-N is variable; however, Figure 12 of the April 1 to June 30, 2018 BCRET Quarterly Report demonstrates that nitrate-N is higher downstream (BC7) than upstream (BC6). Chlorides and nitrates follow similar seasonal fluctuations in that they are higher during summer and autumn months when stream discharge is most influenced by groundwater. ADEQ reviewed Jim Petersen’s May 31, 2018 expert report, which presents an analysis of temporal trends among nitrate-N and E. coli from January 2014–December 2017 at BC6 and BC7. Mr. Petersen’s analysis presents decreasing trends of ammonia and chlorides and increasing concentrations of E. coli at BC6. Yet, increasing concentrations of nitrate-N were observed downstream at BC7. The conflicting temporal analysis prompted Mr. Petersen to further review trends upstream to downstream. By analyzing paired concentration data (collected same day) at BC6 and BC7 from January 2014 through December 2017, Mr. Petersen reports significant increases in total nitrogen, ortho-phosphorus, and chlorides, but non-significant changes in E. coli and nitrate-N. The significant increase of nitrate-N in the house well and ephemeral stream does correspond to increases of total nitrogen at BC7. Mr. Petersen’s analysis illustrates the complexities of evaluating water chemistry in karst systems.

**Comment 32:** After the C&H Hog Farms permit was issued, efforts were undertaken to begin the collection of water quality data by water quality scientists to determine if the ongoing hog farm operations were having any impact on Big Creek. Data is now being collected by the Big Creek Research and Extension Team (BCRET) and other scientists in the field. Background water quality samples were collected from Big Creek upstream from the hog farm location and the land application sites adjacent to Big Creek. Water samples were also collected downstream from the farm and the waste manure land application sites after the farm was operational.

The data collected by BCRET shows nitrate levels downstream from C&H Hog farms are consistently higher than the upstream samples. Additional water quality data recently collected by the National Park Service and the USGS confirmed low Dissolved Oxygen (DO) levels in Big Creek downstream from C&H. This data strongly suggests operation of the C&H Hog Farms may already be adversely impacting the water quality of Big Creek and potentially water quality further downstream.

C&H Hog Farms, has now made application to modify its existing permit for a "No Discharge" permit to store and land apply waste manure in accordance with APPC&E Regulation No.5. The preliminary water quality data from Big Creek,
collected by independent research teams, seems to indicate this farming operation is already having an impact on Big Creek.

Given this, the responsible thing to do would be for ADEQ to suspend the issuance of the C&H permit from thirty (30) to sixty (60) days to allow Water Division staff, stakeholders and other interested parties to sit down and evaluate the water quality data collected to date by all parties, USGS, BCRET, and other research teams collecting water quality data. Once an evaluation of the most recent water quality data has been completed, ADEQ Water Division staff could make a better informed decision on whether it is appropriate to approve C&H's request to modify its current permit.

Otherwise, if ADEQ Senior Staff refuse to look at and evaluate the existing water quality data collected to date from Big Creek and objectively evaluate the potential environmental impact of this hog farm on Big Creek, they are again, just blindly stumbling along while, extending the initial flawed permit review process into the current proposed permit modification review process. Furthermore, as previously stated, any review of the proposed permit modification by C&H Hog Farms should also include an ADEQ Professional Geologist in the review process.

ADEQ Senior Staff claim they want the permit modification process for C&H Hog Farms permit to be open, transparent and above board for all citizens in the State of Arkansas. Senior Staff also have said the permit review process would be fair and impartial. However, the failure of ADEQ Office of Water Quality staff to consider, evaluate and interpret the current water quality data already collected in regards to the pending permit modification application for C&H would be inappropriate, unprofessional and demonstrates the lack of transparency from the agency which is extremely frustrating to me and most citizens of the State of Arkansas.

If the data suggests the ongoing hog farming operations at C&H are indeed having an adverse environmental impact on Big Creek and possibly downstream, then ADEQ should reconsider whether it is appropriate to allow the proposed permit modification from C&H to expand its farming operation to be approved. If current waste storage and land application of manure are found to be already impacting Big Creek then, C&H should not be allowed to expand it current operation under Regulation No.5.

As a long time former ADEQ employee I am keenly aware of the dedication and professionalism required by the employees who presently work for and or have worked for ADEQ in the past. The job is often difficult, tedious and without reward but, the job gets done, day in day out by the Department's staff. Many of my former co-workers in the Water Division as well as current ADEQ employees were shocked, dismayed and disgusted the C&H Hog Farms Permit was ever
approved and issued given its sensitive location. Engineers working in the Water Division who knew the permit process was flawed and who adamantly disagreed the C&H Hog Farms permit should have been issued, resigned and/or took early retirement.

It is well established the permitting process for C&H was flawed from the start as the C&H Hog Farm should have been required to submit an application for an individual permit. This would have allowed for having a traditional thirty (30) comment period on the draft permit prior to issuance to allow the appropriate interested parties (AR Game and Fish, NPS, Stakeholders, AR Citizens, etc.) to comment and have input into the C&H Hog Farms permitting process.

As we know, this was not done as the permit was issued under a General Permit for CAFO's which did not require a thirty (30) day comment period under the Notice of Intent (NOI) procedures. As a result, "the Department has been doing damage control" ever since this hog farm permit was issued. Now the permit is approved, ADEQ employees are stuck in the unenviable position of having to defending its decision to issue this permit. Ultimately C&H and ADEQ are now essentially partners in running this hog farm operation. Many of my former ADEQ co-workers and current ADEQ staff members have expressed their disappointment to me that the Department would approve and issue a permit to store and land apply waste manure at the C&H hog farm without effectively evaluating existing site conditions, prior to issuance of the permit given its sensitive geologic location and the hog farms relative close proximity to the Buffalo River.

The fact is C&H Hog Farms now has a legally authorized permit to operate a hog farm at its present location. They appear to be here to stay regardless of the consequences. Based on my years of experience working as a Professional Geologist for the Department, all pond liners can eventually leak no matter how well they are constructed. In fact, the C&H manure holding ponds actually have a permitted, approved leakage rate. Clearly, shallow karst limestone environments in Arkansas are fragile and highly susceptible to having contaminates introduced both directly from a release or indirectly from the downward infiltration of wastes.

Unfortunately, based on my experience it appears most likely outcome for the environment as a result having this permitted hog farm, at this location, will be the continued, ongoing disposal of large volumes of waste manure on the land application sites associated with this permit will lead to an eventual overloading of the nutrients (phosphorous and nitrogen) in site soils which will eventually be leached into the environment. No matter how well the application of liquid waste manure is handled by C&H, it is highly likely over time, impacted surface water
runoff from these land application sites will eventually enter and have an adverse impact on Big Creek.

Therefore, it is my professional opinion that ADEQ's final decision to issue the initial hog farm permit to C&H to allow storage and land application of extremely large volumes of waste manure at these permitted locations will ultimately lead to the slow, long term degradation of overall surface water quality in Big Creek and most likely will in the long term, adversely impact both local and regional groundwater supplies in this watershed.

In addition, if ADEQ staff decide to approve the current permit modification request from C&H Hog Farms to expand the number of land application sites and to increase the overall volume of liquid manure waste to be stored onsite and disposed off site, ADEQ by their approval they will have only increased the potential for the continued, ongoing degradation of water quality both locally and regionally as a result of the increase in waste storage and disposal volumes by C&H.

At this point in the C&H Hog Farms permit application review process, ADEQ staff have options. It is hoped the agency will do the right thing and step back from seemingly stumbling blindly along with the current hog farm permit application review process for C&H permit and take the time to evaluate all of the data collected by all of the researchers and scientists, prior to issuing the final permit to C&H.

Hopefully, this approach would allow ADEQ staff conducting the permit review to make a better informed decision regarding whether or not the proposed permit modification application for C&H Hog Farms should be approved and issued by ADEQ. If the data indicates the ongoing farming operation at C&H is already adversely impacting the water quality in Big Creek then, C&H Hog Farms is in violation of the Arkansas Air and Water Pollution Control ACT and there current permit. If this is the case, the proposed permit modification to expand the C&H hog farm operations should, in my opinion be denied by ADEQ.

It is my opinion ADEQ's final decision issue the permit and allow C&H Hog Farms to store and land apply extremely large volumes of waste manure at these permitted locations will ultimately lead to the slow, long term, inevitable degradation of overall water quality of both in surface water and groundwater supplies present locally and regionally within the watershed.

Thank you for your time and consideration in these matters. I await ADEQ's responses to the comments and questions contained in this correspondence. In addition, I also await your responses to the attached Questions and Comments...
concerning C&H's Hog Farms current permit modification application request for No Discharge Permit coverage under Regulation No. 5.

Original Commenter: Gerald Delavan

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. This permitting decision is for an APC&EC Regulation 5 permit application whereas the previous general permit coverage was under APC&EC Regulation 6. The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

The Department considered all relevant scientific data submitted during this permitting process. Although BCRET raw data indicate nitrate averages are higher at the downstream sample location, the 2017 second quarter BCRET report states: “In the Ozark Mountain karst region, nutrient concentrations in streams of the Buffalo, Upper Illinois, and Upper White River Watersheds increase as the percent of land in pasture and urban use increases. Averaged over the last three years, nutrient concentrations in Big Creek above and below the C&H Farm are similar to concentrations found in other watersheds where there is a similar amount of pasture and urban land use.”

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to
water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

In the April 1 to June 30, 2018 Quarterly Report, BCRET presents data that documents a statistically significant increase of nitrate-N in the ephemeral stream (BC4) since 2014. However, BCRET notes that chloride, a conservative tracer, did not show a statistically significant increase. Four years of data also indicate a steady increase of geometric mean nitrate-N within the house well (W1) (BCRET April–June 2018, Figure 24). Increased nitrate-N in both the ephemeral stream and the house well does suggest that these systems may be hydrologically connected to areas where farm activities take place.

BCRET data document that nitrate-N is variable; however, Figure 12 of the April 1 to June 30, 2018 BCRET Quarterly Report demonstrates that nitrate-N is higher downstream (BC7) than upstream (BC6). Chlorides and nitrates follow similar seasonal fluctuations in that they are higher during summer and autumn months when stream discharge is most influenced by groundwater. ADEQ reviewed Jim Petersen’s May 31, 2018 expert report, which presents an analysis of temporal trends among nitrate-N and E. coli from January 2014–December 2017 at BC6 and BC7. Mr. Petersen’s analysis presents decreasing trends of ammonia and chlorides and increasing concentrations of E. coli at BC6. Yet, increasing concentrations of nitrate-N were observed downstream at BC7. The conflicting temporal analysis prompted Mr. Petersen to further review trends upstream to downstream. By analyzing paired concentration data (collected same day) at BC6 and BC7 from January 2014 through December 2017, Mr. Petersen reports significant increases in total nitrogen, ortho-phosphorus, and chlorides, but non-
significant changes in *E. coli* and nitrate-N. The significant increase of nitrate-N in the house well and ephemeral stream does correspond to increases of total nitrogen at BC7. Mr. Petersen’s analysis illustrates the complexities of evaluating water chemistry in karst systems.

**Comment 33:** I assume ADEQ's response to the previous question will be "there is no evidence of any adverse impact from the C&H farming operations, to date". However, has ADEQ reviewed any water quality data or performed any site investigations to determine if this hog farm is having any adverse impact on the environment both "locally and regionally?"

Original Commenter: Gerald Delavan

**Response:** The ADEQ Office of Water Quality Planning Branch routinely collects and evaluates water quality data from approximately 300 stations across the state. The Department is required every two years by 40 CFR 130.7(b)(5) to assess all readily available data for attainment of water quality standards. The EPA did not include Big Creek on the approved 2016 303(d) list.

The Department amends its previous response. ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

**Comment 34:** Does ADEQ staff plan to look at and evaluate existing water quality collected to date by all parties, to evaluate if farming operations at C&H are already having an adverse impact on Big Creek or the surrounding watershed? If no, please explain?

Original Commenter: Gerald Delavan

**Response:** The ADEQ Office of Water Quality Planning Branch routinely collects and evaluates water quality data from approximately 300 stations across
the state. The Department is required every two years by 40 CFR 130.7(b)(5) to assess all readily available data for attainment of water quality standards. The EPA did not include Big Creek on the approved 2016 303(d) list.

Response:  The Department amends its previous response. ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 35: If it is determined by ADEQ staff that there is evidence to support the conclusion C&H farming operations have had already an adverse impact on Big Creek, will ADEQ still approve the current permit application to modify and expand the existing hog farm operation for C&H?

Original Commenter: Gerald Delavan

Response:  The Department considered all relevant scientific data submitted during this permitting process. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

Response:  The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 36: Please respond to the following comments and questions concerning this permit application:
Will a Professional Geologist be included in the permit review process?

Original Commenter: Gerald Delavan

Response:  Professional Geologists were included in this permit review process.
Comment 37: What will be the volume increase for the land application of waste under this new permit?

Original Commenter: Gerald Delavan

Response: There will not be a volume increase for the land application of waste.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 38: Is there any additional soils testing or nutrient loading tests required for the existing or new land application sites? and, If no, please explain why?

Original Commenter: Gerald Delavan

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5.407(C) states that “the soils of each field where liquid animal waste has been land applied shall be sampled and analyzed at least once every five (5) years for the following parameters: pH, Potassium, Phosphorous and Nitrates.”

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 39: Is there any testing and/or monitoring of surface water runoff from the land application sites required in this permit? and, If no, please explain why not?

Original Commenter: Gerald Delavan
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems, which does not require surface monitoring of Waters of the State.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 40: Again, the Applicant is applying for a "No Discharge Permit". Please explain how and why the disposal and application of waste manure to the land surface is not a discharge and is allowed under a "No Discharge Permit".

Original Commenter: Gerald Delavan

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 41: Why does Environmental Assessment submitted for its existing permit by the Applicant fail to mention or even discuss the presence of shallow karst limestone present beneath the farm and the land application sites?

Original Commenter: Gerald Delavan

Response: An Environmental Assessment is not required for the permitting process and was not provided as part of the permitting process. The
Environmental Assessment was prepared by the United States Department of Agriculture Farm Service Agency and the United States Small Business Administration as part of their process in issuing loan guarantees.

**Comment 42:** Why is no additional Environmental Assessment required by ADEQ to determine if the existing, ongoing hog farming operation is having any adverse impact on Big Creek and the watershed?

Original Commenter: Gerald Delavan

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems, which does not require an Environmental Assessment.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

**Comment 43:** Why are monitoring requirements for C&H less stringent under this new permit and Regulation No. 5?

Original Commenter: Gerald Delavan

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The Department is not sure what monitoring requirements the commenter is referring to in the comment.

**Comment 44:** Does this permit increase to volume of waste manure which can be stored in the holding ponds? Does this permit increase to volume of waste manure which can be land applied?

Original Commenter: Gerald Delavan
Response: The volume of waste that can be stored in the waste storage ponds has not increased. There will not be a volume increase for the land application of waste.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 45: Engineering plans were prepared by DeHaan, Grabs & Associates LLC, consulting engineers in accordance with ADEQ rules and regulations… Is this statement correct? In accordance with ADEQ policy, the NOI has been reviewed and has been determined to be complete. Is this statement correct?

Original Commenter: John Murdoch

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

Comment 46: Do the plans provided by the ADEQ online meet the following statements directly below?

“Engineering plans were prepared by DeHaan, Grabs & Associates LLC, consulting engineers in accordance with ADEQ rules and regulations… In accordance with ADEQ policy, the NOI has been reviewed and has been determined to be complete”

Original Commenter: John Murdoch

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.
The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 47: Are the three sets of plans listed above “complete”? (NOI_NMP, As Built and the Major Modification pond liners and cover), pay special attention to the sheets I included below before you answer.

Did someone at ADEQ check over these plans as being complete and sign off on them? If so could you provide this information?

If ADEQ did review the plans and found missing information is that a deficiency? Please answer in complete detail. If one did find there was missing information from Certified Arkansas Professional Engineer Plans, would this allow the permitting to continue without a complete set of plans, or would the permitting process halt until things were corrected? Other words, if ADEQ saw they were missing a card out of the deck would they go ahead and issue the permit or wait until the information was provided?

Original Commenter: John Murdoch

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other
subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 48:** Once a facility is built, does a inspector(s) from ADEQ come out to the site and review the plans and compare to what has been built to the actual design plans and if there are no deficiencies, sign off on it?

Or does one take the site inspection back to the ADEQ panel of various degrees of expertise’s and ask for a letter of consensus so that it has been reviewed by several experts in various fields and then the permit is approved based on a consensus who deemed the As Built as worthy of a permit?

Please explain in detail and provide the form or whatever was used to inspect the facility and say that it meets state and federal requirements.

Original Commenter: John Murdoch

**Response:** It is the responsibility of the permittee’s consultants to certify that the facility was built according to the plans, designs, and specifications, as approved. This certification must be submitted to the Department for review and approval prior to commencing operation.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 49:** There appeared to be an application for a Permit to Construct listed in the NOI_NMP 2012, Is there a “Permit to Construct”? Please answer in detail. Please provide this information if it is available.

Is there a “Construct Authorization Permit” from ADEQ? Please answer in detail. Please provide this information if it is available.

Original Commenter: John Murdoch

**Response:** The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number
ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

Comment 50: Based on Section 1.5 of the CAFO General Permit (ARG590000), 1.5.1.5 Submit an ADEQ Form 1 and plans and specifications that stamped by Professional Engineer in Arkansas for construction of pond(s). Was this done? Please explain in detail. Please provide the documentation.

Original Commenter: John Murdoch

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

Comment 51: Please pay special attention to Section 1.6 HOLDING POND LINER This section appears to cover some important design specifications relating to Clay Liners.

“Liner material shall not contain significant amounts of organic material, frozen material, ice or rocks larger than four inches in diameter and shall not be placed on a frozen surface”.

Based on the photographic logs and comments from the First Compliance Inspection (07/23/2013) and the Second Compliance Inspections (01/23/2014) with notations like “gravel to cobble-sized coarse content within the liner clay” and “large rocks in liner” combined with “rocks larger than four inches in diameter.

Do the two Clay Liners meet the Design Specifications stated in the NOI_NMP2012 Section 1.6? This is extremely important to my understanding, so please answer in detail, this is relevant to the original permit and subsequent Major Modification of the permit to allow synthetic liners that may some day cover those Cobble-Sized Rocks, as well as the future Compliance Inspections integrity to the public.

Original Commenter: John Murdoch
Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The record included one recompacted permeability test that is insufficient to determine liner integrity in accordance with AWMFH 651, Table 10-4, and Appendix 10D.

Comment 52: I want go into the written exchange between the Compliance Inspectors report, response by C&H Hog Farms and what they said they did to address some of the deficiencies for Pond 2. I do think it is worth reading and see that some of the deficiencies appear have not been addressed and others appear to still exist. Is this “self-regulation” at work?

The main thing I feel is very important is that original Clay Liner appears to have tomahawk size limestone rocks in them. Do the Clay Liners meet the wording in the NOI_NMP 2012 and the state requirements? I realize this may be a re-run question but it is important and deserves and answering. Thanks for your patience.

Original Commenter: John Murdoch

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior
APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The record included one recompacted permeability test that is insufficient to determine liner integrity in accordance with AWMFH 651, Table 10-4, and Appendix 10D.

**Comment 53:** Please compare the “As Built” Plan (State of Arkansas Certified 04//12/2013) Plan sheets 7 & 10 to the (State of Arkansas Certified 08/04/2016) “Surveyed Boring Location”. I combined the two images, rotating the “As Built” Plans to align approximately as to compare. I realize there is a difference in scale and I can not tell you exactly where the boring (or Borehole) is located on those drawing, but feel they are clearly lower elevation than the elevation of the “Boring Location” as stated.

What is the actual surface elevation (ground elevation or the top of the Borehole where Harbor Drilling Study recorded in detail their locations directly below that Lat/Lon/Elevation? Harbor reported their findings (field notes and final report) in Below Ground Surface (BGS) in feet.

Are both of these State of Arkansas Certified documents correct concerning the surface elevation for the boring (borehole). Other words the elevation in feet directly on top of the borehole? What is the Lat/Lon and Elevation of that particular spot on earth? Is it the same as the As Built map contours indicate?

If not please answer in detail. I feel this is very important and relevant as I stated earlier. There have been numerous Surface (or Ground level) as well as Below Ground Surface documenting things like the first NOI_NMP Borings and Benchmarks, Trench Interceptors, Well depths, ERI land and lagoon survey transects. Please clarify.

Original Commenter: John Murdoch
Response: The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

Response: The Department amends its previous response. The Department acknowledges the discrepancy between the surface elevations reported by DeHaan, Grabs & Associates, LLC, and Johnny R. Tweedle.

Comment 54: In closing I want to go on record that this facility should have never been permitted for many reasons, Incompleteness sums it up, also close proximity to fragile areas, below the farm as well as the waste spreading fields, the people and nature. Health risk like exhaust fans only yards from residents and a school, etc, water quality degradation for sure.

Original Commenter: John Murdoch

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e., karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground
penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

Comment 55: As a geologist, I want to go on record as stating there is a very important subsurface component to the movement of water and nutrients below the farm lagoons as well as the waste spreading fields, in general that region. The surface and subsurface area is fragile in many places. If you don’t like the words epikarst or karst, call it white rock or whatever. The area over there is blessed with a fairly large supply of good water historically that is a true resource to all that live there. It should be protected by all including ADEQ to insure its future. Groundwater exists and it goes places not always seen from the surface. Water provides a resource, but it is also located in broad fragile area that needs protection or that resource will be lost. There are many caves, springs and some sink holes in the twin Big Creek Valley and beyond. I will leave the geology and hydrology to the experts; I am only speaking from what I have witnessed over there.
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 56: ADEQ did you take the endangered species into account? After all the lagoons are still permitted to leak and there is a Gray Bat maternity cave near the mouth of Big Creek on the Buffalo River. There are Indiana Bats on Left Fork Big Creek and scattered throughout the area. The cave above is a Gray Bat maternity colony site and a positive dye trace to the spreading fields of C&H Hog Farm. (Brahana Dye Study 2014).

Original Commenter: Carol Bitting

Response: The Department emailed public notice of the draft permit to the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, and the Department of Arkansas Heritage for review and comments. During the comment
period, no concerns were raised in regard to Endangered and Threatened Species from the agencies with the jurisdiction over these matters.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504(a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

**Comment 57:** Note the Regulation 5 permit plan and review dated September 1, 2015, by engineers. In a karst environment many things can happen. Did you check the pits below the pigs for leakage? Is there any way to determine if the concrete lined pits are leaking? Can you please list all other ADEQ employees and their qualifications whom reviewed this permit? It appears very minimal for Regulation 5 in karst geology.

Original Commenter: Carol Bitting

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

The preparation and technical review of this permit application were conducted by the Office of Water Quality staff with support from other resources within ADEQ including the Office of Law and Policy and the Office of Land Resources. The review team was led by Dr. Robert Blanz, Ph.D., P.E., Chief Technical Officer for ADEQ.

Comment 58: Page 5, Operation and Maintenance, Land Management, Spreader Calibration , Soil & Swine Fertilizer Sampling the word fertilizer has been substituted for manure or waste application. This is a waste application permit, not a fertilizer permit. Hog manure from a concentrated animal operation is waste management.

Regulation 5.201 defines the “Waste Management Plan means a plan prepared by the United States Department of Agriculture Natural Resource Conservation Service (NRCS), an Arkansas Natural Resources Commission water quality technician, the University of Arkansas Cooperative Extension Service, or a professional engineer registered in the state of Arkansas detailing the management and disposal of liquid wastes generated in a confined animal operation.”

Why have you changed the wording to fertilizer? it is liquid animal waste, so operation and maintenance section is unacceptable and the permit should be denied. The operator cannot manage proper calculations of waste when the Nutrient Management Plan has been altered beyond acceptable definition. There are up to 6500 hogs living within the confines of 2 buildings. This is waste management. Reg. 5.301 states, No confined animal operation using a liquid animal waste disposal system shall be constructed or operated unless the owner
has first obtained a permit from the Department. Please explain to the operator the
difference in fertilizer and waste management and the health conditions related to
waste verses fertilizer. This facility and spreading fields are rock throwing
distance to a community and school.

Original Commenter: Carol Bitting

Response: The Department did not change the wording to fertilizer. However,
fertilizer is a commonly acceptable term for animal waste. The NMP initially
submitted for this permit application was developed by ANRC. APC&EC
Regulation 5.406(E) states that “application of waste/wastewater shall not be
made within 50 feet of property lines or 500 feet of neighboring occupied
buildings existing as of the date of the permit.” These buffers can be waived by
the adjoining property owners.

The Department made this permitting decision in accordance with state laws and
APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon
consideration of the completed permit application, the public comments on the
record, and additional data and information submitted during the permitting
process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration
of the submitted permit application, the public comments on the record, and other
subsequently available and relevant data and information, the Department denies
issuance of the permit.

The Department received a comment from the Arkansas Department of Health
regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that
stated, “Permit requirements for best management practices and stream buffer
zones should be strictly adhered to during the land application of swine wastes to
prevent water-borne pathogens from leaving the sites.”

Comment 59: NMP Section 1, page 5; Soil & Swine Fertilizer Sampling Soil samples are to be
taken once every five years or when the nutrient management plan is revised.
Dated 3/2/2016 by Monica Hancock and signed by engineers Pat Bass and Dennis
Carmen.

Soil samples once every 5 years for a permit in the watershed of an ORW? C&H
ARG590001 is required to sample yearly, these samples are not available and
many of the fields are dated 2014. These are outdated for an NPDES permit and a
large CAFO in the Buffalo River watershed and outdated for a Nutrient
Management Plan dated 2016. Will you continue to permit a large cafo that is
already out of NMP compliance with their permit? Again this appears C&H has
been allowed a modification not a new permit and the oversight of the industrial hog factory is to lax.

In an inspection by Jason Bolenbaugh dated 1/23/2014, owner, Jason Henson is reminded soil samples for Nitrate-N and Phosphorus shall be taken no less than annually.

Original Commenter: Carol Bitting

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. During the development of the NMP, the plan writer used the most recent soil analyses at the time. APC&EC Regulation 5 states that “the soils of each field where liquid animal waste has been land applied shall be sampled and analyzed at least once every five (5) years for the following parameters: pH, Potassium, Phosphorus and Nitrates.” Therefore, the statement in the NMP complies with APC&EC Regulation 5.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5.407 sets forth monitoring frequencies for land application of waste and for soils of each field where liquid animal waste has been applied.

Comment 60: Section 651.0201(d) of the AWMFH states: “If wastes are applied to agricultural fields, the application must be planned so that the available nutrients do not exceed the plant’s need or contain other constituents in amounts that would be toxic to plant growth.”
It is apparent there is a problem when you look at the 2016 Annual Report and you see that 15 of the 17 C&H soil samples are above optimum and the waste is still being spread on them. This is a violation of the Regulation 6 NPDES permit.


Below are excerpts from the NMP prepared by Monica Hancock for the Regulation 5 permit.

NMP dated 3/2/2016 by Monica Hancock Section 1;
Soil and Swine Fertilizer Sampling states, “Soils samples are to be taken once every 5 years or “when the nutrient management plan is revised.”
Looking through the soil samples I see outdated soil samples such as Field JH 1, JH 4 JH 2, FD11, CC 13, CC13A, CC13B, C1C15B, BH16, is dated 12/04/2015 and above optimum for P & K
Field CC 3, EGC7, CH35, CC8, CC8A, CC9, CC9A, FD10, BC10A, RF 12, CC 14, C1C15, JC 17, GN23, HC32, HC33, RC34 is dated 12/04/2015 and above optimum for P
Field GR 5, RC20, EGC7A is dated 04/01/2014 and above optimum for P (definitely outdated)
Field SR 6, GR 6A is dated 04/01/2014 and above optimum for P & K (definitely outdated)
Field CH36, dated 12/04/2015; above optimum for K
Field C1C15A, MB1B, MB19, RC21, RC21A, RC21B, KC22, DH24, is dated 04/01/2014 (outdated)

Original Commenter: Carol Bitting

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

APC&EC Regulation 5.402 incorporates both the AWMFH and NRCS Field Office Technical Guides. The AWMFH Part 651.0106(i) lists applicable NRCS Conservation Practice Standards, which includes NRCS Conservation Practice Standard Nutrient Management Code 590 for nutrient management. NRCS Conservation Practice Standard Nutrient Management Code 590 for the State of Arkansas allows for land application based on the API, which does not limit land application of phosphorus to agronomic need.
The API is used to develop loading rates for land application based on phosphorus. There are many factors taken into account to determine whether land application on a specific field is allowable. While the soil test phosphorus, referred to as “above optimum” by the commenter is one of those factors, it is not the determining factor. A field with high soil test phosphorus may still be appropriate for land application. The Department only permits land application when the API value is a low or medium class.

**Response:** The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA1029⁸, “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA9516⁹ states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

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⁹ [https://www.uaex.edu/publications/PDF/FSA-9516.pdf](https://www.uaex.edu/publications/PDF/FSA-9516.pdf)

Original Commenter: Carol Bitting

Response: The commenter is referencing the prior APC&EC Regulation 6 NMP. As part of the permitting process for the APC&EC Regulation 5 Permit, a new NMP was developed and submitted. During the development of the NMP, the plan writer used the most recent soil analyses at the time. APC&EC Regulation 5 states that “the soils of each field where liquid animal waste has been land applied shall be sampled and analyzed at least once every five (5) years for the following parameters: pH, Potassium, Phosphorus and Nitrates.”

Response: The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 62: A Regulation 5 permit is a non point source permit. EPA definition, “Non point source pollution generally results from land runoff, precipitation, atmospheric deposition, drainage, seepage or hydrologic modification. Non point source (NPS) pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters and ground waters. How can ADEQ even consider allowing this when downstream impairment exist?

I am not stating I am in agreement with either permit, I am not. This is the wrong place for an industrial operation of hogs and this factory should be denied any permit in the Buffalo River watershed. Unless this is done the continued trespassing on the community and the nation will continue.

According to the EPA under definition of non point source it says, States report that nonpoint source pollution is the leading remaining cause of water quality problems. The effects of non point source pollutants on specific waters vary and may not always be fully assessed. However, we know that these pollutants have harmful effects on drinking water supplies, recreation, fisheries and wildlife.”
The term “non point source" is defined to mean any source of water pollution that does not meet the legal definition of "point source" in section 502(14) of the Clean Water Act. That definition states:

The term "point source" means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged.

40 CFR 122.23 Discharge of a pollutant means: a) Any addition of any “pollutant” or combination of pollutants to “waters of the United States” from any “point source,” …

C&H discharges waste to a pipe, where the flow creates a surface water of over 1 acre called lagoons or ponds, these lagoons collect rainwater as well as piped hog waste from the barns, they then use a pipe to remove this waste to a tank truck where it is then spread via pipes over sink holes and thin sandy gravelly soils, with discrete fissures to waters of the state. There is no natural animal to ground transport of the waste, all the waste is manipulated from the time it leaves the animal body. See Waste Management Plan requirements https://www.adec.state.ar.us/water/permits/nodischarge/individual.aspx

The terms of point source includes every means that C&H uses to get the waste out of its lagoons and transferred to fields and by discrete fissures to the waters of the state. In a karst environment unless you do a full ERI study of all application fields and rule out the presence of discrete fissures you must presume they are there.

In this email below the AHD and ADEQ know..."the system flushes well after a rainfall”. Is this the reason for throwing out the storm flow data?

Original Commenter: Carol Bitting

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Section 502(14) of the Clean Water Act states that “[t]he term "point source" means any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged.” (emphasis added) The piping of waste from barns to waste storage structures and the piping of waste from waste storage structures to land application equipment is not a discharge.
Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 63: In May of 2012 C&H applied for a General Permit, this general permit did not include public notification requirements that the Regulation 5 individual permit did at that time. May 10, 2012 Mr. Jason Sutherland of Forman, Ar #3604-WG-AG-2 was told ADEQ would no longer reissue the General Permit and he was required to get an individual permit. This information is on the ADEQ website. On the ADEQ site the specific instructions still do not require state general permits to undergo the same notifications as a Regulation 5 permit. Public notification and interagency communications would have saved the C & H Hog Farm owners, the state and all stakeholders many millions of dollars. This permit should be denied as the public was unable to participate in the permit at that time and it appears to be treated as a modification not a new permit at this time.

Original Commenter: Carol Bitting

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for
public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

The State General Permit for Confined Animal Feeding Operations, Permit No. 0000-WG-AW was not reissued in 2008 and is related to neither the APC&EC Regulation 6 general permit nor individual APC&EC Regulation 5 permits.

**Response:** The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 64:** Reg. 5.102 ’s purpose is to establish the minimum qualifications, standards and procedures for issuance of permits for **confined animal operations** using liquid animal waste management systems within the state and for the issuance of permits for land application sites within the state. By definition from Reg 5 C&H Hog Farm is a CAFO. A CAFO requires an NPDES permit because it is a point source pollution.

40 CFR 122.23
(a) Concentrated animal feeding operations (CAFOs), as defined in paragraph (b) of this section or designated in accordance with paragraph (c) of this section, are point sources, subject to NPDES permitting requirements as provided in this section. Once an animal feeding operation is defined as a CAFO for at least one type of animal, the NPDES requirements for CAFOs apply with respect to all animals in confinement at the operation and all manure, litter, and process wastewater generated by those animals or the production of those animals, regardless of the type of animal.

Original Commenter: Carol Bitting

**Response:** APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system. Conditions for land application are prescribed by APC&EC Regulation 5.406. These land application requirements are necessary for compliance with APC&EC Regulation 5.102 and 5.303.
APC&EC Regulation 5.201 states, “Confined Animal Operation means any lot or facility where livestock, fowl, or other animals have been, are or will be stabled or confined and fed or maintained and where crops, vegetation, forage growth or post-harvest residues are not sustained in the normal growing season over significant portions of the lot or facility.” This facility meets the definition listed within the regulation.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:**  The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 65:** Could you please tell me where fields 25 thru 31 are? and or explain the skip in numbering?

Original Commenter: Carol Bitting

**Response:**  The NMP initially submitted for this permit application was developed by ANRC, not the Department. Fields are not required to be numbered sequentially.

**Comment 66:** #10 (A) Are all these facilities located at these coordinates Latitude 35°55’30.47”N Longitude 93°4’18.42”W?

Original Commenter: Carol Bitting

**Response:**  The facility is located at the referenced coordinates, and the land application sites are located in Newton County.

**Comment 67:** #11 This is a no discharge permit….there is no discharge not even a 25 year 24 hour storm event, neither can there be any pollution from application fields. ADEQ considers runoff from application fields as pollution. See full answers under ADEQ’s Permit Fees_Economic_Impact_Environmental_Benefit_Analysis.pdf  Below is an excerpt:

4. What risks are addressed by the proposal and to what extent are the risks anticipated to be reduced?
NPDES permitting for CAFOs will require the CAFOs to implement waste management practices that reduce the amount of pollutants that may enter waters of the State from waste storage and land application.

Original Commenter: Carol Bitting

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies on Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 68: Regulation 2.201 states: Existing in stream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected. I have seen no data verifying this is being maintained on the contrary the opposite appears true. Can you please verify this regulation is upheld.

Original Commenter: Carol Bitting

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the Buffalo River Watershed and to protect the vitality of the Buffalo National River as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018. Watershed management plans are recognized by EPA as comparable, state-led management approaches expected to result in the attainment of water-quality standards.

Comment 69: There is no consideration for the tourist whom are seen wandering the National Forest sightseeing or hiking. Nor economic considerations for the many whom make a living from rental property.

Original Commenter: Carol Bitting

Response: Consideration of tourism and revenue is not within the Department’s regulatory authority.

Comment 70: Omitted under part 3 Technical Requirements

3.a,
* each field should have distance to stream and highways, each stream should be named and marked for easy reference to the waterways
* A permit with this liability should have a topo map that is readable

Original Commenter: Carol Bitting

Response: A topographic map and county road map are included within the NMP in addition to aerial maps showing the approximate setbacks and soil boundaries. The Department reviews the location of streams to verify that setbacks are correctly applied on the submitted maps. The Department also
requested, and the applicant submitted, an additional table that includes the nearest waterbodies and distances to land application sites.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 71:** I could find no water quality TMDL’s for Big Creek or water quality data referenced for permitting of large cafo in already impaired stream (Big Creek) as per documents from list in the public comments for the 303 (d) listing. These agencies including NPS, USGS, and BCRET data show Big Creek to be impaired. Regulation 2.201 states Existing in stream water uses and the level of water quality necessary to protect the existing uses shall be maintained. Regulation 2.30 states….any stream with watersheds of greater than 10 mile square are designated full body contact. Reg 2.301 states….the criteria to protect the most sensitive use shall be maintained. Reg 2.304 ….the department may require an evaluation of all practicable alternatives to the project including; an environmental assessment of the impacts of each alternative, an engineering and economic analysis and a socio-economic evaluation of the project in the local area. Dr. Sharpely’s study may not be completed until 2019 but that doesn’t have anything to do with Regulations and the permitting of C & H Hog Farms. Dr Sharpely’s BCRET study has already shown increased e coli and nitrates since the permitting of C&H. The trends have already been done by ADEQ.

Original Commenter: Carol Bitting

**Response:** The commenter is incorrect regarding the listing status of Big Creek. The EPA did not include Big Creek on the approved 2016 303(d) list. There are no in-stream alterations requested in this permit application. Therefore, APC&EC Regulation 2.304 does not apply.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo
National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the Buffalo River Watershed and to protect the vitality of the Buffalo National River as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018. Watershed management plans are recognized by EPA as comparable, state-led management approaches expected to result in the attainment of water-quality standards.

There are no in-stream alterations requested in this permit application. Therefore, APC&EC Regulation 2.304 does not apply.

**Comment 72:** In accordance with APC&EC Regulation 8.204 (B) all applicants for the issuance (new, Modification, and renewal or transfer of any permit under the environmental law of Arkansas shall submit a “Disclosure Statement” to the Department. This one is blank and due to a new permit and the risk involved why isn’t this section completed? There were millions of dollars borrowed against the facility in 2012 see Farm Service Agency and Small Business Association documents. There may be other debts accumulated over the last few years. One stipulation is the full name and business address of any legal entity in which the applicant holds a debt or equity interest of at least 5% or that is a parent company or subsidiary of the applicant and a description of the ongoing organizational relationships as they may impact operations within the state; https://www.adeq.state.ar.us/ADEQ_Disclosure_Statement.pdf

Original Commenter: Carol Bitting

**Response:** In accordance with the Disclosure Statement instructions, entities that have previously submitted Disclosure Statements to the Department are required to fill out items 1 through 5 and 18 of the Disclosure Statement Form. The applicant has submitted a complete Disclosure Statement in regard to this permit application. The applicant has submitted a Disclosure Statement with previous applications.

**Comment 73:** Did you know in 2008 there were two Segments of the Buffalo River impaired for water quality? ADEQ is using the 2008 data and these segments are downstream
of C&H 21 miles by river and 18 miles by air. This segment is shown here in these 2016 photos as impaired.

Original Commenter: Carol Bitting

Response: The EPA did not include the Buffalo National River on the approved 2016 303(d) list.

Response: The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 74: In the inpress, 2017 USGS Scientific Investigation report “Utilizing Fluorescent Dyes to Identify Meaningful Water-Quality Sampling Locations and Enhance Understanding of Groundwater Flow Near a Hog CAFO on Mantled Karst—Buffalo National River, Southern Ozarks Dr. Brahana states, “One positive trace to Mitch Hill Spring on the opposite side of the Buffalo River from injection reflected how complex the karst flow system is and how far flow from the study area could be measured. “

Here a map showing injection at BS36 and dots at positive dye receptors within the Buffalo National River. The spreading fields surrounding this injection are the most heavily spread. The red line indicates 11.4 approximate miles to Woolum from injection. I have only noted 4 receptors and of these, 3 are springs. From Woolum (green dot at end of red line) to Tyler Bend Campground is less than 9 miles. It would be easy to visualize the fast transport of swine waste downstream and through underground conduits, settling in the deeper pools downstream as the finer particles are absorbed by the rocks and soils creating breeding grounds for pathogens, over loading of nutrients and algae blooms such as last summer.

Original Commenter: Carol Bitting
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit. The permit application does not contain a groundwater flow direction study as recommended by AWMFH Chapter 7. The Department has determined that a groundwater flow direction study is necessary due to the specific siting of this facility.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 75: 303(d) water body – Under section 303(d) of the 1972 Clean Water Act, states, territories, and authorized tribes are required to develop lists of impaired waters.
These impaired waters do not meet water quality standards that states, territories, and authorized tribes have set for them. The law requires that these jurisdictions establish priority rankings for waters on the lists and develop TMDLs for these waters.

Specifically stated in Regulation 2.203; Outstanding Resource Waters, Where high quality waters constitute an outstanding state or national resources, such as those waters designated as extraordinary resource waters, ecologically sensitive or natural and scenic waterways, those uses and water quality for which the outstanding waterbody was designated shall be protected by (1) water quality controls, (2) maintenance of natural flow regime, (3) protection of in stream habitat, and (4) encouragement of land management practices protective of the watershed.

Original Commenter: Carol Bitting

Response: The EPA did not include Big Creek on the approved 2016 303(d) list. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 76: The stream to the right is below C&H Hog Farm. It is below a plugged well that at one time was Mt. Judea’s water supply until it was contaminated after dead hogs were thrown into a sink hole upstream. (prior dating to C&H) Big Creek goes dry and resurges just upstream of this photo. Above this area the closest spreading field is 6270 feet by Big Creek stream.

In 2014 Dr. Van Brahana put dye into a well (map below). The well is approximately 1,600’ from C&H Hog Barns and approximately 1,600’ from the spring it emerged in 31 hours later in Big Creek. The emergence of the dye was visually apparent under the ledge in the stream (see photo). 1,200’ downstream of
the spring is a deep pool and 1,200’ further is another on Big Creek and both used for swimming.

Big Creek is considered a primary contact stream and flows into the campground at Carver on the Buffalo River. E coli monitoring results show Big Creek as impaired…

see C & H All data in the 2016 303 (d) impaired waters comments on the ADEQ website. See 2013 Arkansas Department of Health concern for … pathogens such as e coli and cryptosporidium from the proposed land application sites…..


Original Commenter: Carol Bitting

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits. The EPA did not include Big Creek on the approved 2016 303(d) list.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at
all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 77: If C&H is given a Regulation 5 permit, a non point source permit, then according to the definition of non point source and the pollution increased risk of non point source and a karst topographical setting, along an Outstanding Resource Waterway and the first National River the potential for poor water quality will continue escalating.

In a recent interview of Dr. Andrew Sharpely, University of Arkansas states, “you cannot expect cheap food and clean water at the same time” https://youtu.be/0lvkRwXpZYY

The Buffalo National River is downstream of Dr. Sharpely’s, University of Arkansas, Division of Agriculture’s study of C&H Hog Farm in Big Creek.

To my knowledge the owners were not aware of the fragile ecosystem in which they have been raised and lived. They understand the beauty, the hunting, the easy availability to all the scenic sports they enjoy and wanted to work in their community, but they may not have had an idea of the impact they created or will continue creating without Dr Sharpely, ADEQ, Pork Producers & Farm Bureau showing them the facts. They have put their trust in these agencies and these agencies are at fault for allowing the continued degradation of the waters and the community by continuing to support the wrongful permitting of this cafo and not informing the owners and the community of the science that supports these statements of degradation.

One person in tourism told me if we don’t talk about it people won’t know. Does this mean if we ignore it, it will go away? I doubt it and I found the comment an insult to those whom I know that work so hard to keep this part of Arkansas for the enjoyment of all. I want people to come back or share a wonderful view of our beloved state and its people. We are the host to an industry that we the people of these counties along the Buffalo River have developed. We are responsible for the needs of the million plus visitors and the sensitive Buffalo River. It is our responsibility as residents to protect her having survived and built our own successful business’ with her influence. This market is open to everyone with initiative in the 5 counties that line her borders and we are the largest stakeholders. C & H and all stakeholders have shown that an industry such as the hog CAFO industry isn’t sustainable in this area. It is time to make decisions based on all facts.
The federal and state agencies have increased the wages of hundreds of county residents over the years and contributed to many added incomes and retirements. Those who live here sacrifice to live here. We treasure our solitude, the scenic beauty and we at times enjoy the simplest lives because we can. We are blessed and at this time we are battling our state and industry for what we know is the livelihood of millions of people and the future of a river. I can’t even imagine how many jobs or recreational values will be lost when the Buffalo River is no longer a river that is treasured for what Congress designated. I can’t imagine that the algae experienced last summer will choke the life out of all her miles. But I know that if the cafo’s of this state continue to haul their waste to the poor, rocky, hillsides and continue to force chicken and hog waste down her throat, she will suffocate and all the while ADEQ refuses to admit wrong doing ignoring the very value they represent as taken from their website “The Arkansas Department of Environmental Quality (ADEQ) is the state's main environmental protection agency, charged with protecting, enhancing, and restoring the environment for Arkansans.”

Original Commenter: Carol Bitting

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Consideration of tourism and revenue are not within the Department’s regulatory authority.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not
prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 78: I am using excerpts from my comment in the 2016 303 (d) impaired waters listing to be reviewed along with the C&H 5264-W Regulation 5 permit. This large swine CAFO has added degradation to the streams surrounding it’s spreading fields, including the photo above which is on Left Fork Big Creek near a spring that resurges and positive dye trace from a well near the C&H highly used spreading fields on Big Creek.

It appears ADEQ has lost sight of its goal to “Protect, Enhance and Restore the Natural Environment for the well being of all Arkansans”. Over the years ADEQ has seen a departure of conscientious employees qualified to understand the duty the agency has to the citizens of Arkansas. Many people like myself were under the impression ADEQ was watching out for the environmental well being of our state. The nonchalant permitting of a large swine CAFO in the watershed of America’s First National River, an Outstanding National Resource Water has placed tremendous burdens upon our state.

There are 3 streams the National Park Service has asked to be included and I recommend they be included. All three streams are greater than 10 square miles therefore are categorized as primary contact water within the Buffalo River Watershed. These streams are Mill Creek of Newton County, Big Creek of Newton County and Bear Creek of Searcy County. This region is within ADEQ’s Integrated Water Quality Monitoring Assessment Report Section 305 (b) and 303 (d) of the Federal Pollution Control Act submitted biennial.

Page 373 states; In cooperation with the US Parks Service, approximately 60 monitoring stations on the Buffalo River, its tributaries, and watershed springs are routinely monitored. Page 31 states: Extraordinary Resource Waters (ERW) This beneficial use is a combination of the chemical, physical, and biological characteristics of a waterbody and its watershed which is characterized by scenic beauty, aesthetics, scientific values, broad scope recreation potential, and intangible social values.
Unless the watershed is included the Buffalo River cannot maintain Extraordinary Resource Waters (ERW), Ecologically Sensitive Waterbody (ESW) or Natural and Scenic Waterway (NSW) status.

Original Commenter: Carol Bitting

Response: While the definition of ERW is inclusive, all tributaries are not listed as ERWs in Appendix D of APC&EC Regulation 2. The Department relies upon the streams designated as ERWs within Appendix D of APC&EC Regulation 2 in making permitting decisions.

The EPA did not include Big Creek or the Buffalo National River on the approved 2016 303(d) list.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 79: I begin with Big Creek, Newton County due to ADEQ’s permitting of an NPDES large swine CAFO on an already at capacity stream without use of documentation or historical stream data information. In other words you did not utilize your own research and data prior to the permitting of a General Permit. Below Regulation 2.304 states you must provide documentation that there will be no degradation to the Extraordinary Resource Water, Ecologically Sensitive Waterbodies or the Natural and Scenic Waterways. The NPS and USGS data report there has been degradation therefore you are in violation of state regulations and you have not
provided proof that the permitted facility is not degrading the water of the tributary and the river.

Algae growth in Big Creek has continued to rise over the last few years with the increased application of millions of gallons of untreated waste. This waste is spread throughout the year even when there are no plants to uptake the nutrients. The lower 2 miles of Big Creek are within the boundaries of the National Park. The above photo of the stream choked with algae is 6 miles upstream Big Creek. Big Creek is impaired for dissolved oxygen according to USGS & NPS data, data you have been accepting since the 1970s.

According to Reg 2.30 (below) these streams are full body contact streams and therefore when sampling bacterial data from these streams during May 1-Sep 30 a geometric mean of 126 colonies per 100 ml is the standard.

These streams are within the watershed of the Buffalo National River and must be maintained as Reg 2.01 states to prevent the degradation of the Buffalo River.

Reg. 2.01 states; Existing in-stream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.

Reg 2.203 states; Where high quality waters constitute an outstanding state or national resource, such as those waters designated as Extraordinary Resource Waters, Ecologically Sensitive Waterbodies or Natural and Scenic Waterways, those uses and water quality for which the outstanding waterbody was designated shall be protected by (1) water quality controls, (2) maintenance of natural flow regime, (3) protection of in-stream habitat, and (4) encouragement of land management practices protective of the watershed.

Reg 2.30 (d) states; Primary Contact Recreation - This beneficial use designates waters where full body contact is involved. Any stream with watersheds of greater than 10 mile square are designated for full body contact.

Reg 2.301 states; Substantially all the waters of the State have been designated for specific uses as shown in Appendix A. In those instances where waters are classified for multiple uses and different criteria are specified for each use, the criteria to protect the most sensitive use shall be applicable.

Below is a regulation that states you must provide documentation that there will be no degradation to the ERW, ESW or the NSW.

Reg 2.304 states; Significant physical alterations of the habitat within Extraordinary Resource Waters, Ecologically Sensitive Waterbodies or Natural and Scenic Waterways are not allowed. In other waters, where significant
physical alterations of the habitat are proposed, the Department must be assured that **no significant degradation of any existing use or water quality necessary to protect that use will occur**. In order to make such determinations, the Department may require an evaluation of all practicable alternatives to the project including: an environmental assessment of the impacts of each alternative, an engineering and economic analysis, and a socioeconomic evaluation of the project in the local area.

Original Commenter: Carol Bitting

**Response:** This permit is not an NPDES Individual or General Permit. The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

The commenter is also misapplying the APC&EC regulations; APC&EC Regulation 2.302(D) is in place to define designated uses for the State of Arkansas. The commenter incorrectly identifies a geometric mean of 126 colonies/100mL as applicable to Big Creek; the applicable criteria for Big Creek is 410 colonies/100mL, as it is not an ERW. APC&EC Regulation 2.304 applies to in-stream alterations, such as dams, bridges, etc. Therefore, APC&EC Regulation 2.304 does not apply.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the
Buffalo River Watershed and to protect the vitality of the Buffalo National River as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018. Watershed management plans are recognized by EPA as comparable, state-led management approaches expected to result in the attainment of water-quality standards.

There are no in-stream alterations requested in this permit application. Therefore, APC&EC Regulation 2.304 does not apply.

ADEQ is working to support a collaborative study with the Arkansas Game and Fish Commission, US Geological Survey, and the National Park Service focused on the distribution and causation of the rapid expansion of filamentous algae in the Buffalo River.

**Comment 80:** ADEQ is empowered to enforce and administer all laws and regulations relating to pollution of the waters of the state and the Commission is authorized to promulgate rules and regulations relating to pollution of waters of the state. Ark. Code Ann. § 8-4-201. Because “waters of the state” include “…all bodies or accumulations of water, surface and underground…,” the Commission is authorized under state law to develop standards for the protection of groundwater.

Please add Mill Creek, Bear Creek and Big Creek to the 303 (d) impaired waters list. It is visibly and data apparent these tributaries are impaired due to some type of pollution within the watershed. The source of the impaired criteria does not come from the Buffalo River itself but from the tributaries that are the sources of the waters of the river.

It is very important when visiting an ERW with your children or immune compromised individual that people are aware when the water quality has degraded and harmful bacteria can enter the body causing kidney failure in young children or bacterial infections on the skin. Children love to splash and play in the water and they should not have to worry about raw sewage. They deserve the protection, the enhancement and the restoration of their environment.

I look forward to watching Arkansas become a leader in Environmental Quality. Not just a rubber stamped leader, but a real quality leader.

Original Commenter: Carol Bitting
**Response:** The development of the 303(d) listing and the development of APC&EC regulations are outside the scope of this permitting decision.

**Response:** The Department amends its previous response. ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

**Comment 81:** We believe that the Regulation 6 permit previously granted to C&H Farms was wrong, because the public was not properly notified and allowed a comment period before issuance of the permit. We thank the Department for a chance to comment on the proposed Regulation 5 permit. We are unalterably opposed to the permitting of C&H farms for the reasons cited below.

Summarized Commenters: Virginia Booth, Debbie Alexy, Bob Allen, and The Sierra Club

**Response:** The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

**Comment 82:** It is reasonable to expect that the farm and spray fields where the feces and urine are spread are underlain by Karst, as the Boone Formation dominates the watershed of the Buffalo National River. This risks polluting an Extraordinary Resource Water and a wilderness area through which it flows.

The Karst topography has already been shown to exit near the farm and spray fields because of the presence of springs, intermittent creeks, and caves. This porosity has been confirmed by dye-tracing studies nearby and by one Electrical Resistivity Imaging (ERI) study near the holding ponds. The dye testing has revealed some movement of waste effluent into the Karst geology surrounding C&H, which could devastate Buffalo River wildlife should a new permit be issued. The dye tracing studies, and the decision to conduct only one ERI study, show a disregard for the real risks to subsurface water movement and migration of nutrient and bacterial pollution to the Buffalo National River and its tributaries.
Original Commenter: Bob Allen for the Sierra Club

Response: APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes, rock outcrops, springs, and intermittent creeks are required by regulation and are included in all APC&EC Regulation 5 permits.

The Department emailed public notice of the draft permit to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, the Department of Arkansas Heritage, and the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health or Endangered and Threatened Species from the agencies with the jurisdiction over these matters.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land
application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504(a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 83: Pollutants could already be leaking into the subsurface strata and hence to the BNR but no testing of the river itself is being conducted by this agency to ensure the public's safety.

Summarized Commenter: Bob Allen and The Sierra Club

Response: Testing of the Buffalo National River is conducted by the National Park Service.

The ADEQ Office of Water Quality Planning Branch routinely collects and evaluates water quality data from approximately 300 stations across the state. The Department is required every two years by 40 CFR 130.7(b)(5) to assess all readily available data for attainment of water quality standards.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

Response: The Department amends its previous response. ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 84: Transportation of the liquid wastes by tanker truck to the newly added spray fields over steep mountain roads constitutes an unreasonable additional risk of pollution of the BNR and its tributaries.

Original Commenter: Bob Allen and The Sierra Club
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Transportation of liquid animal waste via tanker truck is an acceptable method of waste transport.

Comment 85: ACC and Sierra Club members have enjoyed and continue to enjoy all aspects of the Buffalo National River and its watershed. We paddle the river, camp the gravel bars, fish the pools, and hike the trails every month of the year in every conceivable weather condition. Rain or shine, high flow or low, we are there. We enjoy direct contact with the river, tributaries, and springs.

The Buffalo River Enabling Act, Public Law 92-237, § 1, 86 Stat. 44, 44 (1972) declares that the river shall be preserved "for the benefit and enjoyment of present and future generations." This means that Congress has declared that the Buffalo is held in a public trust so that future users, including future Arkansas Sierra Club members, can access the Buffalo in the same condition as it was back in 1972. C&H has not explained to this agency in its permit application how its operations will not harm or impact future generations' ability to enjoy the Buffalo in its 1972 condition. It also has not explained how land applying the liquid waste will not harm future individuals' ability to enjoy the Buffalo.

Summarized Commenters: Bob Allen and The Sierra Club

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the Buffalo River Watershed and to protect the vitality of the Buffalo National River as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018.
Watershed management plans are recognized by EPA as comparable, state-led management approaches expected to result in the attainment of water-quality standards.

APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 86: Since C & H’s Regulation 5 application and the Department’s Draft Permit are based almost entirely on the information contained in C & H’s original permit, including the Notice of Intent and the Nutrient Management Plan, I respectfully urge the Department to reexamine the basis of its original permitting decision for ARG590001 and review ALL design, specs and calculations in the context of C & H’s application for a No Discharge permit. ADEQ conducted the Pond Integrity Evaluation in conjunction with C & H’s Reg 5 Permit. Therefore, material produced as part of the Evaluation (i.e., data, work plans, reports, reviews, and/or questions submitted by the public with regard to Final Report) is part of the administrative record. Thus, public comments related to the Evaluation fall within the scope of consideration with regard to the ADEQ’s Draft and Final Permit decisions.

Original Commenter: Dane Schumacher

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department considered all relevant scientific data submitted and information submitted during this permitting process.
The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 87: I object to the original CAFO general permit issued and the current CAFO Reg 5 permit application for C&H farms due to negative economic impact on hundreds of Arkansans who depend upon the thriving tourism industry dollars generated by the Buffalo National River. Negative health impact on locals and tourists in the Buffalo National River watershed.

Original Commenter: Debbie Alexy

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

**Comment 88:** I object to the original CAFO general permit issued and the current CAFO Reg 5 permit application for C&H farms due to CAFO is an inhumane method for raising large animals for commercial agri-production; CAFOs increase health risks from pharmaceutical and chemical contaminates generated from the animal factory released in air, earth, and waterways of the surrounding area which affects millions of people who swim in the Buffalo National River, Arkansas children at Mt. Judea school and residents in the area who rely upon well water for drinking.

Original Commenter: Debbie Alexy

**Response:** The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5. The method by which animals are raised is not within the Department’s regulatory authority.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

**Comment 89:** The C&H CAFO could be closed and moved. Regulations can be put in place now stating there will be no more CAFO’s within a certain distance of the Buffalo River watershed. Any within range should be required to have its massive sewage
treated (which would probably be cost prohibitive). I hope you come to the conclusion that area farms be legally obligated to protect the water in this national river at a higher level than for other areas. Solutions must be found while they are still relatively inexpensive to fix.

Original Commenter: Virginia Booth

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

Based on the permit application, this facility meets the requirements of APC&EC Regulation 5.901.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 90: Along with the anticipated contamination of the groundwater and springs from allowable pond leakage, allowing the liquid effluent which is at the top of the settling ponds to be broadcast sprayed on fields adjacent to, or in the near proximity of streams and surface drainage areas will inevitably allow contaminants to be carried into the nearby waterways during storm events.

Original Commenter: Gerald Weber

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 requires at least a 100-foot buffer from all waterbodies. Land application of liquid animal waste is an authorized method of disposal under APC&EC Regulation 5.

Response: The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires liquid animal waste management systems and associated land application to be in the designs and waste management plans for
liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

**Comment 91:** When this Farm was proposed, many jobs were touted as going to bring prosperity to the County and thereby raise the living standards for locals. What happened to these jobs? I believe only a few jobs were actually created so the jobs BS which seems to drive all of Arkansas politicians continues.

Original Commenter: Gerald Weber

**Response:** Consideration of tourism and revenue is not within the Department’s regulatory authority.

**Comment 92:** I continue to be concerned about the containment ponds and their ability to survive a major storm. And I feel all the waste from such operation should be required to be hauled off and disposed of elsewhere – completely away from any Karst or other environmentally sensitive areas.

Original Commenter: Gerald Weber

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

**Response:** The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. A facility located in a sensitive geologic
area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

**Comment 93:** The Arkansas Water and Air Pollution Control Act of 1949 makes it unlawful to “cause pollution…of any waters of this state,” or to place any sewage, industrial waste or other wastes in a location where it is likely to cause pollution of any waters of this state.” It is inevitable by locating point source animal waste lagoons and application fields so close to Big Creek that water pollution will occur (and in fact there is already evidence of discharge). Granting this permit would be in violation of The Arkansas Clean Water and Air Pollution Control Act and should be denied.

Original Commenter: Mark Richards

**Response:** APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires liquid animal waste management systems and associated land application to be in the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The
necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 94: Specifically by allowing this facility to be constructed and granted permits for operation without proper public notice and community input from both residents, as well as, the National Park Service. Adding insult to injury, the original nutrient management plan was not site specific, and failed to adequately address properly managing the volume of waste being produced. Proposed expansion of waste management by spraying excess manure from ponds in the Little Buffalo River watershed is unacceptable and should not be approved or allowed.

Original Commenter: Shawn Porter

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

Land application of liquid animal waste is an authorized method of disposal under APC&EC Regulation 5.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other
Comment 95: The current nutrient management plan that C&H employs depends heavily on the availability of pasture land in the Buffalo River Watershed. As existing pastures reach nutrient saturation, the pressure to convert forest to pasture increases in order to manage the solid and liquid waste produced by C&H swine.

Original Commenter: Emily Jones for the National Parks Conservation Association

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 96: Ground water recharge in the Buffalo River system is either through the slow percolation of water through the soil until it reaches the aquifer, or concentrated rapid movement of water to the subsurface drainage network, most common in areas dominated by karst, which is typical in the Ozarks. Water usage from the aquifer is increasing and protection of the groundwater is important not only for maintaining water quality of the Buffalo but also for more general protection of a major drinking water source in the Ozarks. There was concern for the quality of ground water in the region because large amounts of waste are surface applied as fertilizer.

Original Commenter: Emily Jones for the National Parks Conservation Association

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

Land application of liquid animal waste is an authorized method of disposal under APC&EC Regulation 5.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other
subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

ANRC is the agency tasked with monitoring of aquifers in Arkansas.

Comment 97: I noted the C&H original application listed numerous best management practices (BMP) that could be applied to mitigate the odor permeating and the Mt. Judea region, or more securely preventing permeation of the ground under the sewage lagoons, etc., but NOT A SINGLE BMP WAS REQUIRED OF C&H.

Original Commenter: Duane Woltjen

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

Consideration of odor from agricultural facilities is not generally within the Department’s regulatory authority; however, in order to minimize odor, the APC&EC’s policy is to encourage permittees to adopt a good neighbor policy and consider the use of chemical or biological additives or other best management practices in the operation of liquid animal waste management systems. The NMP contains recommended measures to minimize odors.
Comment 98: Why should the Campells and Hensons be allowed to contaminate large areas of the surrounding private and public lands by their desire to enrich themselves by forcing everyone else to conform to their point of view. This is not “freedom,” it is coercion and bullying to the ninth degree. Simply to the principal of good stewardship of native and the environment, permit 5264-W should definitely, irrevocably, be denied.

Original Commenter: Robert N. Runyan

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Land application of liquid animal waste is an authorized method of disposal under APC&EC Regulation 5. APC&EC Regulation 5.405(B) requires the applicant to provide proof of land ownership or of contractual agreements for use of the land as a land application site.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 99: A contribution to the state’s economy? C&H has, as I understand it, provided fewer than 10 jobs. Whatever profits accrue from this environmental blot on the landscape go to one local family and Cargill, which is now owned by a Brazilian company, so the profits have little or no impact on the local or the state economy. Arkansas tourism in the area accounts for something like $150 million a year in income, not to mention the pleasure Arkansans and visitors to the area derive from experiencing the many beauties of the nation’s first national river, which should be preserved in its pristine state for the benefit of both people and wildlife.

Original Commenter: Nancy Baxter

Response: Consideration of tourism and revenue is not within the Department’s regulatory authority.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 100: In light of that, looking at the differences between the AR Reg. 5 and EPA Reg. 6 permits sheds some light on why a Reg. 6 permit was pushed for in the first place. For one thing, Reg 5 requires a "Good Neighbor Policy" that includes notification of neighbors (Reg. 5.302): The Notice of Intent must also be posted
in a local newspaper. A Reg. 6 Permit has no such requirements, making it far easier to keep plans secret and place a NOI on a website where only those interested in commenting favorably on the application are likely to find it, as happened in this case. Without knowledge of the permit application, the public was shut out of the comment period and left without standing to appeal. It is unlikely that this was unintended.

Original Commenter: Lin Wellford

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

Comment 101: Since we were not given the chance to get an explanation from the company that drilled the single hole and then filled it up, can someone at ADEQ give a reasonable explanation of why a bore hole required so much more material to fill it up than scientific calculations had indicated? Is there any other explanation other than that there was an underground cavity that the bore hole intersected?

Original Commenter: Lin Wellford

Response: The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

Comment 102: Before I get started on this current permit, I would like to discuss what I see as the real problem with this pig factory. ADEQ issued a general permit under APCE Regulation 6 in 2012 with no effective public notice. Not receiving any public comments, ADEQ issued the permit without fanfare. Since no-one commented, no-one had standing to appeal the permit. I and many others regard the granting of the permit by ADEQ without looking at the water quality of Big Creek and the Buffalo River, without doing any geotechnical work to determine the facility was going to be built on KARST, and without even determining that the receiving waters for this DISCHARGE facility was a major tributary to the BUFFALO RIVER, the first river in the United States of America to receive this designation, was a CAPRICIOUS AND ARBITRARY action, and an ABUSE OF DISCRETION. It was capricious because the permit was issued as if by a whim, without providing the public your agency serves an opportunity to review and
comment. It was Arbitrary because sound reasoning did not go into the permit issuance. The permit was issued for what is arguably the most sensitive landscape in the State of Arkansas. It was an abuse of discretion because ADEQ has a responsibility to the citizens of Arkansas and the United States to protect water quality; particularly when dealing with an Extraordinary Resource Water and Natural and Scenic Waterbody as well as an Outstanding National Resource Water. ADEQ failed to take the Buffalo River into account, and failed to conduct any modeling of the potential impacts of the facility prior to issuing the permit, even though ADEQ established the precedent for such modeling in the Buffalo River watershed in the case of the to Devoe Smith hog farm application in the early 1990s. Since the public could not appeal ARG590001, we were left with very little recourse but to vigorously oppose the operation of the facility in this sensitive environment at every opportunity.

Original Commenter: Charles Bitting

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

Comment 103: I suspect the myopic engineers at ADEQ have not noticed that the hamlet of Mt. Judea is completely surrounded by spreading fields in the draft permit. As a Newton County resident, I know that the Mt. Judea public school is situated within that hamlet. I also read the newspaper and know that the Mt. Judea public school is in fiscal distress, and doing their best to keep their doors open. I suppose such minor details are not noticed by engineers and administrators at ADEQ. I grew up close to a dairy farm and know how the odors of manure can permeate and area. I believe that if this new permit is granted, the stench of aerosolized hog waste resulting from manure spreading will drive the last nail in the coffin of the Mt. Judea school, and the community of Mt. Judea. I have heard that some parents are already taking their children to other schools because of the current configuration of the pig factory and its waste disposal fields. This is likely to increase, killing yet another rural school and making for extra long bus rides for many children.

Original Commenter: Charles Bitting
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

Consideration of odor from agricultural facilities is not generally within the Department’s regulatory authority; however, in order to minimize odor, the APC&EC’s policy is to encourage permittees to adopt a good neighbor policy and consider the use of chemical or biological additives or other best management practices in the operation of liquid animal waste management systems. The NMP contains recommended measures to minimize odors.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 104: Dr. Halihan and Mr. Fields discovered epikarst under at least two of the fields through Electrical Resistivity Imaging (ERI). BCRET discovered epikarst under at least one field through Ground Penetrating Radar (GPR) surveys. The NMP was not modified to avoid applying waste to the areas within 100 feet of these soil mantled sinkholes, even though it is required in Regulation 5.406(D). Failure to protect these sinkhole features in the epi-karst is not protective of groundwater quality.

Original Commenter: Charles Bitting

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality
impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

**Comment 105:** The C&H combined animal feeding operations (CAFO) should continue to monitor— and report—on its operations and activities that involve potential pollutants.

Original Commenter: Jeffrey Short

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5.407 requires monitoring and reporting by all APC&EC Regulation 5 permitted facilities.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 106:** Another concern is that the nasty slurry of anti-biotic laden manure and urine so necessary in CAFOs, can lead to antibiotic-resistant bacteria in the environment. If these bacteria reach the Buffalo River, then a prick from a fishhook, could lead to a life-threatening situation for the fisherman. The primary concern is to prohibit CAFO pollution—in all its forms—from reaching environmental media (water, air) that can transfer the harmful aspects of the wastes to the environs and people.

Original Commenter: Jeffrey Short

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

The Department emailed public notice of the draft permit to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, the Department of Arkansas Heritage, and the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health or Endangered and Threatened Species from the agencies with the jurisdiction over these matters.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

**Comment 107:** As a minimum, the State of Arkansas is responsible to design, develop and employ best management practices (BMP) for the site to prevent release to surface or subsurface waters. BMPs will require periodic monitoring to ensure that there are no releases. Many more performance standards are important to the primary standard prohibiting waste from reaching receptors such as, ensuring adequate freeboard of lagoons with an impending precipitation event; cessation of land application before a significant precipitation event; adequate vegetative cover on land application areas; no human ingestion of waste from crops; immediate tilling of bare soil used for waste application; proper disposal of dead animals; proper sludge removal and disposal, and adherence to all air and water quality standards. ADEQ should continue to monitor the activities at the hog farm as a part of a permit to continue operations. This monitoring data can provide additional management information quality improvements.

Original Commenter: Jeffrey Short

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

The Department emailed public notice of the draft permit to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, the Department of Arkansas Heritage, and the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health or Endangered and Threatened Species from the agencies with the jurisdiction over these matters.
APC&EC Regulation 5.407 requires monitoring and reporting by all APC&EC Regulation 5 permitted facilities.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 108: I’m not a water scientist but when somebody says there’s 2.5-3 million gallons a year of hog waste that’s being sprayed on 600 acres of land around here, for how many years it’s going to take for those contaminants, those pathogens to leak into the drinking water, if it hasn’t happened already. How many years is it going to take before that really happens and people are getting sick? The economics of this never made sense to me as an accountant. I’ve represented big and small companies and there’s an old saying that says many companies like to privatize their profits and socialize the cost. Well this is a case where the profits are being privatized and the costs are being socialized for you and me tax payers to pay for them.

Original Commenter: Steve Blumreich

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

Consideration of the facility’s profits and revenues are not under the Department’s regulatory authority.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer
zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

Comment 109: There is so much waste produced by this hog farm that C&H previously applied and was granted a permit by ADEQ. (Once again, I question if ADEQ is doing its job to preserve & protect the environment) to transport the excess waste across the curvy roads of Newton County, to fields near Deer, Arkansas, known as EC Farms, also in the watershed of the nationally protected river. I have a well on my property and I fear that we will begin to see serious contamination of my drinking water and my paradise if they are allowed to spread this waste at EC Farms.

Original Commenter: Phyllis Head

Response: The Department made this permitting in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

The EC Farms Permit is outside the scope of this permitting decision.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

Comment 110: I also noticed that no monitoring of groundwater was being done? Why? At the flow rates measured & knowing that virtually no filtration of contaminates can occur at these flow rates, why is this not being done? There are people all around this area that rely on groundwater as their only source of potable water. How will they know if their well is contaminated? Will they have to become ill & find out from their Dr. that their water has sickened them? I doubt they can afford
to get city water? Who will pay this? Who will be liable if a catastrophic illness occurs?

Original Commenter: Dorothy Walters

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not require groundwater monitoring.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

**Response:** The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”
Comment 111: I recently learned about C&H Hog Farm's application for a new state permit that would supersede a federal permit that requires regular review and a five year expiration. This new state permit requires no review and no expiration and would add an additional 599 acres to the hog farm waste spray area. It is my understanding that a state permit supercedes the Federal Permit, has no expiration date and does not call for regular reviews. Scientific research has already shown an increase in nitrates downstream of the C&H Hog Farm lands, which negatively affects the quality and health of Big Creek as well as the Buffalo River watershed and organisms that live there. Reducing regulation is the antithesis of what is needed to conserve environmental integrity of the Buffalo River watershed as well as the health of people recreating and living in it. The Buffalo River is an Arkansas and national treasure. We cannot allow hogs to muck it up. Granting C&H this new permit presents a real threat to public and environmental health and safety.

I request ADEQ to deny granting this permit to C&H Hog Farms.

Summarized commenter: Lee Bryant, Jared Swenson, Carol Joan Patterson, Mark W. Corley, Sharon Dumas, Deanne Van Briggle

Response: It is the applicant’s discretion regarding what type of application to submit for permit coverage of its facility. It is then the Department’s charge to evaluate the proposed systems for compliance with applicable laws and regulations.

The EPA did not include Big Creek or the Buffalo National River on the approved 2016 303(d) list.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
Comment 112: I am worried that Arkansas is not doing enough to protect the Buffalo River. The factory farm which confines some 6,500 hogs should never have been permitted in the Buffalo River watershed.

It is my understanding that the river and its tributaries are showing signs of impairment due to increased algae, and compromised dissolved oxygen levels. While I realize that there can be other contributors of impairment, allowing these industrialized swine factory farms near the Buffalo only worsens any other problems the river might face.

There are many issues surrounding the ill placed swine CAFO in the Buffalo River watershed. That our state has spent so much money on this one swine entity points to the conclusion that swine CAFOs have no place in the sensitive karst terrain of the Buffalo National River

• Implement a permanent moratorium for any new medium and large hog CAPOs in the Buffalo River Watershed
• As requested by the National Park Service to the ADEQ, list 3 streams (Bear Creek, Mill Creek and Big Creek) on the 303 (d) list of impaired streams.
• Do not allow renewal C&H 's hog factory farm Reg. 6 or Reg. 5 permits. This hog operation should never have been permitted by ADEQ.
• While the Buffalo River Collaboration that you announced has promise, please be sure you make the possibilities substantive by doing the above.
• Do the right thing and SAVE THE BUFFALO now before it is too late.

Let your legacy be one that saves and furthers the natural state's tourism, not one that allows this vital resource to be destroyed.

Original Commenter: Carol Florida

Response: The Department considered all relevant scientific data submitted during this permitting process.

The ADEQ Office of Water Quality Planning Branch routinely collects and evaluates water quality data from approximately 300 stations across the state. The Department is required every two years by 40 CFR 130.7(b)(5) to assess all readily available data for attainment of water quality standards. The EPA did not
include Big Creek or the Buffalo National River on the approved 2016 303(d) list. Only Bear Creek, a tributary to the Buffalo River, remains on the EPA-approved 2016 Impaired Waterbodies list (303(d) list) for total dissolved solids.

The Department has received multiple comments regarding algae concerns in the Buffalo National River Watershed. The Department and the NPS are in the process of designing an algal monitoring program for the Buffalo National River and its tributaries.

The implementation of a permanent moratorium is outside the scope of this permitting decision.

Consideration of tourism is not within the Department’s regulatory authority.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

ADEQ is working to support a collaborative study with the Arkansas Game and Fish Commission, US Geological Survey, and the National Park Service focused on the distribution and causation of the rapid expansion of filamentous algae in the Buffalo River.

**Comment 113:** I have attended, and reviewed videos of, many ADEQ Public Forums held in Newton County for the permitting of the C & H Hog Farms Contained Animal Feeding Operation.
My main concern is the allowing of RAW, LIQUID and SOLID HOG FECES on pasturelands in and around Newton County.

Besides the high nitrate content, these applications will include hormones, antibiotics and other pharmaceuticals used to keep animal factories viable.

Three DISEASES which are caused by unchecked RAW FECES in the environment are CHOLERA (caused by bacteria), MALARIA (a parasite source), and DENGUE FEVER (a virus). MALARIA and DENGUE FEVER are both carried and spread by mosquitoes, thriving in still, standing water.

These DISEASES are on the rise again, as global warming continues to create the conditions favorable to Bacterial, Viral and Parasitic growth ~ and they all stem from substandard sanitation practices in the environment.

Continued monitoring will show over-saturation of the land. The Karst topography in Newton County will allow the percolation of these contaminants into our Streams, which will eventually end up fouling our beautiful Buffalo River National Park. Once the River is contaminated, we’ve lost it ~ there goes the Tourism industry, which supports not only jobs and income for the County, but State revenue as well as national recognition for our Natural Resources.

Please, re-consider the permitting of these high quantity land applications of Factory Farm RAW FECES.

Original commenter: Vallie Graff

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Land application of liquid animal waste is an authorized method of disposal under APC&EC Regulation 5.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

Consideration of tourism and revenue is not within the Department’s regulatory authority.
The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

Comment 114: Although I’ve worked closely with ADEQ over the years as a biologist with another Arkansas state agency, I’ll identify my work experience over the years and plainly state that I write this simply as an Arkansas resident for most of
my 63 years of age. I am a retired fisheries/aquatic biologist having received a degree in fisheries biology from Colorado State University and working as a professional fisheries/aquatic biologist for nearly 40 years, 36 of those with our state Game and Fish agency (which I do not claim to represent via this letter after retirement 2 years ago by any means). For the majority of those 3 decades plus, I worked on rivers and streams throughout Arkansas, evaluating not only the impacts of anglers on fish populations but almost as much on other natural and man-induced impacts to our invaluable stream resources. Certainly this included floods and droughts as natural impacts but also gravel mining, natural gas fracking, silviculture and other man-induced impacts. I’ve worked with numerous ADEQ ecologists, biologists, inspectors, chemists and administrators over the years on such matters mentioned above and found the ADEQ staff to be in general a solid group of professionals.

That is why it pains me as I have followed the C and H Hog Farm issue over the years via the press, TV, web and in person at Commission meetings how the ADEQ agency can continue to NOT work as they once did when say, Randall Mathis, was Director. In a situation such as the consideration of allowing a hog farm with its significant amount of liquid waste flowing into a major tributary of the Nation’s First National River, then Director Mathis would have immediately notified all the state agencies that had anything to do with natural resource management in the state (i.e. Game and Fish, Soil and Water Commission [now ASWCC], Health Department, Forestry Commission and so on) about this potential permit since these agencies are supposed to be working together for the management of the state’s most valuable resources like a team. AND to be frank, he would also have contacted the key people in various citizens groups so they wouldn’t be blindsided by such a permit approval since the public should be part of the team as well.

Instead, relative to the history of this issue, (1) while the ADEQ might have done what they had to do originally according to the letter of the Law, they did not follow in the spirit of a team player with the best interests of Arkansas’ natural resources in mind. On something this large, a state agency needs to practice some public outreach in order to get representative public comments. A rush job does not benefit the state as a whole. (2) When monitoring was conducted on site on Big Creek and other parts of the Buffalo River watershed which is in a karst topographical part of the state, well respected geohydrologist Dr. John Van Brahana (USGS, UAF geoscience professor emeritus) and his team’s data was not utilized by the Big Creek Research and Extension Team, based out of the UAF’s Department of Agriculture. The BCRET found supposedly no real problems with water quality nor flow transport from the hog farm into or around Big Creek, a major tributary of the Buffalo, while Dr. Van Brahana’s data showed dye injections coming up in five locations in the mainstem Buffalo River. And Dr. Van Brahana’s results were verified by two external scientists who ran duplicate samples from their dye receptors. (3) Potential leakage from C and H’s hog farm’s
waste lagoons was initially identified by Dr. Todd Halihan, hydrogeophysics professor from Oklahoma State University via electrical resistivity imaging. So, ADEQ hires Dr. Halihan to do follow up bore hole drilling to evaluate this potential leakage. That was a good decision. Unfortunately, rather than do multiple bore holes to get some idea of the scope and variance of this leakage, only one hole was drilled. So n=1 finds little to no significant leakage via the one hole that was drilled. What field in science, whether it’s chemistry, fisheries, geology or whatever only takes one sample and calls it adequate?

Therefore, at this point in time, considering the lack of good or even adequate science, public outreach, and/or monitoring, and the impact of such a facility on the ecology of the Buffalo River, which in turn has the potential to impact a strong economic driver in that part of the state, I strongly suggest ADEQ not approve the new and revised permit until additional outreach and science can be conducted. I appreciate the opportunity to make these public comments to the agency mandated to uphold water quality in the Natural State.

Original commenters: Steve Filipek, Jerry Hawley, and Lucien R. Gillham

Response: The Department emailed public notice of the draft permit to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, the Department of Arkansas Heritage, and the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health or Endangered and Threatened Species from the agencies with the jurisdiction over these matters.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

The Department did not review or approve the study design and has no authority over the day-to-day activities of BCRET. While the Department may consider the research conducted by the University of Arkansas, questions regarding the study should be more appropriately directed to the University of Arkansas.

The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the
record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Pursuant to the Memorandum of Agreement between the Board of Trustees of the University of Arkansas System for and on behalf of the University of Arkansas System-Division of Agriculture and the Arkansas Department of Environmental Quality, the study performed by BCRET is being carried out for the use and benefit of ADEQ; however, the study shall be funded and conducted independently of ADEQ and shall meet the requirements of an independent study conducted by professionals in the field of water quality.

**Comment 115:** We moved here from North Carolina and so have considerable knowledge of hog farms. They are as polluting as any enterprise imaginable. Their waste lagoons are enormous, and they ALWAYS end up leaking, regardless of the quality of construction or the geology of their location.

Fields sprayed with waste ALWAYS have runoff that pollutes waterways at both short and long distances.

The air pollution, too, is horrific, and sickens people for miles around. There is no worse imaginable siting for one of these pollution-spewing factory farms than the Buffalo River watershed.
PLEASE RESCIND the C & H hog farm permit immediately!

Original commenter: Janine Perlman

Response: APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

Potential issues involving air quality are outside the scope of this permitting decision.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.
ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 116: I am writing to express my extreme opposition to C and H Reg 5 draft permit. I am an Arkansas native and resident, physician, and land owner in the Buffalo river watershed near Parthenon. The Buffalo River is the jewel of Arkansas, and the preservation of its waters defines its existence. The hog farm waste is poison to the river, and has been clearly documented with increased levels of pollution already above threshold in the past 4 years this farm has been operating. This has been obvious with the algae overgrowth seen last fall. The levels are already above acceptable. I am worried about my property value, but most importantly I am concerned for the preservation of this great river for generations. Please please do not grant reg 5 to C/H as this gives even more leniency to environmental regulations.

Original commenter: Adam Carver

Response: The Department considered all relevant scientific data submitted during this permitting process.

The ADEQ Office of Water Quality Planning Branch routinely collects and evaluates water quality data from approximately 300 stations across the state. The Department is required every two years by 40 CFR 130.7(b)(5) to assess all readily available data for attainment of water quality standards. The EPA did not include Big Creek or the Buffalo National River on the approved 2016 303(d) list.

The Department has received multiple comments regarding algae concerns in the Buffalo National River Watershed. The Department and the NPS are in the process of designing an algal monitoring program for the Buffalo National River and its tributaries. If an algal bloom is reported, the Office of Water Quality may conduct an investigation.

Consideration of tourism, revenue, and property values is not within the Department’s regulatory authority.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the
record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

ADEQ is working to support a collaborative study with the Arkansas Game and Fish Commission, US Geological Survey, and the National Park Service focused on the distribution and causation of the rapid expansion of filamentous algae in the Buffalo River.

**Comment 117:** The geology of the Ozarks makes factory farming of swine impossible. Additionally there is already evidence of discharge into local streams. This request also violates the current moratorium so vital to all of us who enjoy the benefits of this free-flowing clear and clean river. Please consider the next generations who deserve a clean and wild Buffalo River.

Original commenter: Paula Mariedaughter

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

The ADEQ Office of Water Quality Planning Branch routinely collects and evaluates water quality data from approximately 300 stations across the state. The Department is required every two years by 40 CFR 130.7(b)(5) to assess all readily available data for attainment of water quality standards. The EPA did not include Big Creek on the approved 2016 303(d) list.

Based on the permit application, this facility meets the requirements of APC&EC Regulation 5.901.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 118: I support a clean Buffalo River. There is supported evidence that this hog farm will pollute the Buffalo in the future. IT IS A BAD IDEA. At the very least, approve a permit for half the number of hogs, so the impact will be less.

Original commenter: Judi Walker

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The Department considered all relevant scientific data submitted during this permitting process.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other
subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 119: Such confined animal waste operations pose a great threat to downstream waters simply from the mere concentration of too many animals on too little land. When combined with extreme weather events which are becoming more common every year, the risk of harm to a scenic river like the Buffalo is too great.

Summarized commenters: Ralph Heimlich, Brenda Frey

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The Department considered all relevant scientific data submitted during this permitting process.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.
Comment 120: If the farm was not depending on the tax payers and department of emergency management to rescue them when they eventually do have a spill, this would not be possible. Specific, complete restoration from all perils language should be written into any approval. Bonding and Insurance should reflect all perils. This approach would allow them freedom to use their land in any way they then feel is appropriate. It should be very expensive to place this CAFO anywhere close to the Buffalo River.

Original Commenter: Scott Stanley

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not require facilities to provide financial assurance.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

Comment 121: And I would like to ask ADEQ, if I was to build an apartment complex on my property and collect all the human waste in a lagoon and spread it on fields, would you approve the permit? I think the answer would be no. And if pig manure is cleaner than human manure, I’d like to know that. And so this whole thing doesn’t make sense. I support farmers. This is not a farming operation, this is a factory. And the factory is owned by a big corporation who’s getting most all the money; I don’t think there’s very many jobs at all being produced in our local farm here. And pigs produce 10 ten times more waste than humans in case people don’t know that. Spraying on the fields not only puts the sludge on the fields but it also aerosolizes it, which means its flowing in the air, its flowing in the air to homes, its flowing in the air to the schools which are pretty close by. CAFOs are one of the most destructive agricultural practices in the United States and I would like to add that ADEQ is not totally to blame. I think our law makers failed to provide proper protections for ADEQ to follow. North Carolina’s had a lot of problems and recently they’ve passed laws to incorporate proper sewage
treatment for any CAFOs that are being built and I would suggest we look at that as well and maybe work together.

Original Commenter: Steven Miller

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

**Comment 122:** I am writing to encourage you not to approve C&H Hog Farms Application for a No-Discharge Permit:

1. The ADEQ has no way to monitor or substantiate whether or not C&H will have a point source discharge at any time. This was made obvious at the recent public meeting in Jasper, AR.
2. C&H has not complied with the Agricultural Waste Management Field Handbook as required.
3. The liquid waste is being discharged onto the Buffalo River watershed area. Decreasing the amount of monitoring and reporting from this permit will increase the risk of potential harm to the Buffalo River. This would create a major environmental and economic hardship to our communities.

Original Commenter: Steven Miller

**Response:** It is the applicant’s discretion regarding what type of application to submit for permit coverage of its facility. It is then the Department’s charge to evaluate the proposed systems for compliance with applicable laws and
regulations. APC&EC Regulation 5.407 requires monitoring and reporting by all APC&EC Regulation 5 permitted facilities. APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

**Comment 123:** The methodology used in testing the hog waste ponds for leaching into underground water systems has never been fully explained in regards to the location of the drill site, nor has the reason for only one drilling location in an area known by geologists to be karst, nor has there even been a recognition by ADEQ of this underground structural characteristic. Many of us submitted questions and comments about this pond site test and have not received answers. Were these questions and comments not considered pertinent? A summary comment from ADEQ certainly did not address the methodology decisions made for that single drill hole test. I'm not even sure a summary I read had anything to do with the comments submitted.

Last year thick algae was photographed stretching for 11 miles down the Buffalo River, but the public has not been informed as to any test results explaining the nutrient loading that would have triggered the river to become green slime. We do
not even know if testing was done up and down multiple places on the river to identify the source of the nutrient fueling of this algae. If this algae growth continues another season, Arkansas can kiss tourism on the river goodbye and the loss of that revenue to the region and the state will fall directly to ADEQ for not adequately monitoring and addressing this pollution problem immediately, which is its responsibility.

If nutrient loads are increasing in the tributaries and the Buffalo River from run-off from the fields where thousands of gallons of pig manure are being spread those nutrients are the responsibility of ADEQ. With soil so thin, uptake of fertilizer so minimal, and slopes so prone to run-off, the probability of manure reaching the water downhill is pretty much a sure thing. Is ADEQ denying this is happening?

If Reg 5 truly does not require inspections and soil tests but a couple of times a decade to monitor this hog farm, then Reg 5 is essentially a Free Pass card for an indefinite period of time (permanent?) of its operation. A facility that is generating more raw sewage than the city of Harrison's human population, and is allowed to spread this waste on the surface of fields, has become a blatant violation of human common sense. To expect there to be no serious consequences to the health of plants, animals, and humans and to turn a blind eye to this reality is inexcusable. Please do NOT issue this Reg 5 for C & H Hog Farm and save us all a lot of grief, money, and more years of struggle and strife because the battle to save the Buffalo will not end until its safety is secure."

Original Commenter: Fran Alexander

**Response:** APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

The API is used to develop loading rates for land application based on phosphorus. There are many factors taken into account to determine whether land application on a specific field is allowable. While the soil test phosphorus is one of those factors, it is not the determining factor. Slope is also a factor. A field with high soil test phosphorus may still be appropriate for land application. The Department only permits land application when the API value is a low or medium class.

APC&EC Regulation 5.406(C) states that “[w]aste/wastewater shall not be applied on slopes with a grade of more than fifteen percent (15%) or in any manner that will allow waste to enter waters of the State or to run onto adjacent property without the written consent of the affected adjacent property owner.”
The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

The Department has received multiple comments regarding algae concerns in the Buffalo National River Watershed. The Department and the NPS are in the process of designing an algal monitoring program for the Buffalo National River and its tributaries. If an algal bloom is reported, the Office of Water Quality may conduct an investigation.

In the Ozark Mountain karst region, nutrient concentrations in streams of the Buffalo, Upper Illinois, and Upper White River Watersheds increase as the percent of land in pasture and urban use increases. Averaged over the last three years, nutrient concentrations in Big Creek above and below the C&H Hog Farms are similar to concentrations found in other watersheds where there is a similar amount of pasture and urban land use.

The Department emailed public notice of the draft permit to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, the Department of Arkansas Heritage, and the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health or Endangered and Threatened Species from the agencies with the jurisdiction over these matters.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

All individual permits issued by ADEQ’s Office of Water Quality have self-regulating and self-monitoring conditions and requirements that require the permittee to monitor the facility and submit reports to demonstrate compliance. The Office of Water Quality Compliance Branch makes every effort to inspect facilities at least once every five years or more frequently, as needed. The inspectors may visit random land application sites to observe the application of waste to ensure the waste is being land applied in the proper manner and in the appropriate location. The Office of Water Quality Compliance Branch inspects any facility when the Department receives citizen complaints that may indicate non-compliance with permit conditions.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

ADEQ is working to support a collaborative study with the Arkansas Game and Fish Commission, US Geological Survey, and the National Park Service focused on the distribution and causation of the rapid expansion of filamentous algae in the Buffalo River.

APC&EC Regulation 5.407 sets forth monitoring frequencies for land application of waste and for soils of each field where liquid animal waste has been applied.

Comment 124: As a stakeholder who makes their living primarily from tourists who visit the Buffalo National River and as a resident of Newton County Arkansas who values the protection of the waters of the State of Arkansas and the health of our citizens I respectfully ask that you deny the renewal and change to Reg 5 5264 W for C&H Hog factory. One ill-conceived large hog farm in the Buffalo River Watershed should not be allow to degrade the the Buffalo National River which has special protection from an act of congress which recognized the importance of
this exceptional water resource. This river was set aside in perpetuity for the public and it is your duty to protect it. I have no ill-will for the farmers involved even though I think they made a serious mistake in site selection that will be compounded as time passes. I sincerely hope that the Governor and ADEQ recognize this harmful error and will close this hog factory and make the operators financially whole.

I have questions about the weight of comments made by concerned citizens. Does the request for denial of this permit by hundreds, possible thousands, of individuals asking ADEQ and the Governor to protect the watershed from millions of gallons of untreated hog waste have any bearing on your decision? Do public comments have to be scientific in nature and specific to the permit to be taken seriously? Do comments like “for the love of God protect the crown jewel of Arkansas, the Buffalo National River” or “my family has floated the river for generations and I want my grandchildren to be able to enjoy an unpolluted river” have any merit? Most reasonable people will assert that exceedingly large volumes of raw hog sewage will reach and contaminate the water in our karst, fragile soils. Are the comments by professional scientists who have thoroughly and completely studied the permit and come to the conclusion that millions of gallons of raw hog sprayed annually on fragile karst soils adjacent to Big Creek and the Mt. Judea School is harming the watershed and ultimately the Buffalo National River considered? How much weight do paid lobbyists of the Arkansas Pork Producers and the Arkansas Farm Bureau comments compared to the public? Who ultimately makes this permit decision and how many comments for denial would have any influence to deny the permit and close down this hog factory that was not properly vetted from the start? At what point will ADEQ step up and admit their harmful mistakes. Please see comments by a former ADEQ geologist, Gerald Delavan, that confirm this was a sloppy and unlawful process from the beginning. Is the Governor the only one that has the power to protect the watershed and quality of life here? Does ADEQ have the will or power to do what is morally and ethically right? Others with more scientific background than myself have contended that renewal of this permit and operation to this point will and has harmed the waters of the state of Arkansas. As a stakeholder the comments of the Buffalo Watershed Alliance, which includes reports from Dr. Mike Smolens and Dr. JoAnn Burkholder, have my full support. David N Motts report for the Buffalo National river of November 2016 reflects my concerns. Tom Aley, a licensed hydrologist in Arkansas, comments confirm my beliefs. The work of Dr Van Brahana and his team over a 3 year period also validates the degradation of the watershed and the karst topography that make this spreading of raw sewage so dangerous to our health and the health of the water millions of people canoe and swim in. The March 5, 2017 letter and comments from The National Park Service signed by Superintendant Kevin Cheri supports my objections to the renewal of the C & H permit as well. The March 10, 2017 letter to Katherine McWilliams from Emily Jones of the National Parks Conservation Association asking to deny the permit is reflective of my views. Also the letter and
comments submitted on April 6, 2017 by Teresa A. Turk to Katherine McWilliams and Governor Hutchinson express my objections to the permit renewal in detail. I could go on and on referencing the thoughtful study of the flawed permit by many individuals and groups who have spent a great deal of volunteer time addressing what is at stake now. The more I know the more firm I am that the permit renewal should be denied. Tens of thousands of hours have been spent by people who care deeply about the Buffalo National River and our quality of life here in Newton County as well as our economy. Please respect these individuals and their work and consider them seriously and fully in the decision making process. The people of Arkansas deserve no less than your commitment to do what is just and right. The spotlight is now on ADEQ and Governor Hutchinson to deny this permit and protect our health and quality of life.

Original Commenter: Susan Watkins

Response: APC&EC Regulation 8.211(A)(2) requires the Department to respond to each issue raised in any public comment received during the public comment period. The Department considered all relevant scientific data submitted during this permitting process.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies,
borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 125: I am writing to voice my opposition to the C&H Hog Farms permit. It was improperly approved by the Dept of Environmental Quality and should be denied. There are also health concerns at play here. Exposure to hog waste increases the incidence of asthma as just one example. Children are most vulnerable. And yet waste from C&H is spread in close proximity to a school. Why would anyone want to pollute such a beautiful river and destroy her beauty for generations to come? Why would anyone want to ruin this tourist attraction which would mean loss of tourist income for our state? So many good reasons to deny this permit! There are hundreds of reasons this hog waste factory, (more than 2.6 million gallons of waste annually, which is equal to the amount a city of 25,000 would excrete) should be removed from this sensitive area, including the fact is sits on a karst geologic area, the buffer zones for the application fields don't give adequate protection to the local school, local ponds and to Big Creek, as well as the fact that is a dire threat to the Buffalo River. The greatest economic driver for this region is the Buffalo National River and this factory hog farm is an accident waiting to happen. C&H already is exceeding recommended phosphorous levels and less monitoring of this facility does not promise that they will adhere more stringently to the needed protections for our river.

Summarized commenters: Bill Pettit, Trish Starks, Kathy Martone, Charlene Annabel, Jennifer Wang

Response: APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes, rock outcrops, and neighboring occupied buildings are required by regulation and are included in all APC&EC Regulation 5 permits.

Consideration of tourism and revenue is not within the Department’s regulatory authority.
The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

The API was used to develop loading rates for land application based on phosphorus. There are many factors taken into account to determine whether land application on a specific field is allowable. While the soil test phosphorus is one of those factors, it is not the determining factor. A field with high soil test phosphorus may still be appropriate for land application. The Department only permits land application when the API value is a low or medium class.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

The Department reviews all buffers to ensure that the applied buffers are in accordance with the buffer distances proscribed in APC&EC Regulation 5.406(D).

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer
zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA1029, “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA9516 states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 126: The original permit to operate was granted to C & H in almost total secrecy due to wholly inadequate public notice requirements for a permit of that type and scale. Since being made aware of the hog factory well beyond the 30 day appeal period, the public has done everything it could to ensure this factory hog farm was stripped of its ability to operate in this sensitive area near Big Creek which feeds into the Buffalo National River. It appears to me that both ADEQ and C&H have gone to great lengths the past few years to avoid acknowledging the delicate terrain of the hog factory's location. The area, being karst, is subject to leakage from the hog factory which in turn can flow into Big Creek and eventually into Buffalo National River. Putting a hog factory in this location was the initial mistake on the part of ADEQ as well as the owners of the CAFO and the agency that financed it. This permit fails to take into account evident that discharge into the creek and possibly the river is already occurring. The Big Creek

2 https://www.uaex.edu/publications/PDF/FSA-9516.pdf
Research and Extension Team (BCRET) shows nitrate levels are consistently higher down stream of the CAFO than above it. Seems to me that this would indicate a very likely impact that this hog factory is having on not only the creek but the river itself. This industrial operation has no business in the geologically sensitive karst environment of our own national river. Any failures or long term degradation risks a $62M tourism industry in one of the poorest areas of our state. Deny it because it makes economic sense. Deny it out of respect for the Arkansans who came before you who fought to protect it.

Summarized commenters: Allison Burke, Barry Haas, Sybil Craig, Charlie Gagen, Lisha Gagen, Stewart Gagen, George Gagen, Colin Gagen, Joni McGaha, Owen Farrell

Response: APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits. APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

Although BCRET raw data indicate nitrate averages are higher at the downstream sample location, the 2017 second quarter BCRET report states, “In the Ozark Mountain karst region, nutrient concentrations in streams of the Buffalo, Upper Illinois, and Upper White River Watersheds increase as the percent of land in pasture and urban use increases. Averaged over the last three years, nutrient concentrations in Big Creek above and below the C&H Farm are similar to concentrations found in other watersheds where there is a similar amount of pasture and urban land use.”

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

In the April 1 to June 30, 2018 Quarterly Report, BCRET presents data that documents a statistically significant increase of nitrate-N in the ephemeral stream (BC4) since 2014. However, BCRET notes that chloride, a conservative tracer, did not show a statistically significant increase. Four years of data also indicate a steady increase of geometric mean nitrate-N within the house well (W1) (BCRET April–June 2018, Figure 24). Increased nitrate-N in both the ephemeral stream
and the house well does suggest that these systems may be hydrologically connected to areas where farm activities take place. APC&EC Regulation 5 requires the design and waste management plans for liquid animal waste management systems be in accordance with the AWMFH. The AWMFH requires a detailed, geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. Detailed geologic investigations are necessary to determine that the ephemeral stream and house well are not influenced by the waste storage holding ponds, on-farm activities, or waste management practices. A dye tracing study may be necessary to understand the movement of groundwater in this complex geologic system.

BCRET data document that nitrate-N is variable; however, Figure 12 of the April 1 to June 30, 2018 BCRET Quarterly Report demonstrates that nitrate-N is higher downstream (BC7) than upstream (BC6). Chlorides and nitrates follow similar seasonal fluctuations in that they are higher during summer and autumn months when stream discharge is most influenced by groundwater. ADEQ reviewed Jim Petersen’s May 31, 2018 expert report, which presents an analysis of temporal trends among nitrate-N and E. coli from January 2014–December 2017 at BC6 and BC7. Mr. Petersen’s analysis presents decreasing trends of ammonia and chlorides and increasing concentrations of E. coli at BC6. Yet, increasing concentrations of nitrate-N were observed downstream at BC7. The conflicting temporal analysis prompted Mr. Petersen to further review trends upstream to downstream. By analyzing paired concentration data (collected same day) at BC6 and BC7 from January 2014 through December 2017, Mr. Petersen reports significant increases in total nitrogen, ortho-phosphorus, and chlorides, but non-significant changes in E. coli and nitrate-N. The significant increase of nitrate-N in the house well and ephemeral stream does correspond to increases of total nitrogen at BC7. Mr. Petersen’s analysis illustrates the complexities of evaluating water chemistry in karst systems.

**Comment 127:** I sincerely believe you would like to protect the Buffalo National River which is the center point of our tourism trade in Arkansas. I request that you do the following because I believe they are reasonable and doable actions. New evidence by the United States Geological Survey show that the dissolved oxygen necessary for aquatic life is impaired on Big Creek, a major tributary of the Buffalo. This corroborates evidence submitted by the National Park Service last year that Big Creek is an impaired stream.

Therefore please act to
- Not allow renewal C&H’s hog factory farm Reg. 6 or Reg. 5 permits. This hog operation should never have been permitted by ADEQ.
• Implement a permanent moratorium on any future medium and large hog factory farms in the Buffalo River watershed and a moratorium on the spreading of swine waste from such entities in the watershed.


Response: The ADEQ Office of Water Quality Planning Branch routinely collects and evaluates water quality data from approximately 300 stations across the state. The Department is required every two years by 40 CFR 130.7(b)(5) to assess all readily available data for attainment of water quality standards. The EPA did not include Big Creek on the approved 2016 303(d) list.

The implementation of a permanent moratorium is outside the scope of this permitting decision.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as
required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 128: I respectfully request that you consider the following when reaching your decision regarding the subject application. C&H Hog Farms, Inc. (Applicant) applied for a No-Discharge permit under Regulation 5.

- Applicant states on first page of the NPDES Notice of Intent that 2,090,181 gallons of manure, litter, and wastewater will be applied to 630.7 acres annually.
- Applicant's Nutrient Utilization Plan states on p. 5:
  o "Land application will be conducted in a manner which will prevent a discharge or drainage of manure to ground or surface waters of the State."
  o "Land application practices will minimize the possibility of contamination of surface and ground waters of the State."

These statements are inconsistent, and indicate that operation of this facility will not preclude point source water pollution. Issuing a No-Discharge permit under Regulation 5 is not appropriate. Information is currently available that indicates the C&H Hog Farm CAFO may have previously released contaminants to surface and ground water:

- Big Creek Research & Extension Team (BCRET) sample data shows higher nitrate concentrations in Big Creek downstream of the C&H Hog Farm, Inc. CAFO than upstream:
- BCRET data as evaluated in a report prepared for BRWA titled, "Assessment of Environmental Data and Draft Regulatory Changes Regarding the C&H CAFO, Including the Present Draft Permit, JoAnn M. Burkholder, Ph.D., 27 March 2017" also shows E. coli concentrations higher downstream than upstream of the C&H Hog Farms, Inc. CAFO.
- Kevin Cheri, Superintendent for the National Park Service (NPS) notified ADEQ on October 6, 2015 that Big Creek dissolved oxygen levels, based on USGS sampling data, have chronically been below the regulatory limits.

The Regulation 5 permit to operate the C&H Hog Farms, Inc. CAFO near Mt. Judea, Arkansas, as a No-Discharge facility should be denied for the following reasons:

- Discharge of wastes is not allowed under a Regulation 5 permit
- Scientific evidence indicates contamination of surface waters has occurred due to operation of the facility.

Original Commenter: Mark A. Smith

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior
APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

BCRET data analyzed by Mott (2016) indicate that nitrates increased from a median value of 0.10 mg/L to 0.23 mg/L from upstream to downstream, respectively. Nitrate values upstream and downstream are comparable to the Boston Mountain median values. With regards to domestic water supply uses, nitrate values observed in Big Creek, both upstream and downstream, are well below most groundwater and source water intake nitrate values. For example, the Arkansas Department of Health reports in the 2016 Annual Drinking Water Quality Report for the City of Jasper a mean nitrate value of 0.36 mg/L, with a range from 0.12 mg/L to 0.59 mg/L (ADH, [http://www.healthy.arkansas.gov/eng/ccr/397.pdf](http://www.healthy.arkansas.gov/eng/ccr/397.pdf)). The source water intake for the City of Jasper is located in Bull Shoals Lake.

Data from the BCRET quarterly reports show variability in the upstream and downstream E. coli values. Those data do not demonstrate that downstream E. coli values are statistically different than upstream E. coli values. Based on the January 2016 to November 2016 BCRET data, the average upstream value was higher than the average downstream value.

The EPA did not include Big Creek in the Buffalo National River Watershed on the approved 2016 303(d) list.

The 2017 second quarter BCRET report states, “In the Ozark Mountain karst region, nutrient concentrations in streams of the Buffalo, Upper Illinois, and Upper White River Watersheds increase as the percent of land in pasture and urban use increases. Averaged over the last three years, nutrient concentrations in Big Creek above and below the C&H Farm are similar to concentrations found in other watersheds where there is a similar amount of pasture and urban land use.”

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

In the April 1 to June 30, 2018 Quarterly Report, BCRET presents data that documents a statistically significant increase of nitrate-N in the ephemeral stream (BC4) since 2014. However, BCRET notes that chloride, a conservative tracer, did not show a statistically significant increase. Four years of data also indicate a steady increase of geometric mean nitrate-N within the house well (W1) (BCRET April–June 2018, Figure 24). Increased nitrate-N in both the ephemeral stream and the house well does suggest that these systems may be hydrologically connected to areas where farm activities take place. APC&EC Regulation 5 requires the design and waste management plans for liquid animal waste management systems be in accordance with the AWMFH. The AWMFH requires a detailed, geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. Detailed geologic investigations are necessary to determine that the ephemeral stream and house well are not influenced by the waste storage holding ponds, on-farm activities, or waste management practices. A dye tracing study may be necessary to understand the movement of groundwater in this complex geologic system.

BCRET data document that nitrate-N is variable; however, Figure 12 of the April 1 to June 30, 2018 BCRET Quarterly Report demonstrates that nitrate-N is higher downstream (BC7) than upstream (BC6). Chlorides and nitrates follow similar seasonal fluctuations in that they are higher during summer and autumn months when stream discharge is most influenced by groundwater. ADEQ reviewed Jim Petersen’s May 31, 2018 expert report, which presents an analysis of temporal trends among nitrate-N and E. coli from January 2014–December 2017 at BC6 and BC7. Mr. Petersen’s analysis presents decreasing trends of ammonia and chlorides and increasing concentrations of E. coli at BC6. Yet, increasing concentrations of nitrate-N were observed downstream at BC7. The conflicting temporal analysis prompted Mr. Petersen to further review trends upstream to downstream. By analyzing paired concentration data (collected same day) at BC6
and BC7 from January 2014 through December 2017, Mr. Petersen reports significant increases in total nitrogen, ortho-phosphorus, and chlorides, but non-significant changes in *E. coli* and nitrate-N. The significant increase of nitrate-N in the house well and ephemeral stream does correspond to increases of total nitrogen at BC7. Mr. Petersen’s analysis illustrates the complexities of evaluating water chemistry in karst systems.

Comment 129: I request that the permit be denied. This is not a small family farm. It is a large scale factory operation involving many thousands of pigs. Over time, due to the proximity of the farm to the conduits of water, many thousands of gallons of hog excrement spread on the fields will end up in Big Creek & eventually will reach the Buffalo River. I do not believe the plants that may be growing on the fields are capable of absorbing the hog wastes in the volume that they are being applied. In addition to the surface runoff of the excrement to the stream and river, there is the karst geology that should be considered. It is like the holes in a sponge. The hog excrement will be somewhat trapped in the many crevices & tunnels in this geology before water pressure builds up to move the waste residues to Buffalo River. I am very curious how ADEQ intends to remedy the situation when an accumulation of the hog wastes is detected in Big Creek or the Buffalo River. If a huge sponge was thoroughly soaked in hog excrement it could be cleaned by successively squeezing it in successive buckets of clean water. Can ADEQ do that to the karst geology under the hog farm pond and under the fields that hog excrement has been sprayed on them? What about a catastrophic failure to the hog pond? This has happened to hog ponds of CAFOs in other states. Excessive rains happen. Earthquakes can happen.

Original Commenter: Edward Vollman

Response: Land application of liquid animal waste is an authorized method of disposal under APC&EC Regulation 5. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits. APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

During the development of the NMP, the API was used to develop loading rates based on phosphorus. The API takes into consideration multiple factors to calculate the risk of phosphorus runoff. The soil analysis and site information for each land application site were used and referenced in the creation of the NMP, which classifies the fields by risk level calculated by the API. The Department only permits land application when the API value is a low or medium class.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon
consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e., karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.
Comment 130: We were hit by some wind last night, but we’re still standing. I’m submitting these comments on behalf of the Buffalo River Watershed Alliance and I’ll talk fast since I didn’t expect to only have two minutes. First of all a No Discharge permit is inappropriate for C&H. C&H is currently covered under an NPDES permit which allows and in fact presumes waste discharge. C&H is by definition a CAFO. Under the Clean Water Act CAFOs are considered point sources. Point sources are regulated by the NPDES permitting program. In its application for a No Discharge permit, C&H states that it is applying for an administrative change from a Reg. 6 to a Reg. 5 permit. The only change in the operational management will be the addition of more land. Regulation 5.301 states “The operator of a confined animal operation shall not allow or cause a point source discharge from any part of the liquid animal waste system.” Without major operational changes in its waste storage system there remains the same likelihood of point source discharge. In fact, ADEQ has stated the same allowances for storm event discharge applied equally under both Reg. 5 and Reg. 6 permits. Caleb clarified for me that that was a misunderstanding by the reporter that stated that. Secondly, the permit is based on a deficient nutrient management plan. The nutrient management plan which is an essential term of the permit uses optimistic and unrealistic assumptions. If the permittee deviates even slightly the impact will be significantly higher than indicated. Here’s some examples: assumptions of forage production at 6 tons per acre are unrealistically high for the area, particularly on the upper fields. Assumptions of rotational grazing are not correct, grazing practices in the area are not as beneficial as projected, resulting in a higher risk than calculated in the API. Soil test phosphorus is above optimum on all fields included in the 2016 annual report and no further applications of phosphorus are recommended. The applications in excess of agronomic need is contrary to official guidance and increases the long term impact on receiving waters, the risk factor which is not well accounted for in the API planner. Many of the fields, particularly the upper ones include buffer zones which, it’s impossible to avoid applying in the buffer areas. Thank you.

Original Commenter: Gordon Watkins

Response: It is the applicant’s discretion regarding what type of application to submit for permit coverage of its facility. It is then the Department’s charge to evaluate the proposed systems for compliance with applicable laws and regulations.

APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.
The API is used to develop loading rates for land application based on phosphorus. The API has been adopted by the NRCS Practice Standard Nutrient Management Code 590 to manage the application of phosphorus in the State of Arkansas. There are many factors taken into account to determine whether land application on a specific field is allowable. While the soil test phosphorus, referred to as “above optimum” by the commenters, is one of those factors, it is not the determining factor. A field with high soil test phosphorus may still be appropriate for land application. The Department only permits land application when the API value is a low or medium class.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA1029, “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA9516 states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best

4 https://www.uaex.edu/publications/PDF/FSA-9516.pdf
management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 131: If a new permit is issued, please put into place:
Monitoring of Big Creek on a regular basis. Weekly minimum at owners expense.
Monitoring of Big Creek at high water levels.
Monitoring with permanent wells on property.
Add immediate closure on any pollution found.
Reduce the total number of hogs on property. No clause for temporary increases.
It was apparent that disposal of waste was a problem. (Incinerator) What is plan if there is no place to spread or dispose of waste? Ponds should only be allowed to fill to a point where the heaviest predicted rain fall will not drive waste over the banks.
Please do the best thing for the state by denying a permit in the Buffalo River watershed.

Original Commenter: Kirk Wasson

Response: APC&EC Regulation 5 does not require stream monitoring or groundwater monitoring.

APC&EC Regulation 5 waste storage ponds are required to have the capacity to receive all waste, as well as the necessary freeboard and capacity for a 24-hour, 25-year storm.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
Comment 132: The following questions and comments are predicated on certain indisputable facts:
The C&H hog facility is in a particularly sensitive area due to its location on a major tributary of Arkansas’ famous Buffalo National River.
C&H is built on karst, a situation that should have called for extra scrutiny before the first permit was granted even if the facility was not to be built near a national river.
By its own admission the previous administration erred in granting the original operating permit.
As affirmed by court decision, the loan guarantees were approved under inadequate and hastily filed documentation and investigation.
Data from multiple studies and monitoring stations point to impairment of Big Creek.
Research from other states has shown harmful health outcomes for residents living close to hog waste spray fields.
Governor Hutchinson’s administration now has an opportunity to correct the error by his predecessor. To grant a permanent Regulation 5 permit will only compound the original error and provide questionable benefit to a few and harm the many.
Why were no ADEQ geologists involved in the C&H permitting process? Isn’t this omission, in and of itself, a reason to deny a new and permanent permit?
This facility, or any similar such operation, threatens an Extraordinary Resource Water which is also situated in a community where some families rely on shallow wells for their needs, including for drinking. Shouldn’t the health and property of the local people be considered over the needs of a foreign multinational corporation?
Retired professionals from the U.S. Forest Service, U.S. Fish and Wildlife Service and former employees of ADEQ have stated that the investigation into the site and the subsequent application for a permit was totally inadequate. These professionals have previously stated their concerns at public hearings and in written form. Why would ADEQ ignore these qualified people?
The spray fields, where raw untreated sewage is applied, not only has already built to above optimum levels and where the process also releases waste into the air. Since it is well documented that breathing these contaminants is especially harmful to young children, how can ADEQ allow the disposal of hog waste to close to a public school?
Now that it is clear that Big Creek is impaired, how can a new permit be granted when, at the very least, there are valid reasons to suspect that C&H may be contributing to the pollution problems? Does it really make sense to wait to the point of no return to prevent serious harm to the local residents, the environment, and the reputation of the State of Arkansas?
Given the thousands of dollars of taxpayer money spent to support and “study” the impacts of this one facility, wouldn’t it be make more sense to spend that
money in ways that would help alleviate the systemic poverty in the local communities?

Original Commenter: Jack Stewart

Response: APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from occupied neighboring buildings are required by APC&EC Regulation 5.406(E).

The API is used to develop loading rates for land application based on phosphorus. There are many factors taken into account to determine whether land application on a specific field is allowable. While the soil test phosphorus, referred to as “above optimum” by the commenter, is one of those factors, it is not the determining factor. A field with high soil test phosphorus may still be appropriate for land application. The Department only permits land application when the API value is a low or medium class.

This permit application was reviewed by technical staff, including Professional Geologists.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

The litigation concerning the loan guarantees is outside the scope of this permitting decision.

The Department emailed public notice of the draft permit to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, the Department of Arkansas Heritage, and the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health or Endangered and Threatened Species from the agencies with the jurisdiction over these matters.

Based on the Disclosure Statement submitted with the permit application by the applicant, the facility is owned by Jason Henson, Richard Campbell, and Philip Campbell.
APC&EC Regulation 8.211(A)(2) requires the Department to respond to each issue raised in any public comment received during the public comment period.

The EPA did not include Big Creek on the approved 2016 303(d) list.

Consideration of tourism, revenue, and local economic development is not within the Department’s regulatory authority.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504(a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.
Comment 133: This seems like a really bad idea. The Buffalo is a National River and should be protected to our fullest ability. It costs much less to protect our natural resources and natural spaces than it does to try to clean them up and restore them. Clean water and areas of natural beauty should be available to all and nothing should interfere with that.

The Buffalo National River had 1.46 million visitors last year, the third-highest total since it became a national river and the highest since a record count of 1.55 million in 2009.

1. Notification of the public is inadequate. Notice appeared on the ADEQ website. One must know how to wade through a great deal of information to look up permit applications. ADEQ issues about 30-40 permits per month. One plus – ADEQ’s Permit Section Director told me that in the future he would try to list permits by county. That would certainly be helpful.

2. In heavy rain events, pits and ponds may overflow into Dry Creek which flows into Big Creek, a tributary of the Buffalo National River. It is approximately 6 miles from the confluence of Big Creek and Dry Creek to the Buffalo. Hog waste applied on fields can run off into streams even with the precaution of buffer zones. An aquatic biologist has explained that when “fine organics” from decomposing hog waste (includes feces and urine) run off or slowly leach into soil and water, it becomes trapped in gravel bars where decomposition continues and produces ammonia and methane – products that are toxic to mussels and fish. At risk are two mussel species and two fish being studied for classification as “endangered” near the confluence of Big Creek and the Buffalo River. It is possible that they also exist in Big Creek. Excessive nutrients in the water decrease clarity of the water, encourage growth of algae such as spirogyra, (the long green strands that we already see in the Buffalo during the summer) and lower dissolved oxygen.

3. This information is about prevention of problems. A few years down the road, the 630 acre farm may or may not be able to handle the quantity of hog waste, or the permittee may become less attentive to the rules and pollution becomes excessive as it did in NW Arkansas on the Illinois River.

4. As a conservation organization trying to protect and preserve the water quality of our streams and rivers, we have no desire for this farmer to lose the right to develop his land. The water quality of our rivers is at stake. To his credit, this farmer operated a successful hog farm near Jasper for 10 years with no citations or permit violations.

5. We believe a long term goal of ADEQ should be to deny permits for any animal or poultry factory farms in the watersheds of major rivers and streams, especially the Buffalo River, our first National River, and a designated Extraordinary Resource Water stream. All of our designated ERW streams deserve this extra protection! The state of Arkansas is empowered to protect the quality of water in our streams and rivers by the Clean Water Act. ADEQ follows national EPA guidelines established for Hog factory farms. They can set more restrictive permit rules than EPA but must follow minimum EPA guidelines.
6. The significant economic issue is that the Buffalo National River attracts more than a million visitors each year, contributing millions of dollars to the economy of Arkansas. There must be a balance between development of industry and protecting our state waters. Do our state agencies get that? Do you, the public, value our streams enough to protect them? You must decide and let ADEQ know of your objection or concerns. The conservation community has had a good working relationship with ADEQ and their fine scientific staff. We certainly want that relationship to continue however we believe that granting the permit for the location of this new hog farm is a serious error.

Original Commenter: Karissa Eaton

Response: The Department considered all relevant scientific data submitted during this permitting process. APC&EC Regulation 5.407 requires monitoring and reporting by all APC&EC Regulation 5 permitted facilities.

APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

The EPA did not include Big Creek on the approved 2016 303(d) list.

All violations of APC&EC regulations and applicable state laws are subject to enforcement actions by the Department.

The Department emailed public notice of the draft permit to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, the Department of Arkansas Heritage, and the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health or Endangered and Threatened Species from the agencies with the jurisdiction over these matters.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the
record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the Buffalo River Watershed and to protect the vitality of the Buffalo National River as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018. Watershed management plans are recognized by EPA as comparable, state-led management approaches expected to result in the attainment of water-quality standards.

Comment 134: With waterways being impaired nationwide by concentrated animal feeding operations, how can you guarantee that C&H hog facility will not damage the Buffalo River? Will you allow C&H to continue expanding acreage if it's current disposal acreage, tests above optimum for nutrients? Future generations are going to wonder even more than we citizens today...how can DEQ not require a more accurate EA? Neil Compton must be spinning in his grave.
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

The API is used to develop loading rates for land application based on phosphorus. There are many factors taken into account to determine whether land application on a specific field is allowable. While the soil test phosphorus is one of those factors, it is not the determining factor. A field with high soil test phosphorus may still be appropriate for land application.

An Environmental Assessment is not required for the permitting process and was not provided as part of the permitting process. The Environmental Assessment was prepared by the United States Department of Agriculture Farm Service Agency and the United States Small Business Administration as part of their process in issuing loan guarantees.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the Buffalo River Watershed and to protect the vitality of the Buffalo National River as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018.
Watershed management plans are recognized by EPA as comparable, state-led management approaches expected to result in the attainment of water-quality standards.

Comment 135: Were the profits so great that it didn’t matter if the Buffalo River was polluted? The river is already showing more algae. Studies show nitrate levels are consistently higher in Big Creek downside from C&H than above. Years ago, our church in Wisconsin was uphill from a family farm. Every spring when they cleaned the pig barn, you couldn’t open church windows for the stench. Imagine what the children in the school near this factory farm are breathing? This permit was fast-tracked under the noses of both state and national citizens. Don’t renew it! A C&H permit alteration would change from operating under federal regulations to a state version without expiration or a review requirement. How sweet for C&H! Don’t renew the permit.

Original Commenter: Catherine Behlendorf and Larry Behlendorf

Response: Data collected by the Department shows no statistical difference in nitrates on Big Creek before and after prior permit issuance.

The Department has received multiple comments regarding algae concerns in the Buffalo National River Watershed. The Department and the NPS are in the process of designing an algal monitoring program for the Buffalo National River and its tributaries. If an algal bloom is reported, the Office of Water Quality may conduct an investigation.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

BCRET data document that nitrate-N is variable; however, Figure 12 of the April 1 to June 30, 2018 BCRET Quarterly Report demonstrates that nitrate-N is higher downstream (BC7) than upstream (BC6). Chlorides and nitrates follow similar seasonal fluctuations in that they are higher during summer and autumn months when stream discharge is most influenced by groundwater. ADEQ reviewed Jim Petersen’s May 31, 2018 expert report, which presents an analysis of temporal trends among nitrate-N and E. coli from January 2014–December 2017 at BC6 and BC7. Mr. Petersen’s analysis presents decreasing trends of ammonia and chlorides and increasing concentrations of E. coli at BC6. Yet, increasing concentrations of nitrate-N were observed downstream at BC7. The conflicting temporal analysis prompted Mr. Petersen to further review trends upstream to downstream. By analyzing paired concentration data (collected same day) at BC6 and BC7 from January 2014 through December 2017, Mr. Petersen reports significant increases in total nitrogen, ortho-phosphorus, and chlorides, but non-significant changes in E. coli and nitrate-N. The significant increase of nitrate-N in the house well and ephemeral stream does correspond to increases of total nitrogen at BC7. Mr. Petersen’s analysis illustrates the complexities of evaluating water chemistry in karst systems.

ADEQ is working to support a collaborative study with the Arkansas Game and Fish Commission, US Geological Survey, and the National Park Service focused on the distribution and causation of the rapid expansion of filamentous algae in the Buffalo River.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the Buffalo River Watershed and to protect the vitality of the Buffalo National River as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The
nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018. Watershed management plans are recognized by EPA as comparable, state-led management approaches expected to result in the attainment of water-quality standards.

Comment 136: Mr. Huetter's (Harbor 2016) field book indicates that 50 gallons of grout was needed to grout a six inch diameter borehole for the last 12 feet. What is ADEQ's opinion of this anomalous volumetric amount of grout required for this short vertical distance that is directly adjacent to the swine waste lagoons when it has been calculated that it would only take approximately 17 gallons?

Original Commenter: Ray Quick

Response: The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

Comment 137: It is noted on Harbor's boring log that "Total approx. 750 gallons of potable water added" at 38.5 feet (ft.) below ground surface (b.g.s.) while drilling a 120.5 ft. borehole. Anomalous amounts of grout where consumed and circulation losses where noted above the competent bedrock/regolith lithologic contact at 28.5 b.g.s.. This is/was an important area to delineate because this lithologic interval is directly adjacent and below the swine waste lagoons where potential swine waste leaks could have been initially detected. Does ADEQ think it is possible that discrete or perched groundwater in this interval (e.g. commonly referred to as epikarstic flow by Hydrogeologists) could have been missed because of the introduction of large amounts of potable water during drilling operations?

Original Commenter: Ray Quick

Response: The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

Comment 138: Is it possible that there was an underestimate of 104 gallons of Portland cement required for grouting the borehole other than Harbor's explanation of weathered limestone, fractures, "possible void" ADEQ (2016) at 25 ft. b.g.s. as opposed to enhanced solution feature(s)?

Original Commenter: Ray Quick
Response: The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

Comment 139: Did an ADEQ Arkansas Registered Professional Geologist review the initial Regulation 6 permit? Is an ADEQ Arkansas Registered Professional Geologist reviewing the proposed Regulation 5 permit?

Original Commenter: Ray Quick

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

This permit application was reviewed by technical staff, including Professional Geologists.

Comment 140: Does ADEQ believe ERI geophysical signatures can change over time?

Original Commenter: Ray Quick

Response: The Electrical Resistivity Imaging study was performed as part of the BCRET on-going study. While the Department may consider the research conducted by the University of Arkansas, questions regarding the study should be more appropriately directed to the University of Arkansas.

Comment 141: Why wasn't the rotosonic drill rig equipped with the proper mechanical apparatuses(s) to properly complete this costly taxpayer project? ADEQ states that a high speed rotation tool was not available at the time. Why didn't AQEQ, as they require consultants to do, request the consultant to get the proper drilling equipment to the site on this costly taxpayer job?

Original Commenter: Ray Quick

Response: The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.
Comment 142: Due to high levels of public interest, complexity of the Draft Permit and reference documents and the impending release of relevant reports the Panel request an extension of time for the submission of comments on the Draft Permit.

Original Commenter: Anna Weeks

Response: This draft permit was public noticed on February 15, 2017. In accordance with APC&EC Regulation 8.208 (B), the public comment period shall begin on the day the notice is published and shall expire on the thirtieth (30th) calendar day after the publication of the notice. Therefore, the public comment period ended on March 17, 2017. The Department received multiple requests for a 20-day extension of the comment period, which the Director granted in accordance with APC&EC Regulation 8.208(C). The extension of the comment period ended on April 6, 2017. The referenced report was published on March 15, 2017.

Comment 143: During the Arkansas Pollution Control and Ecology Commission third party rulemaking process on Regulations 5 and 6 initiated by the Panel and Ozark Society, the Panel along with the Ozark Society submitted thorough comments in regards to the environmental, public health, and economic risks associated with swine CAFOs in general and specific risks of siting CAFOs in karst terrain. The issues and concerns raised in those comments are relevant to this draft permit; I have attached them and request they be incorporated into this record.

Original Commenter: Anna Weeks

Response: The development of APC&EC regulations is outside the scope of this permitting decision. This permitting decision and the corresponding comment period are separate from the third-party rulemaking of APC&EC Regulation 5 and Regulation 6.

Comment 144: APC&EC Regulations 5 and 6 that govern CAFOs in Arkansas do not require independent monitoring of the CAFO facility or manure application. The entire hog operation is self-monitored by the grower. This includes the number of hogs on site, carcass treatment and disposal, disease management (drug and antibody regimes), maintenance and discharge of holding ponds, manure transportation, compliance with permitted manure field application sites, and manure application levels. The grower also collects annual soil and water samples. ADEQ may inspect the facility from time to time largely driven by citizen complaints. Because C&H is a private facility, inspection by concerned citizens would be considered trespassing. ADEQ by their own admission lacks a sufficient number of inspectors and funding to ensure compliance with the law.

Original Commenter: Teresa Turk
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. All individual permits issued by ADEQ’s Office of Water Quality have self-regulating and self-monitoring conditions and requirements that require the permittee to monitor the facility and submit reports to demonstrate compliance. The Office of Water Quality Compliance Branch makes every effort to inspect facilities at least once every five years or more frequently, as needed. The inspectors may visit random land application sites to observe the application of waste to ensure the waste is being land applied in the proper manner and in the appropriate location. The Office of Water Quality Compliance Branch inspects any facility when the Department receives citizen complaints that may indicate non-compliance with permit conditions.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 145: Please provide evidence that you have reviewed all the calculations made to access the current API contained in the NMP of the existing and proposed manure application fields.

Original Commenter: Teresa Turk

Response: The example calculations included in the NMP were reviewed during the technical review of the application.

Comment 146: Please provide evidence that you have reviewed and have confirmed that all land application contracts are accurate and the signatures valid.

Original Commenter: Teresa Turk

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5.405(B) requires the applicant to provide proof of land ownership or of contractual agreements for use of the land as a land application site.

Comment 147: Please provide a copy of ADEQ’s monitoring plan to assess compliance with all aspects of the permit and ensure that citizens coming in contact with water from Big Creek or the BNR are safe from pathogens.

Original Commenter: Teresa Turk
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

Comment 148: Please provide a copy of your eco-monitoring of Big Creek to ensure that algae blooms and excessive growth are in compliance with Regulation 2 requirements and to ensure the public that cyanobacteria or other harmful types of algae are not present in Big Creek or the BNR.

Original Commenter: Teresa Turk

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

The Department and the National Park Service are in the process of designing an algal monitoring program for the Buffalo National River and its tributaries. If an algal bloom is reported, the Office of Water Quality may conduct an investigation.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the Buffalo River Watershed and to protect the vitality of the Buffalo National River.
as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018. Watershed management plans are recognized by EPA as comparable, state-led management approaches expected to result in the attainment of water-quality standards.

ADEQ is working to support a collaborative study with the Arkansas Game and Fish Commission, US Geological Survey, and the National Park Service focused on the distribution and causation of the rapid expansion of filamentous algae in the Buffalo River.

Comment 149: BCRET data indicate that C & H Hog farms is having a negative impact on surface waters. By evaluating nitrate concentrations in Left Fork Big Creek (BC9, Control) compared to Big Creek (BC7, Impact), we see they are significantly greater at BC7 (Student's t-test, df = 37.1, t = -2.11, P = 0.042; Figure 1). The same trend holds true with total nitrogen (Figure 2). Because the watershed sizes, land-use land-cover (Table 2), and proximity to one another, these sites serve as pretty decent control and impact sites. Despite the higher proportion of pasture land in LFBC, we still see higher nitrate concentrations in Big Creek. The significance of this should not be lost on the reviewer, as one would expect to see the highest concentrations in LFBC based on percent pasture alone.

Condition No. 2 prohibits discharge from this facility, and if the facility anticipates any discharge then the facility must be covered under a NPDES permit. Here ADEQ is relying on the argument that just because this particular CAFO is not actually proposing to discharge that a NPDES permit is not necessary. However, data indicate that the permitted facility, either through the holding ponds or through the application fields, has already violated the condition of this permit by discharging to waters of the state (Figure 1).

Since the purpose of Governor Beebe requesting $340,510 of tax payer funds was for the University of Arkansas to form the Big Creek Research and Extension Team (BCRET) to develop a study for “the use and benefit of ADEQ and to inform its ultimate performance of its regulatory functions”, these data cannot be dismissed. If the Department cannot assume that the current study design and methods will allow the Department to make a permitting decision based on definitive evidence of contamination, then the Department is obligated to take a weight of evidence approach to determine the potential for irrevocable harm. And although the state has not adopted numeric nutrient criteria for Arkansas, the recommended total nitrogen aggregate ecoregion criteria for this area is
0.31mg/L, which is well below the 0.41 mg/L mean TN concentration found on Big Creek.

These data indicate that either a) current permitting requirements are not sufficient enough due to karst topography (more on this below) or b) the permittee is not following requirements set out in the permit and therefore is in violation and should not be issued a new permit. Because it is within ADEQ’s right to deny a permit based on violations and it should be their prerogative when considering how best to protect the Buffalo River.

Original Commenter: Jessie J. Green

Response: The Department considered all relevant scientific data submitted during this permitting process. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

The ADEQ Office of Water Quality Planning Branch routinely collects and evaluates water quality data from approximately 300 stations across the state. The Department is required every two years by 40 CFR 130.7(b)(5) to assess all readily available data for attainment of water quality standards. The EPA did not include Big Creek on the approved 2016 303(d) list.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.
While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504(a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

BCRET data document that nitrate-N is variable; however, Figure 12 of the April 1 to June 30, 2018 BCRET Quarterly Report demonstrates that nitrate-N is higher downstream (BC7) than upstream (BC6). Chlorides and nitrates follow similar seasonal fluctuations in that they are higher during summer and autumn months when stream discharge is most influenced by groundwater. ADEQ reviewed Jim Petersen’s May 31, 2018 expert report, which presents an analysis of temporal trends among nitrate-N and *E. coli* from January 2014–December 2017 at BC6 and BC7. Mr. Petersen’s analysis presents decreasing trends of ammonia and chlorides and increasing concentrations of *E. coli* at BC6. Yet, increasing concentrations of nitrate-N were observed downstream at BC7. The conflicting temporal analysis prompted Mr. Petersen to further review trends upstream to downstream. By analyzing paired concentration data (collected same day) at BC6 and BC7 from January 2014 through December 2017. Mr. Petersen reports significant increases in total nitrogen, ortho-phosphorus, and chlorides, but non-significant changes in *E. coli* and nitrate-N. The significant increase of nitrate-N in the house well and ephemeral stream does correspond to increases of total nitrogen at BC7. Mr. Petersen’s analysis illustrates the complexities of evaluating water chemistry in karst systems.

ADEQ evaluated total phosphorus concentrations in Big Creek according to the 2016 Assessment Methodology and the 2018 Assessment Methodology. For the 2016 assessment cycle, Big Creek (BUFT06, AU 11010005_020) mean total phosphorus and total nitrogen were 0.026 mg/L and 0.33 mg/L, respectively. The assessment methodology for APC&EC Reg. 2.509 screens the monitoring

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station’s mean total phosphorus and total nitrogen concentration to the 75th percentile for a given ecoregion for the assessment cycle period of record. Screening values for the Boston Mountain ecoregion for 2016 total phosphorus and total nitrogen were 0.036 mg/L and 0.46 mg/L, respectively. The 2018 screening values were 0.036 mg/L and 0.55 mg/L for total phosphorus and total nitrogen. The mean values for 2018 for BUFT06 were 0.028 mg/L total phosphorus and 0.297 mg/L total nitrogen. All mean total phosphorus and total nitrogen for Big Creek were below the Boston Mountain ecoregion 75th percentile. At this time, neither the Buffalo National River nor Big Creek have been identified as impaired for phosphorus based on the EPA-approved Assessment Methodology.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the Buffalo River Watershed and to protect the vitality of the Buffalo National River as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018. Watershed management plans are recognized by EPA as comparable, state-led management approaches expected to result in the attainment of water-quality standards.

**Comment 150:** If the Department believes that the 2015 Primary Contact season *E. coli* impairment on Big Creek, the 2015 dissolved oxygen impairment on Big Creek, and the significantly higher nitrate and nitrogen levels ([Figure 1](#) and [Figure 2](#)) are not sufficient enough to make a determination that C & H Hog Farms is having a negative impact on water quality, then it’s obvious that using nutrients, *E. coli* and Fecal coliform as the only means for determining whether or not water quality impacts can definitively be attributed to this facility48 is not sufficient enough for ADEQ to make a determination and they should require additional monitoring.

If the agency wanted to monitor parameters that they would not eventually end up disregarding or attributing to a number of other sources (e.g. feral hogs), they would also require monitoring of steroid hormones, antibiotics, or a number of the numerous carcinogenic pharmaceuticals that are commonly used at CAFOs. As we all know, *E. coli* is a surrogate for measuring the potential for presence of other microbial pathogens. These pathogens that we should really be concerned about in swine manure are pathogens such as, *Salmonella* spp., *Campylobacter* spp., *Clostridium perfringens*, and *Cryptosporidium parvum*. 
Pathogens can survive longer in groundwater than surface water because of the lower temperature and protection from the sun. Viruses can become attached to sediment particles and linger as a source of viral contamination to groundwater. Unfortunately, long periods of survival in groundwater are somewhat irrelevant, as rapid transport of pathogens is extremely common in karst settings. At the same time, long-term storage in karst terranes often occurs.

Original Commenter: Jessie J. Green

Response: The ADEQ Office of Water Quality Planning Branch routinely collects and evaluates water quality data from approximately 300 stations across the state. The Department is required every two years by 40 CFR 130.7(b)(5) to assess all readily available data for attainment of water quality standards. The EPA did not include Big Creek on the approved 2016 303(d) list.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity
assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504(a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 151: Please describe how the ADEQ interprets the results of the 1994 CAFO study, the basis for determination that the 1992 CAFO moratorium is no longer in effect, and how a determination of a facility of this size meets the intent of the Basin-Wide Initiative of the Buffalo River Watershed and Moratorium.

Original Commenter: Jessie J. Green

Response: The administrative notice issued on October 12, 1992, was not a moratorium because it was not a final decision by the Department. The administrative notice clearly stated that any person adversely affected by a subsequent action by the Department could challenge that action as provided by applicable law. In the administrative notice, the Department indicated that it would signal the Department’s final decision through a subsequent permitting decision. The 1994 CAFO study is outside the scope of this permitting decision.

Comment 152: Also, relying on physicochemical measures of water quality alone to measure changes in stream ecosystems ignores nutrient cycles and disregards basic aquatic ecology principles of trophic interactions. Reactive nitrogen and phosphorous in the water column aren’t the endpoints of concern when one is trying to protect water quality. Uptake of nutrients by plants such as algae (generally the most common form of submerged vegetation) and emergent vegetation such as water willow can have a significant impact on aesthetics and recreational quality of a waterbody, by stimulating plant growth. Aquatic life beneficial uses are impacted by the change in food web dynamics that result from increasing plant productivity (the result of increased nutrients), but they are also impacted by the oxygen depletion that results in response to increased photosynthesis and decomposition in the waterbody.

Original Commenter: Jessie J. Green

Response: The Department considered all relevant scientific data submitted during this permitting process.
Response: The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen. Neither the Buffalo National River nor Big Creek have been identified as impaired for phosphorus.

ADEQ is working to support a collaborative study with the Arkansas Game and Fish Commission, US Geological Survey, and the National Park Service focused on the distribution and causation of the rapid expansion of filamentous algae in the Buffalo River.

Comment 153: E. coli levels have also been shown to be excessively high during periods of heavy rainfall, when Arkansas Sierra Club members (including children) are most likely to be using this stretch of river -- meaning that we are already being exposed to the detriments of the hog factory.

Original Commenter: Bob Allen for the Sierra Club

Response: Results of E. coli sampling in the Big Creek watershed do not show conclusive evidence that this facility is the source of high E. coli levels.

The EPA did not include Big Creek on the approved 2016 303(d) list.

Response: The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four
Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 154: ADEQ's initial decision to grant a CAFO permit to C&H was ill-conceived, but more importantly failed to protect the river for future generations' use. Nothing in the original permit indicates that ADEQ even considered the farm's impact on future generations. The present Regulation 5 permit also ignores C&H's impact on future generations of Americans and Arkansans, including young and future Arkansas Sierra Club members. Any decision to renew C&H's permit would arbitrarily discriminate against those future users of the Buffalo National River, because their ability to enjoy the Buffalo River would be, at the very least, diminished substantially.

Original Commenter: Bob Allen for the Sierra Club

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the Buffalo River Watershed and to protect the vitality of the Buffalo National River as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018. Watershed management plans are recognized by EPA as comparable, state-led
management approaches expected to result in the attainment of water-quality standards.

Comment 155: I worry that our areas growth, everything from rental cabins to retirement homes, from chicken houses to hogs running wild, has caused our Buffalo River watershed to reach a tipping point. Why is this permit expansion being considered at a time when not only is there supposed to be a moratorium on any new pig farms, but the permit for C&H Farm was supposed to run out of 2015? A CAFO is not a farm, it is a point-source major polluter. This CAFO is equivalent to a new mid-size city along the Buffalo, one without a sewage treatment plant. So far C&H is ruled “safe for the environment” simply because leakage and field spreading of manure has not built up enough to show damage yet.

Original Commenter: Virginia Booth

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Based on the permit application, this facility meets the requirements of APC&EC Regulation 5.901.

APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 156: We are at the beginning of a new era for water management along the river since it is starting to degrade at a more noticeable rate. Since the river is changing then rules and regulations that weren’t necessary before are now needed to more closely regulate the water and halt or reverse any noted drop in water quality. There needs to be a publicly known defined limit of what amount of
nitrates etc. are allowable, and assurances that if the level is reached certain steps will be taken to halt and reverse the pollution.

Original Commenter: Virginia Booth

**Response:** APC&EC Regulation 2 Chapter 5 gives specific standards for waterbodies in the State of Arkansas. The ADEQ Office of Water Quality Planning Branch routinely collects and evaluates water quality data from approximately 300 stations across the state. The Department is required every two years by 40 CFR 130.7(b)(5) to assess all readily available data for attainment of water quality standards.

**Response:** The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the Buffalo River Watershed and to protect the vitality of the Buffalo National River as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018. Watershed management plans are recognized by EPA as comparable, state-led management approaches expected to result in the attainment of water-quality standards.

The water quality standards set forth in APC&EC Regulation 2 are outside the scope of this permitting decision.
Comment 157:    I also learned that in a flat area the sludge pollution only moves about 10’ a year, which I would assume gives it time to season and weaken and diffuse. Whereas in a hilly area the sludge moves 2,000’ every (I didn’t catch how often, a week, a month, a year?) This means that Big Creek, next to C&H Farms and six miles upstream from the Buffalo, is nothing but a pipe line to send the sludge quickly to the river. I don’t know how they will find flat fields like that in this area!

Original Commenter: Virginia Booth

Response:    The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5.406(C) allows waste or wastewater to be land applied on to slopes of up to fifteen percent (15%) and prohibits land application in any manner that will allow waste to enter Waters of the State or to run onto adjacent property without the written consent of the affected adjacent property owner.

Response:    The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 158:    As I understand it this new permit does not expire as the previous permit did which could allow additional review and public input. This is another major flaw in the entire permitting process.

Original Commenter: Gerald Weber

Response:    APC&EC Regulation 5 permits do not expire. Any major modifications will be subject to the permit review process and associated public comment process.

Comment 159:    The testing results from the single well which was drilled to supposedly assure that the ponds were not leaking was not the preferred number of wells the scientific community had recommended and although no significant contamination from the ponds was indicated, there was an area where the karst makeup indicated a major fracture of the substructure rock. So, it is clear from even this single well that should the ponds leak, the subsurface structure will
allow the transport of any contaminants throughout the region and where it will end up in the nearby waterways.

Original Commenter: Gerald Weber

**Response:** APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 1D. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

**Comment 160:** The water testing in Big Creek below the C&H hog farm clearly indicates increasing levels of nitrates. The argument is that at this point no one knows if this is due to the C&H hog farm or from upstream. I believe that any person with any scientific knowledge understands that when increases are shown which could lead to upsetting the biological norm that one begins a through investigation of where they came from. And, I understand that Big Creek has now been requested they AGFC and the NPS to be placed on the impaired stream list due to the low
levels of dissolved oxygen, another indication of a serious problem which likely is the result of operations at C&H Farms.

Original Commenter: Gerald Weber

Response: BCRET data analyzed by Mott (2016) does indicate that nitrates increase from a median value of 0.10 mg/L to 0.23 mg/L from upstream to downstream, respectively. In comparison to domestic water supply uses (10 mg/L), nitrate values observed in Big Creek, both upstream and downstream, are well below most groundwater and source water intakes. For example, the Arkansas Department of Health reports in the 2016 Annual Drinking Water Quality Report for the City of Jasper a mean nitrate value of 0.36 mg/L, with a range from 0.12 to 0.59 mg/L (ADH, http://www.healthy.arkansas.gov/eng/ccr/397.pdf).

The EPA did not include Big Creek on the approved 2016 303(d) list.

While nitrate concentration peaks as well as other nonpoint source pollutant peaks could be noted in the watershed, several potential sources of nonpoint source pollution other than land applied hog waste exist in the watershed, including but not limited to animal grazing, poultry litter, wild animals, lawn maintenance, and failing septic systems. ANRC is currently developing a watershed plan for the Buffalo National River.

Response: The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

BCRET data document that nitrate-N is variable; however, Figure 12 of the April 1 to June 30, 2018 BCRET Quarterly Report demonstrates that nitrate-N is higher downstream (BC7) than upstream (BC6). Chlorides and nitrates follow similar seasonal fluctuations in that they are higher during summer and autumn months when stream discharge is most influenced by groundwater. ADEQ reviewed Jim
Petersen’s May 31, 2018 expert report, which presents an analysis of temporal trends among nitrate-N and E. coli from January 2014–December 2017 at BC6 and BC7. Mr. Petersen’s analysis presents decreasing trends of ammonia and chlorides and increasing concentrations of E. coli at BC6. Yet, increasing concentrations of nitrate-N were observed downstream at BC7. The conflicting temporal analysis prompted Mr. Petersen to further review trends upstream to downstream. By analyzing paired concentration data (collected same day) at BC6 and BC7 from January 2014 through December 2017, Mr. Petersen reports significant increases in total nitrogen, ortho-phosphorus, and chlorides, but non-significant changes in E. coli and nitrate-N. The significant increase of nitrate-N in the house well and ephemeral stream does correspond to increases of total nitrogen at BC7. Mr. Petersen’s analysis illustrates the complexities of evaluating water chemistry in karst systems.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the Buffalo River Watershed and to protect the vitality of the Buffalo National River as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018. Watershed management plans are recognized by EPA as comparable, state-led management approaches expected to result in the attainment of water-quality standards.

Comment 161: This permit fails to take into account evidence that discharge into Big Creek, and possibly the Buffalo National River, is already occurring. Data collected by the Big Creek Research and Extension Team (BCRET) shows that nitrate levels are consistently higher downstream of this CAFO than above. The National Park Service, with concurrence of Arkansas Game and Fish Commission, has requested a 303(d) listing for impaired status for Big Creek due to low dissolved oxygen (DO) levels, a consequence of nutrient overloading. A recent report by USGS confirmed low DO levels in Big Creek.

Original Commenter: Mark Richards

Response: BCRET data analyzed by Mott (2016) does indicate that nitrates increase from a median value of 0.10 mg/L to 0.23 mg/L from upstream to downstream, respectively. In comparison to domestic water supply uses (10 mg/L), nitrate values observed in Big Creek, both upstream and downstream, are well below most groundwater and source water intakes. For example, the Arkansas Department of Health reports in the 2016 Annual Drinking Water Quality Report for the City of Jasper a mean nitrate value of 0.36 mg/L, with a
The EPA did not include Big Creek on the approved 2016 303(d) list.

**Response:** The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

BCRET data document that nitrate-N is variable; however, Figure 12 of the April 1 to June 30, 2018 BCRET Quarterly Report demonstrates that nitrate-N is higher downstream (BC7) than upstream (BC6). Chlorides and nitrates follow similar seasonal fluctuations in that they are higher during summer and autumn months when stream discharge is most influenced by groundwater. ADEQ reviewed Jim Petersen’s May 31, 2018 expert report, which presents an analysis of temporal trends among nitrate-N and *E. coli* from January 2014–December 2017 at BC6 and BC7. Mr. Petersen’s analysis presents decreasing trends of ammonia and chlorides and increasing concentrations of *E. coli* at BC6. Yet, increasing concentrations of nitrate-N were observed downstream at BC7. The conflicting temporal analysis prompted Mr. Petersen to further review trends upstream to downstream. By analyzing paired concentration data (collected same day) at BC6 and BC7 from January 2014 through December 2017, Mr. Petersen reports significant increases in total nitrogen, ortho-phosphorus, and chlorides, but non-significant changes in *E. coli* and nitrate-N. The significant increase of nitrate-N in the house well and ephemeral stream does correspond to increases of total nitrogen at BC7. Mr. Petersen’s analysis illustrates the complexities of evaluating water chemistry in karst systems.

**Comment 162:** 40 C.F.R. Section 131.12(a)(3) of the antidegradation policy states “Where high quality waters constitute an outstanding National resource, such as waters of National and State parks…that water quality shall be maintained and protected.” Outstanding National Resource Waters, such as the Buffalo National River, are afforded the highest level of protection under the anti-degradation policy. Only
activities that cause short-term and temporary degradation may be allowed. Operation of a CAFO in the watershed of the Buffalo National River does not protect its water quality. On the contrary such operation serves only to threaten the water quality. Granting of this permit is in violation of 40 CFR 131 and should be denied.

Original Commenter: Mark Richards

Response: The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2.203. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to dictate regulatory authority over private land within the watershed, other than what exists under local, state, or federal law.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department is actively engaged in developing an antidegradation implementation procedure to address the revision of 40 CFR § 131.12. The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2 Chapter 2. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to dictate regulatory authority over private land within the watershed of an ERW, other than what exists under local, state, or federal law.

Comment 163: A large Swine Concentrated Animal Feeding Operation (Concentration is a key word here: too many in one place and the wrong place, i.e. karst) in the watershed not only endangers water quality in the national river, it puts an undue burden on water resources in the watershed, the Ozark aquifer, and adjacent land use management and erosion control. While it appears that ADEQ and the said permit, via the Environmental Assessment (EA) prepared for their loan guarantees, they have gone to considerable lengths to avoid acknowledging that karst underlies this facility. Scientific data clearly and unequivocally shows otherwise. While concerning in its own right, the presence of karst has other implications. It points to the faulty Environmental Assessment which, rather than a Finding Of No Significant impact , should have led to a full Environmental Impact Statement.

Original Commenter: Ginny Masullo
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

An Environmental Assessment is not required for the permitting process and was not provided as part of the permitting process. The Environmental Assessment was prepared by the United States Department of Agriculture Farm Service Agency and the United States Small Business Administration as part of their process in issuing loan guarantees.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 164: First, allowing the permit would violate the protections afforded to this Tier 3 River. The Buffalo National River is a Tier 3 River. As you know this designation applies to Outstanding National Resource Waters (ONRWs) where ordinary use classifications and supporting criteria may not be sufficient or appropriate. ONRWs are frequently considered the highest quality waters of the United States, but may also include waterbodies that are of “exceptional recreational or ecological significance,” as stated under 40 C.F.R. Section 131.12(a)(3) of the anti-degradation policy. A new study is being released by the National Park Service that looks at 25 year trends in the Buffalo National River’s water quality. We respectfully ask that ADEQ consider postponing a final decision on C&H’s Regulation 5264-W permit until the study is available and can be considered by the department.
Original Commenter: Emily Jones for the National Parks Conservation Association

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The aforementioned study was completed and published and has been considered in this permitting decision.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 165: Condition No. 2 of the C&H Farm permit prohibits any discharge from this facility. If the facility anticipates any discharge then the facility must apply for a National Pollutant Discharge Elimination System (NPDES) permit 180 days prior to the anticipated discharge. NPCA contends that C&H Farms does discharge to either or both the Buffalo National River and/or the Ozark Aquifer through its Waste Management Plan which is part and parcel of the confined animal farrowing operation.

Original Commenter: Emily Jones for the National Parks Conservation Association

Response: APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of
Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 166: According to the draft permit, the facility is estimated, based on animal weight and numbers provided in Section 2 of the NMP, to generate 1,897,635 gallons of waste annually. The annual total waste available (animal waste generation, wash water, rainfall, and 24-hour, 25-year storm event) is estimated to be 2,624,000 gallons. There are 630 acres available for land application, according to the Nutrient Management Plan. If, 2,624,000 gallons of liquid animal waste is applied to 630 acres of land a year, and there is “no discharge”, then all that waste (minus whatever is lost to evaporation) should still be on the fields. That is over 4,000 gallons per acre per year, minus the natural evaporation of H2O. Based on the actual feces and urine the animals generate, each acre would receive more than 3,000 gallons of swine waste annually, or 14.5 gallons of swine waste, not wash water or rainwater, per square foot. Where does it go?

Original Commenter: Emily Jones for the National Parks Conservation Association

Response: Land application of liquid animal waste is an authorized method of disposal under APC&EC Regulation 5.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 167: We feel that the regulation 6 permit previously granted to C&H Farms was wrong if for no other reason that the public was not properly notified and allowed a comment period before issuance of the permit.

Original Commenter: Bob Allen
Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

Comment 168: It is reasonable to expect that the farm and spray fields where the feces and urine are spread are underlain by Karst, as the Boone Formation dominates the watershed of the Buffalo National River. This risks polluting an Extraordinary Resource Water and a wilderness area through which it flows.

The Karst topography has already been shown to exit near the farm and spray fields because of the presence of springs, intermittent creeks, and caves. This porosity has been confirmed by dye-tracing studies nearby and by one Electrical Resistivity Imaging (ERI) study near the holding ponds. The dye testing has revealed some movement of waste effluent into the Karst geology surrounding C&H, which could devastate Buffalo River wildlife should a new permit be issued.

The dye tracing studies, and the decision to conduct only one ERI study, show a disregard for the real risks to subsurface water movement and migration of nutrient and bacterial pollution to the Buffalo National River and its tributaries.

Original Commenter: Bob Allen

Response: APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits. The Department considered all relevant scientific data submitted during this permitting process.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)-(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 169: E coli levels have also been shown to be excessively high during periods of heavy rainfall, when Arkansas Canoe Club members (including children) are most likely to be using this stretch of river - meaning that we are already being exposed to the detriments of the hog farm. Any decision to renew C&H’s permit would arbitrarily discriminate against those who are not yet born or are very young now because their ability to enjoy the Buffalo River would be rendered impossible or, at the very least, diminished substantially.

Original Commenter: Bob Allen

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Results of E. coli sampling in the Big Creek watershed do not show conclusive evidence that this facility is the source of high E. coli levels.

The EPA did not include Big Creek on the approved 2016 303(d) list.

Response: The Department amends its previous response. ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.
APC&EC Regulation 5 requires compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. These geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

**Comment 170:** The National Parks Conservation Association letter states that allowing the permit would violate the protections afforded to the Buffalo National River, a Tier 3 River.

Original Commenter: Fay Knox

**Response:** The Department made this permitting decision in accordance with state laws and applicable APC&EC regulations.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 171:** Are you related to the owners of C&H? Or are you being subsidized by Cargill? If not, I simply cannot see why you continue to ignore all the science and the relevant studies done by reputable geologists and other scientists from the University of Arkansas and the Fish & Wildlife Service showing that the waters of Big Creek and the Buffalo have already been adversely affected. No adequate environmental study has ever been done to prove otherwise, and you have refused to have such a study done to meet the requirements of the original permit and the proposed extension and renewal.

Original Commenter: Nancy Baxter

**Response:** This permitting decision is for a new individual APC&EC Regulation 5 permit, not an extension or renewal. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

The EPA did not include Big Creek or the Buffalo National River on the approved 2016 303(d) list. The Department considered all relevant scientific data submitted during this permitting process.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

APC&EC Regulation 5 requires compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. These geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 172: Now that C&H is built and operating, two of the key reasons for holding a Reg. 6 permit no longer apply. Instead, a Reg. 5 permit will allow them to add land application sites as a minor modification, and lengthens the time between soil testing from once every 3 years to once every 5 years. This could prove useful as many of the new fields C&H proposes to use are already near or above optimum for nutrients.

Original Commenter: Lin Wellford

Response: Pursuant to APC&EC Regulation 5.306, the addition of land application sites to a permit would be a minor modification that would be in an effort to be proactive in environmental protection. The API is used to develop loading rates for land application based on phosphorus. There are many factors taken into account to determine whether land application on a specific field is allowable. While the soil test phosphorus, referred to as “near or above optimum” by the commenters, is one of those factors, it is not the determining factor. A field with high soil test phosphorus may still be appropriate for land application. The Department only permits land application when the API value is a low or medium class.
Response: The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA1029, “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA9516 states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 173: A key point of dispute from the start has been the claim by geologists that Mount Judea sits on porous and fractured limestone formations called karst that are prevalent throughout the Ozark Highlands Plateau. USGS national maps of karst clearly show the Buffalo Watershed is within the karst region. ADEQ and C&H have ignored or denied that karst substrate is an issue. NRCS further states that “waste must be applied in a manner that: Prevents runoff or excessive deep percolation of the wastewater, Applies nutrients in amounts that do not exceed the needs of the crop, Minimizes odors from waste being applied.

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8 https://www.uaex.edu/publications/PDF/FSA-9516.pdf
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

APC&EC Regulation 5.402 incorporates both the AWMFH and NRCS Field Office Technical Guides. The AWMFH Part 651.0106(i) lists applicable NRCS Conservation Practice Standards, which includes NRCS Conservation Practice Standard Nutrient Management Code 590 for nutrient management. NRCS Conservation Practice Standard Nutrient Management Code 590 for the State of Arkansas allows for land application based on the API, which does not limit land application of phosphorus to agronomic need.

Consideration of odor from agricultural facilities is not generally within the Department’s regulatory authority; however, in order to minimize odor, the APC&EC’s policy is to encourage permittees to adopt a good neighbor policy and consider the use of chemical or biological additives or other best management practices in the operation of liquid animal waste management systems.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.
Comment 174: At this point we can look at trends and extrapolate from them that if millions of gallons of sewage continue to be added to the watershed, we are likely to continue to see increasing indicators of stress and impairment in the Buffalo River. More persistent and widespread algae, fish kills, a drop in tourism, possible health warnings due to rising pathogens at certain access areas are all outcomes that become more probable as time goes by. Adding more and more acres of application fields within the watershed only assures that even if (when) this industrial animal operation is finally closed for good, the impact it has had will continue to degrade the water quality for decades.

Original Commenter: Lin Wellford

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The Department considered all relevant scientific data submitted during this permitting process.

The Department emailed public notice of the draft permit to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, the Department of Arkansas Heritage, and the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health or Endangered and Threatened Species from the agencies with the jurisdiction over these matters.

The Department has received multiple comments regarding algae concerns in the Buffalo National River Watershed. The Department and the NPS are in the process of designing an algal monitoring program for the Buffalo National River and its tributaries.

Consideration of tourism is not within the Department’s regulatory authority.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo
National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the Buffalo River Watershed and to protect the vitality of the Buffalo National River as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018. Watershed management plans are recognized by EPA as comparable, state-led management approaches expected to result in the attainment of water-quality standards.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 175: As Judge Marshall Price ruled, the original Environmental Assessment for C&H was inadequate and cursory. He ruled that a 2nd assessment had to be conducted, but again, it was done by an out-of-state company I understand never even visited the area. Both EAs left out mention of the threat of land applied waste in an area of thin top soil and karst geology. In fact, neither one even addressed the fragile geology of the area. Fractures and fissures make it inevitable that pollutants will find easy access and travel deep into the ground. USGS maps, as well as credible state hydro-geologists and also, the ERI images provided through the sub-contracted study done by OK State U. geologists, should have been enough to prove that the area around the facility and throughout the Mount Judea region is particularly unsuitable for the massive land application of waste. Ground water transmission can be as rapid as seen with surface waterways, but is difficult to track without dye testing, which has NEVER been conducted for this facility. Privately funded studies around the facility suggest underground transmission up to 13 miles from the source. C&H is only 6 miles from the Buffalo River, and perhaps even closer via subterranean conduits. Added to that is the single-hole exploration of the suspicious looking cavity that was indicated in the ERI study. Harbor Environmental refused to answer questions about the results of their exploratory drilling, and most particularly, the fact that refilling the bore hole required substantially more cement than expected.
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits. APC&EC Regulation 5 does not require dye tracing studies to be conducted.

An Environmental Assessment is not required for the permitting process and was not provided as part of the permitting process. The Environmental Assessment was prepared by the United States Department of Agriculture Farm Service Agency and the United States Small Business Administration as part of their process in issuing loan guarantees.

The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 176: What will it take to get an admission that C&H Hog Farms, Inc. was indeed inappropriately sited on karst in an ecologically sensitive area?
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 177: Since the very nature of impairment via nonpoint sources is incremental and difficult to track, shouldn't the clear trends being seen in testing be enough to cause ADEQ deep concern? How much impairment will ADEQ consider acceptable? At what point will the director be willing to recognize that damage is being done? Which will it take: A Major fish-kill event? Persistent algae blooms? For how long? How many river miles of algae will be acceptable? Increasing accounts of water-born illness? Will someone have to die in order to have this danger recognized?

Original Commenter: Lin Wellford

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The Department considered all relevant scientific data submitted during this permitting process.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the Buffalo River Watershed and to protect the vitality of the Buffalo National River as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018. Watershed management plans are recognized by EPA as comparable, state-led management approaches expected to result in the attainment of water-quality standards.

ADEQ is working to support a collaborative study with the Arkansas Game and Fish Commission, US Geological Survey, and the National Park Service focused on the distribution and causation of the rapid expansion of filamentous algae in the Buffalo River.

Comment 178: Can the director and agency heads of the water division of ADEQ really be unaware of the ongoing and rising pollution of 55% of all monitored waterways? Have you not seen EPA data that 40% of impairment is caused solely by nonpoint source pollution? Do we really have to let the hog waste build up in the watershed to the point that the river is drastically damaged for decades or can we learn what other states have already learned?

Original Commenter: Lin Wellford

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The Department considered all relevant scientific data submitted during this permitting process.

The ADEQ Office of Water Quality Planning Branch routinely collects and evaluates water quality data from approximately 300 stations across the state. The Department is required every two years by 40 CFR 130.7(b)(5) to assess all readily available data for attainment of water quality standards.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other
subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the Buffalo River Watershed and to protect the vitality of the Buffalo National River as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018. Watershed management plans are recognized by EPA as comparable, state-led management approaches expected to result in the attainment of water-quality standards.

**Comment 179:** Now ADEQ wants to simply convert a DISCHARGE permit to a NO DISCHARGE permit without requiring significant or substantial changes in the engineering, operation, and maintenance of the pig factory. If I may quote Leonard Nimoy, “That is illogical Captain”. For this reason, and this reason alone, the permit should be immediately denied and C&H should be forced to apply for an individual NPDES permit, or be required to close their operation. To do any less is to continue the downward spiral down the path of ARBITRARY AND CAPRICIOUS actions and further ABUSE OF DISCRETION

Original Commenter: Charles Bitting

**Response:** The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.
It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 180: It is my personal opinion that ADEQ engineers are not thoroughly reviewing the applications from C&H. In the ADEQ Disclosure Statement Part 12 in their original application, C&H failed to note the sizable amount of debt being carried by Farm Credit Services, and the fact that the risk for much, if not all of that debt was being shouldered by US citizens through the USDA Farm Services Agency, and the Small Business Administration. Since this was not covered in the original, and has not been covered in any subsequent application, it is my opinion that this NEW PERMIT APPLICATION IS INVALID

Original Commenter: Charles Bitting

Response: The Department received an adequate disclosure statement.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 181: C&H only owns a few of the fields, they do not control the application of lime, nitrogen, and potassium on the majority of acres they spread waste onto. C&H cannot, or will not, balance and optimize these other nutrient to ensure the maximum amount of phosphorus is taken up by the forage grasses. C&H only
owns a few of the fields, they do not control stocking rates and stocking rotations on the majority of acres they have applied to spread waste on. C&H cannot move the livestock on fields they do not own to minimize soil loss while optimizing livestock production. In their 2016 annual report, C&H claims as much as 6 tons per acre of forage removed from fields they spread waste on. Since C&H does not manage most of these fields in the normal sense of a farm lease, I find these production numbers to be highly questionable.

Original Commenter: Charles Bitting

**Response:** APC&EC Regulation 5.405(B) requires the applicant to provide proof of land ownership or of contractual agreements for use of the land as a land application site. All fields are subject to APC&EC Regulation 5 permit conditions. The NMP initially submitted for this permit application was developed by ANRC and incorporates specific variables for each land application site into its calculation of allowable loading rates. The 2016 annual report is outside the scope of this permitting decision as it is a requirement of the prior APC&EC Regulation 6 permit coverage.

**Comment 182:** The hog waste is not a fertilizer in most cases. According to the Oxford English Dictionary, a fertilizer is a chemical or natural substance added to the land to increase its fertility. Nearly all of the fields have Optimum or Above Optimum levels of P already, and the N content of the manure is fairly low. Adding additional high P, low N hog waste will not make the fields substantially more fertile. These fields are actually WASTE DISPOSAL SITES, and should be noted as such.

Original Commenter: Charles Bitting

**Response:** Fertilizer is a commonly acceptable term for animal waste. The API is used to develop loading rates for land application based on phosphorus. There are many factors taken into account to determine whether land application on a specific field is allowable. While the soil test phosphorus, referred to as “above optimum” by the commenter, is one of those factors, it is not the determining factor. A field with high soil test phosphorus may still be appropriate for land application. The Department only permits land application when the API value is a low or medium class.

**Response:** The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA10299, “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA951610 states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504(a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 183: Unless the fields are hayed, and the hay is hauled out of the Big Creek watershed to be used as livestock feed elsewhere, there is a continuous net increase in available P within the Big Creek sub-watershed. The NMP does not account for the buildup of P in the sub-watershed through the feeding of this hay to livestock.

Original Commenter: Charles Bitting

Response: The NMP takes crop uptake and herd management into consideration when calculating loading rates for liquid animal waste.

Comment 184: Swine operations release a potpourri of gases into the air such as ammonia, hydrogen sulfide, volatile organic chemicals, and stink. While certain agricultural menageries are exempted from reporting on hazardous waste releases reportable under CERCLA and EPCRA, the state could independently monitor effluent and air releases associated with the C&H CAFO. Aside from the liquid,
anaerobic wastes in the lagoons, the CAFO releases ammonia wastes from the buildings and the spray application activities. Ammonia is an alkaline gaseous pollutant created by hog farms and other confined animal sites. When released into the air, ammonium-based fine particles are formed in aerosols that create haze and adverse respiratory effects at high levels. Increased haze levels—which are more accentuated in the summer—could foreseeably be another concern for recreational use of the nearby Buffalo River. ADEQ should monitor the aerosols emanating from the swine CAFO as well as the land applications of the manure slurry to ensure there are not adverse effects on human health or the environment, especially at nearby schools or other populated areas.

Original Commenter: Jeffrey Short

Response: Potential issues involving air quality are outside the scope of this permitting decision.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

Comment 185: Employing some intelligent rules and performance standards should allow the swine farm to continue to operate safely. Periodic monitoring of appropriate chemical releases is a relatively inexpensive means to ensure the existing wastes—hazardous, toxic, or biological—do not affect human health and the environment. Continued periodic monitoring is imperative and will provide a positive return-on-investment. It is far more cost effective to prevent pollution than to deal with it once it is released! Continued operation of the CAFO should adhere to performance accomplishments as a part of an approved confined animal waste management plan overseen by ADEQ.

Original Commenter: Jeffrey Short

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5.407 requires monitoring and reporting by all APC&EC Regulation 5 permitted facilities.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for
the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 186: The Buffalo river creates beautiful experiences as well as jobs. According to National Park statistics, the Buffalo River brought in over $62 million to local Arkansas communities in 2015. Perhaps the comparison should be how much revenue does the C&H CAFO produce for the state versus the recreational enjoyment of the Buffalo River? Or, is the CAFO a costly liability?

Original Commenter: Jeffrey Short

Response: Consideration of tourism and revenue is not within the Department’s regulatory authority.

Comment 187: There’s no mention of water quality data in the new permit. The only mention of any kind of data is BECRET’s data but that data won’t be interpreted by Dr. Sharpley until the end of his study, which will be what, 2019. So, I don’t think the state has already paid for this study and providing another permit when this study isn’t completed, this study doesn’t need to be used here. If you’re going to use it, then use the information that you already have. And that is that Big Creek’s impaired.

Original Commenter: Carol Bitting

Response: The EPA did not include Big Creek on the approved 2016 303(d) list. The Department considered all relevant scientific data submitted during this permitting process.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for
the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 188:  And I think the economic impact that the river has on tourism verses the employment that it has given to Newton County is so dramatically out of balance that from an economic tourism standpoint that ADEQ should be talking to the Department of Tourism and get some advice from them on how to address this permit as well.

Original Commenter: Steve Blumreich

Response:  Consideration of tourism and revenue is not within the Department’s regulatory authority.

Comment 189:  ADEQ continually granted permits to this confined animal Feeding Operation. The pork producers and farm bureau are very strong supporters of the hog farm. They have many lobbyists who are attempting to associate this huge factory farm as a family farm. It is NOT! It is situated on very fragile land which is known by scientists as karst. This is very porous rock that allows water to run through it. Hence, we have the most majestic bluffs and caves anywhere. Truly, a wonder of the world.

Original Commenter: Phyllis Head

Response:  The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

Response:  The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The
proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 190: And this indicates that something has been found, people have referred to that nothing has been found, this is evidence of discharge. This permit fails to take into account evidence that discharge into Big Creek and possibly the Buffalo River is already occurring. Data collected by the Big Creek Research and Extension Team show that Nitrate levels are consistently higher downstream of this CAFO than above it.

Original Commenter: Jack Stewart

Response: BCRET data analyzed by Mott (2016) does indicate that nitrates increase from a median value of 0.10 mg/L to 0.23 mg/L from upstream to downstream, respectively. In comparison to domestic water supply uses (10 mg/L), nitrate values observed in Big Creek, both upstream and downstream, are well below most groundwater and source water intakes. For example, the Arkansas Department of Health reports in the 2016 Annual Drinking Water Quality Report for the City of Jasper a mean nitrate value of 0.36 mg/L, with a range from 0.12 to 0.59 mg/L (ADH, http://www.healthy.arkansas.gov/eng/ccr/397.pdf).

The EPA did not include Big Creek or the Buffalo National River on the approved 2016 303(d) list.

Response: The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

BCRET data document that nitrate-N is variable; however, Figure 12 of the April 1 to June 30, 2018 BCRET Quarterly Report demonstrates that nitrate-N is higher downstream (BC7) than upstream (BC6). Chlorides and nitrates follow similar seasonal fluctuations in that they are higher during summer and autumn months when stream discharge is most influenced by groundwater. ADEQ reviewed Jim
Petersen’s May 31, 2018 expert report, which presents an analysis of temporal trends among nitrate-N and *E. coli* from January 2014–December 2017 at BC6 and BC7. Mr. Petersen’s analysis presents decreasing trends of ammonia and chlorides and increasing concentrations of *E. coli* at BC6. Yet, increasing concentrations of nitrate-N were observed downstream at BC7. The conflicting temporal analysis prompted Mr. Petersen to further review trends upstream to downstream. By analyzing paired concentration data (collected same day) at BC6 and BC7 from January 2014 through December 2017, Mr. Petersen reports significant increases in total nitrogen, ortho-phosphorus, and chlorides, but non-significant changes in *E. coli* and nitrate-N. The significant increase of nitrate-N in the house well and ephemeral stream does correspond to increases of total nitrogen at BC7. Mr. Petersen’s analysis illustrates the complexities of evaluating water chemistry in karst systems.

**Comment 191:** National Parks Service with concurrence of the Arkansas Game and Fish Commission has requested a 303d listing for impaired status for Big Creek due to low Dissolved Oxygen levels a consequence of nutrient overloading. A recent report by the USGS has confirmed low Dissolved Oxygen levels in Big Creek.

Original Commenter: Jack Stewart

**Response:** The EPA did not include Big Creek on the approved 2016 303(d) list.

**Response:** The Department amends its previous response. ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

**Comment 192:** While there may be multiple sources of impairment of Big Creek, the timing of both the increase in Nitrates and the decrease in Dissolved Oxygen correlates with the issuance of the initial C&H permit. And logic requires that C&H be considered at the least a significant contributor. Discharge into Big Creek and its associated extraordinary resource water, the Buffalo, violates regulations and therefore this permit should be denied.

Original Commenter: Jack Stewart

**Response:** Data collected by the Department shows no statistical difference in dissolved oxygen or nitrates on Big Creek before and after prior permit issuance.
The EPA did not include Big Creek on the approved 2016 303(d) list.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

BCRET data document that nitrate-N is variable; however, Figure 12 of the April 1 to June 30, 2018 BCRET Quarterly Report demonstrates that nitrate-N is higher downstream (BC7) than upstream (BC6). Chlorides and nitrates follow similar seasonal fluctuations in that they are higher during summer and autumn months when stream discharge is most influenced by groundwater. ADEQ reviewed Jim Petersen’s May 31, 2018 expert report, which presents an analysis of temporal trends among nitrate-N and E. coli from January 2014–December 2017 at BC6 and BC7. Mr. Petersen’s analysis presents decreasing trends of ammonia and chlorides and increasing concentrations of E. coli at BC6. Yet, increasing concentrations of nitrate-N were observed downstream at BC7. The conflicting temporal analysis prompted Mr. Petersen to further review trends upstream to downstream. By analyzing paired concentration data (collected same day) at BC6 and BC7 from January 2014 through December 2017, Mr. Petersen reports significant increases in total nitrogen, ortho-phosphorus, and chlorides, but non-significant changes in E. coli and nitrate-N. The significant increase of nitrate-N in the house well and ephemeral stream does correspond to increases of total nitrogen at BC7. Mr. Petersen’s analysis illustrates the complexities of evaluating water chemistry in karst systems.

Comment 193: NPS, National Parks Service, has provided data and analysis to ADEQ many times over, Big Creek Research Team has provided data but no analysis to date. It’s clear that C&H Hog Factory is polluting Big Creek and contributes to the low Dissolved Oxygen and high E.coli that is present in the water. The state denied information from the National Parks Service and Big Creek Research
Team about the low Dissolved Oxygen and high E.coli that was presented last year during the 303d review with EPA. I contend that that is very, very important. In fact, your director did cartwheels to deny that Big Creek was impaired. The data was very clear that it was impaired.

Original Commenter: Teresa Turk

**Response:** The EPA did not include Big Creek on the approved 2016 303(d) list.

Data collected by the Department shows no statistical difference in dissolved oxygen or *E. coli* on Big Creek before and after prior permit issuance. The 2016 Assessment Methodology did not include data quality considerations or exceedance frequencies for continuously collected data. The Department did not have an approved methodology to allow assessment of the referenced data.

**Response:** The Department amends its previous response. ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

**Comment 194:** ADEQ requested that the US Geological Service conduct a study on the low Dissolved Oxygen around Big Creek and they actually found, this is an impartial agency that was requested by ADEQ, they actually found that there was low Dissolved Oxygen 20% of the time during the critical period. Okay, that exceeds the state standard by twice. The state standard is 10%. So, it is very, very clear that Big Creek is in real trouble.

Original Commenter: Teresa Turk

**Response:** The 2016 Assessment Methodology did not include data quality considerations or exceedance frequencies for continuously collected data. The Department did not have an EPA-approved methodology to allow assessment of the referenced data.

The EPA did not include Big Creek on the approved 2016 303(d) list.

**Response:** The Department amends its previous response. ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a
proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the Buffalo River Watershed and to protect the vitality of the Buffalo National River as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018. Watershed management plans are recognized by EPA as comparable, state-led management approaches expected to result in the attainment of water-quality standards.

Comment 195: So, what I want to ask the state is how much more information do you need before you list Big Creek as impaired? And before a TMDL is conducted, a total maximum daily limit is conducted, so that it would really identify the sources of the contamination and if it did that it would clearly implicate C&H Hog Factory and would also prohibit it from being permitted.

Original Commenter: Teresa Turk

Response: The EPA did not include Big Creek on the approved 2016 303(d) list, so a TMDL is not required.

Response: The Department amends its previous response. ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 196: And make no mistake about it, tourist will not come here, they will not come here to spend their money, 1,000 people will lose their jobs, over 50 million dollars in revenue will be lost when tourists will not come here anymore because the river is dead.

Original Commenter: Teresa Turk
Response: Consideration of tourism, jobs, and revenue is not within the Department’s regulatory authority.

Comment 197: Until these issues are closely looked at and a clear, concise program is devised to professionally monitor & measure these problems I vote "NO", to any permits allowing C & H Hog factory farm to continue their degradation of this fragile environment, which we share with at least 1.7 million visitors per year, to our beautiful state. Many of these people are our family & friends who bring much needed tourist dollars to our state & leave with life long memories of this unique, beautiful, pristine Buffalo River.

Original Commenter: Dorothy Walters

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. APC&EC Regulation 5.407 requires monitoring and reporting by all APC&EC Regulation 5 permitted facilities.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 198: This area is primary limestone, a coarse, crystalline rock which is dissolved by chemical weathering. It has little primary porosity but it has secondary porosity & excellent permeability due to joints, fractures, bedding planes, faults, & karst features. This was proven by field observations by professional Geologist who also measured subsurface groundwater flow rates of up to 21,000 +feet per day with dye tracing techniques. These rates are conservative as heavy rainfall events would accelerate surface flow, and researchers collected dye trace traps 24 hours or so after injection of dyes. These
dyes could have traveled much faster than that 24 hour collection window. This area also has a high percentage of chemically stable chert, within the limestone, and sandstone/siltstone in the higher elevations. The weathering by products of sand, silt, & clay migrate down slope toward depressions with surface water run-off thus filling in surface karst features making them hard to see with the untrained eye. This Area is Karst and must be treated as such.

Original Commenter: Dorothy Walters

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

Response: The Department amends its previous response. The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 199: The C & H Hog Factory Farm well is 325ft. too 350ft. deep. It is fully cased to make sure the well doesn't cave in on itself & to * ensure surface waters don't contaminate deep well waters*. This well also is protected by aquicludes which are represented by the St. Peters Sandstone & Everton Formation. Both units are sandy and work as filters for any surface waters moving downward in the stratigraphic column. I only describe them as aquicludes in respect to the extreme high velocity flow rates that are observed in the Boone Limestone & other limestone formations describes in this area. Any waters tested from this well are nothing more than *False Negatives*, and do not in any way represent contaminated flow occurring in the upper surface water & shallow water table of the karst units.

Original Commenter: Dorothy Walters

Response: Water from the on-site well was tested by the BCRET study. The Department did not review or approve the study design and has no authority over the day-to-day activities of BCRET. While the Department may consider the
research conducted by the University of Arkansas, questions regarding the study should be more appropriately directed to the University of Arkansas.

**Response:** The Department amends its previous response. Pursuant to the Memorandum of Agreement between the Board of Trustees of the University of Arkansas System for and on behalf of the University of Arkansas System-Division of Agriculture and the Arkansas Department of Environmental Quality, the study performed by BC RET is being carried out for the use and benefit of ADEQ; however, the study shall be funded and conducted independently of ADEQ and shall meet the requirements of an independent study conducted by professionals in the field of water quality.

In the April 1 to June 30, 2018 Quarterly Report, BC RET presents data that documents a statistically significant increase of nitrate-N in the ephemeral stream (BC4) since 2014. However, BC RET notes that chloride, a conservative tracer, did not show a statistically significant increase. Four years of data also indicate a steady increase of geometric mean nitrate-N within the house well (W1) (BC RET April–June 2018, Figure 24). Increased nitrate-N in both the ephemeral stream and the house well does suggest that these systems may be hydrologically connected to areas where farm activities take place.

**Comment 200:** As factory farms become the new normal way of producing food, new problems have arise which are very problematic and of grave concern to public health professionals. Weak Veterinary & Public Health Infrastructure can lead to epidemics or possible pandemics. Biosecurity & Biocontainment are the new methods by which we try to contain biologic pathogens from being spread to the general population. Biosecurity is always strongly enforced, but Biocontainment is often lax, which is the means by which pathogens in factory farms can escape to the general public. Vectors of transmission can be varied. They can bring pathogens into a biosecure factory farm. Or they can bring them out. Most viruses enter the body by the fecal oral route. They are excreted in the feces or from mucus membranes, and saliva, then enter the mouth or lungs where infection will occur again.

Animal waste put on fields attracts flies, bugs, birds, feral hogs, dogs & mice. These can take up the virus, and transport for considerable distance and cause infection elsewhere. A heavy rainfall event can carry pathogens to surface water or ground water sites. These virus pathogens can remain capable of infection for many months & years in cool moist water systems. Viruses are either positively or negatively charged. Many clay particles have a positive & negative charged surface that viruses attach to. Special care must be taken to collect viruses in water samples as they tend to stick to clay particles and viral titers can be less than what is actually in the sample. I worked with a Virologist who was able to cause infection with a poultry virus, Infectious Bursal Disease Viruses, (IBDV), isolated from a poultry house soils that were sterilized 2 years before and had not
housed any chickens during that 2 year period. This site was exposed to sun, & seasonal temperature changes which would deactivate a bacteria but not this virus. Viruses in the cool, moist, dark environment of karst features, can remain capable of infection for much greater lengths of time. The CDC, and WHO are constantly monitoring these factory farms, worldwide, for avian influenza & swine influenza out breaks as this is the next most likely potential site of a pandemic strain mutating or developing. Other vectors include the farm workers themselves. Do they wear protective clothing? do they take their laundry home to wash, possible infecting their family? What decontamination procedures do they follow? Do they stay away from work when they are sick, as to avoid bringing pathogens into the pigs? Is the Local Public Health Department doing any form of monitoring of school children or farm workers & their families?

Original Commenter: Dorothy Walters

Response: The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

Response: The Department amends its previous response. The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

Comment 201: I read in the C & H procedures that they reuse/recycle water to wash down the premises & hogs. How has this water been treated?? If it still contains pathogens, then they are simple reinoculating the pigs with pathogens. Essentially they are breeding bigger, meaner, more virulent forms of pathogens that will become immune to antibiotics & antiviral drugs.

Original Commenter: Dorothy Walters

Response: According to Section 5 of the NMP, the recycled water from the waste storage ponds is used to recharge the under house collection pits, not to wash down the hogs or premises.

Response: The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
Comment 202: Pollutants could already be leaking into the subsurface strata and hence to the BNR but no testing of the river itself is being conducted by this agency to ensure the public's safety.

Original Commenter: Bob Allen

Response: Testing of the Buffalo National River is conducted by the National Park Service.

Comment 203: ACC members have enjoyed and continue to enjoy all aspects of the Buffalo National River including the watershed. We paddle the river, camp the gravel bars, fish the pools, and hike the trails every month of the year in every conceivable weather condition. Rain or shine, high flow or low, we are there. We enjoy direct contact with the river, tributaries, and springs. The Buffalo River enabling act, Pub Law 92-237, § 1, 86 Stat. 44, 44(1972) declares that the river shall be preserved “for the benefit and enjoyment of present and future generations.” This means that Congress has declared the Buffalo is held in a public trust so that future users, including future Arkansas Canoe Club members, can access the Buffalo in the same condition it was back in 1972.

Original Commenter: Bob Allen

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

Comment 204: Director Keogh, I can't imagine the stress this CAFO is causing within ADEQ, with the knowledge that ground water contamination from the CAFO is occurring and contaminating wells, Big Creek and the Buffalo River. I sincerely believe you are in a position similar to those officials within Arthur Anderson and Flint Michigan. Will you allow your agency to grant this permit against scientific evidence which shows leakage and contamination is already occurring? Will you risk the Natural State losing significant financial revenues when more and more visitors turn away from the Buffalo River because of hog waste contamination? Will you expose your staff to perhaps criminal prosecution if people get sick from the contamination and you and your staff failed to protect its citizens?

Why would you risk all of this for one hog CAFO? A CAFO that provides very little economic benefit to Newton County and Mt. Judea compared to the harm it is doing. I believe the heart and soul, the moral and scientific compass of ADEQ are in your hands. The health of a community in and around Mt. Judea and a significant Natural State resource are in your hands and I sincerely and strongly urge you to make the right decision to deny the Regulation 5 permit for this CAFO.
Original Commenter: Steve Blumreich

**Response:** The Department considered all relevant scientific data submitted during this permitting process.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”
Comment 205: Reg. 5.102 states:

The purpose of this regulation is to establish **minimum** qualifications, standards and procedures for issuance of permits for confined animal operations using liquid animal waste management systems within the state and for the issuance of permits for land application sites within the state. (Emphasis added).

Thus, the regulation contemplates more stringent “qualifications, standards and procedures for issuance of [CAFO] permits” where circumstances require them. This is consistent with other guidance for siting large swine CAFO’s and with our position that there are certain areas in the State where large swine CAFOs should not be sited. The C&H Hog Farms (C&H) CAFO generates more than three times as much phosphorous as the entire human population of Newton County, is the largest CAFO in the Buffalo River Watershed, and is located in an area of karst geology less than 5 stream miles upstream of the Buffalo National River, America’s First National River and perhaps the most important tourism destination in Arkansas. Yet, the qualifications, standards and procedures contained in the draft permit are no more stringent than those for any other swine CAFO in Arkansas. This means that ADEQ has approached this CAFO the same as it would a similarly sized CAFO anywhere else in Arkansas instead of one located in one of the most sensitive areas of the State and directly upstream from our most pristine river.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk
areas of land application sites. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 206: The research of many agronomists and hydrologists, including Dr. Andrew Sharples, shows phosphorus (P) buildup in soils leads to eutrophication of streams resulting from a “legacy” of improper/uninformed P management (Sharples et al., 1999; Sharples et al., 2013; Scott et al., 2016; Haggard et al., 2017; Mittlestet et al., 2016; Haygarth et al., 2014; Meads et al., 2010; Michalak et al., 2013). Sharples (2016) prescribes key elements to managing agricultural phosphorus in a manner that minimizes the water quality impacts of legacy phosphorus. The first recommendation is to apply fertilizer at the right rate: “Fertilizer P rates are usually established by crop need and modified by the amount already in the soil, as determined by established soil P test methods.”

Soil tests results and University of Arkansas phosphorus application recommendations show that long-term over application of P is occurring on almost 90% of the currently used C&H waste disposal fields. Guidance from the University of Arkansas states that fields are considered to be above the optimum agronomic level for P when values exceed 50 pounds per acre (Espinoza et al., 2007). Mott, 2016, used soil test results to calculate the amount of phosphorus existing on the 17 waste application fields based on the original NMP (DeHaan, Grabs & Associates, 2012). Calculations revealed nearly 25 tons of excess phosphorus existed in the 17 C&H waste application fields prior to the start of swine waste application. Subsequent review of soil test results from these 17 fields are presented in Table 1, and show average phosphorus levels increased by 40 percent in only two-years.

In the current NMP (Hancock et al., 2016) soil test results were provided for 40 fields as shown in Table 2. Out of 630 acres permitted, only 174 acres (28%) required a total of 5,000 pounds of P based on the maximum recommended rate for plant uptake. All other fields were recommended to receive zero pounds of phosphorus to fulfill crop needs. Furthermore, when the acres are looked at in total, these 40 fields contain an above optimum surplus of 50,090 pounds of legacy phosphorus already existing on the landscape. The NMP calculations indicate an additional 33,325 pounds of phosphorus will be added to these fields annually (Hancock et al., 2016). This analysis shows Dr. Sharples’s “Right Rate” recommendation is not being followed at C&H.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

Response: The API was adopted by NRCS as part of the Conservation Practice Standard Nutrient Management Code 590 in the state of Arkansas. The API has been adopted by the NRCS Conservation Practice Standard, Nutrient
Management Code 590 to manage the application of phosphorus in the State of Arkansas. Therefore, the API is an appropriate tool for determining phosphorus-based application rates for nutrient management.

The API is used to develop loading rates for land application based on phosphorus. There are many factors taken into account to determine whether land application on a specific field is allowable. While the soil test phosphorus, referred to as “above the optimum” by the commenters, is one of those factors, it is not the determining factor. A field with high soil test phosphorus may still be appropriate for land application. The Department only permits land application when the API value is a low or medium class.

Response: The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA1029¹, “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA9516² states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as

STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 207: The NMP lists the crop production/pasture use as rotational grazing. With rotational grazing most nutrients are retained within the harvested field and watershed. The distribution of nutrients within soils has been shown to be spatially variable with elevated P concentrations associated with cattle feeding and loafing areas. Cattle can also migrate into unfenced areas near streams and sinkholes and transport nutrients to areas designated as buffers in the permit. Appendix 1 below (taken from BCRET’s 4th Quarter 2016 Report) shows changes in P concentrations in gridded soil samples. In most areas P values have increased significantly in the top 4 inches of the soil column. Agronomists have shown that increased P values in the top 4 inches of soil directly relates to increased dissolved P in storm runoff as shown in the examples in Figure 10 and 11. [https://pubag.nal.usda.gov/pubag/downloadPDF.xhtml?id=60&content=PDF](https://pubag.nal.usda.gov/pubag/downloadPDF.xhtml?id=60&content=PDF) [https://www.bigcreekresearch.org/docs/ARS%20Ag%20Eutrophication.pdf](https://www.bigcreekresearch.org/docs/ARS%20Ag%20%20Eutrophication.pdf)

Figure 11 also shows that for soils above 60 ppm P, e.g. most C&H waste application fields, migration of phosphorus to ground water increases sharply. BCRET’s Appendix 1 below shows phosphorus levels are also generally increasing at deeper depths within the soil profile. As discussed in other comments, waste application field soils are often not well suited to phosphorus retention and the underlying karst ground water transport mechanisms make this area very susceptible to storm runoff and infiltration, and legacy phosphorus build up in soils.

The soil tests and soil mapping clearly show the buildup of legacy phosphorus in soils. The AWMFH predicts this and warns against it (Chapter 11 Waste Utilization, 651.1102 Land application):

“Nutrient management is an essential component of an agricultural waste management system. Plans should be based on soil tests, crop yields, manure nutrient analyses, and environmental concerns of the farm enterprise. The plan must account for the nutrients available in the waste, the crop’s requirement for the nutrients, and timing and method of application. It should be formulated to minimize the potential offsite losses of nutrients by runoff, leaching, and volatilization.”
Figures 10 - 12 show a comparison of P loss in surface runoff at various levels of soil phosphorus concentrations. The results show that fields with low soil phosphorus values provide little phosphorus in storm runoff. Application of phosphorus to achieve maximum crop yield increases the amount of phosphorus in runoff by at least twice as much. Allowing phosphorus application at moderate levels under guidance such as the API results in significantly greater phosphorus losses in runoff.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

The API has been adopted by the NRCS Conservation Practice Standard, Nutrient Management Code 590 to manage the application of phosphorus in the State of Arkansas. Therefore, the API is an appropriate tool for determining phosphorus-based application rates for nutrient management.

The API is used to develop loading rates for land application based on phosphorus. There are many factors taken into account to determine whether land application on a specific field is allowable. While the soil test phosphorus is one of those factors, it is not the determining factor. A field with high soil test phosphorus may still be appropriate for land application. The Department only permits land application when the API value is a low or medium class.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.
The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to the degradation of Big Creek and the Buffalo National River.

Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA1029³, “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA9516⁴ states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 208:  https://www.bigcreekresearch.org/docs/ARS%20Ag%20P%20Eutrophication.pdf Other comments presented herein describe the existing water quality impacts of excessive nutrient application such as storm event runoff, legacy phosphorus buildup in soils, and legacy nitrate buildup in ground water.

⁴ https://www.uaex.edu/publications/PDF/FSA-9516.pdf
Increasing nutrients in aquatic systems is the primary anthropogenic driver of the nuisance algae blooms observed at Buffalo National River. Nuisance algae blooms degrade the visitor experience, and are the number one water quality related complaint submitted by park visitors (Mott and Laurans, 2004). Increasing nutrients in streams also results in changes to aquatic community structure and function, favoring species that directly harvest the more abundant periphyton and other aquatic plants (Petersen and Femmer, 2002; Petersen et al., 2014).

https://www.bigcreekresearch.org/docs/ARS%20Ag%20Eutrophication.pdf

In 2014, a panel of experts reviewed the operational and monitoring activities taking place at C&H and analyzed BCRET’s study design and implementation (https://bigcreekresearch.org/project_reports/docs/Review%20Panel%20Report%20-May%202019%2020.pdf). In their Summary of Findings the panel stated “The complexity of the landscape and the farming operation presents a challenging task for the Team.” They began their review by noting (as we do above) that conclusively demonstrating the impact of C&H on water quality is made difficult by “the fact that limited data on water quality are available prior to the onset of the farming operations. Additionally, within the Big Creek watershed there are a number of other ongoing land management and land use activities that can impact water quality.”

The panel immediately recognized the significance of monitoring storm events and stated “extreme events are often the driver of hydrologic responses to environmental stressors and we recommend that more effort be directed at sample collection during high-flow events.” The panel also “recognized three major potential threats to water quality associated with C&H. These include: 1) leakage from the two onsite waste storage ponds, 2) contamination of surface and subsurface water due to land application of the wastes, and 3) potential long-term buildup of soil nutrient levels (primarily soil phosphorus) due to application in excess of crop needs and removal.”

The following is a list of specific recommendations made by the expert panel, actions BCRET has taken in response to the panel’s concerns, and an assessment of remaining concerns:

**Recommendation #1:** A short-term, detailed water balance study should be conducted to determine the actual seepage rate of the storage ponds.

**BCRET Response:** A water balance study has not been undertaken. Exact pond seepage rates/volumes remain unquantified.
**Recommendation #2:** Water quality samples should continue to be collected from the house well on a routine basis. In addition, the Panel recommends that the detailed well driller’s log be obtained and that a slug test, pump test, or both be conducted on this well to determine characteristics of the aquifer from which water is drawn.

**BCRET Response:** Water samples continue to be collected from the well but it was not apparent that aquifer testing was conducted. Well sample results showed problems with bacteria contamination and nitrate values are higher than in surface water samples.

**Recommendation #3:** A detailed walking survey of the slope down gradient from the waste ponds should be conducted to identify potential seeps and springs from perched aquifers. If perched aquifers are noted based on the driller’s log or by the identification of hillside seeps, one or more shallow monitoring wells should be installed to the depth of the perched aquifer within as short a distance as feasible from the storage ponds. If springs or seeps are noted on the hillside, these should be monitored on a routine basis to establish baselines and trends in water quality.

**BCRET Response:** No monitoring wells were installed. Because BCRET installed trenches below the pond, it might be assumed that seeps were found below the ponds during prolonged dry weather indicating perched water, but this could not be confirmed. In karst environments, trenches are often an ineffective way to assess pond seepage as a result of “discrete recharge zones” and internally drained geohydrologic properties (Aley, 1982). Contaminants could be migrating vertically through solutionally enlarged fractures, such as those identified in the Harbor borehole, to the subsurface drainage network, and then discharge to springs and or surface streams. Some trench results indicate high nitrate values. BCRET has not provided a peer reviewed report describing their trench study methods and results.

**Recommendation #4:** An inventory of the entire reach of Big Creek between the upstream and downstream sampling points with georeferenced notes made on any significant changes in water flow due to tributaries or major springs. This inventory should include karst features located within the contributing area.

**BCRET Response:** A karst inventory could not be confirmed, however the work of Halihan and Fields (2014) clearly shows the mature karst just below the waste application fields and near the ponds, and the fractures and conduits normally associated with karst terrain, and directly supports the AWMFH concerns for siting CAFOs in such terrain.
**Recommendation #5**: A detailed land use map that identifies all land uses within the contributing area of the watershed. This should include surveys of farmers to gauge land management practices, with particular emphasis on animal stocking practices, fertilization, and manure applications.

**BCRET Response**: A land use analysis has been conducted for the contributing watersheds to support the BCRET study objectives (bigcreekresearch.org). The analysis used GIS and remote sensing acquired sources. Unfortunately, the watershed boundary assumptions may be in error in this karst settings. A detailed inventory and survey of farmers as suggested by the panel is more appropriate to developing a stand-alone water quality model as we recommended in other comments.

**Recommendation #6**: A seepage survey to include stream profile measurements and estimations of discharge. The stream survey should be repeated under high (if feasible), medium, and low flow conditions to capture the potential variability in groundwater recharge and discharge to the riparian zone, valley alluvium, and karst features (if present).

**BCRET Response**: Seepage surveys have not been conducted. Sometimes referred to as a gain and loss flow study, seepage surveys are a critical recommendation. Karst influence on surface flow is pronounced in Big Creek as this stream channel is often dry where it passes the C&H’s waste application fields and waste storage ponds during base flow conditions. A seepage survey in this karst setting would yield quantifiable and reproducible results concerning ground water/surface water interactions. Seepage survey design should incorporate water quality measurements and sample collection. By the time Big Creek reaches the upstream sampling site it has flowed across the Boone Formation for two miles. It is likely significant stream flow has already been lost to the subsurface drainage network before it reaches the upstream sampling site. This is confirmed by the times in the BCRET sampling record when the upstream site is dry while the downstream site is still flowing.

At the downstream site, it is likely karst hydrology is having the opposite effects on stream flow. The downstream site is located near the base of the Boone Formation. In the Big Creek valley, the lower Boone contains a relatively high quantity of chert (Braden and Ausbrooks, 2003). Chert is composed mainly of silica, and therefore is insoluble. Chert also interacts in complicated ways with the soluble limestone in which it is inter-bedded to affect hydrologic ground water flow processes (Brahana et al., 2016). At the downstream sampling site, it is likely these chert layers form an aquitard of undefined spatial distribution, disrupting the subsurface drainage network and forcing flow back into Big Creek’s surface channel. Instead of losing flow as happens at the upstream site,
the downstream sampling site is likely capturing water from other basins, such as Dry Creek east of Mt. Judea, for example (bigcreekresearch.org).

**Recommendation #7:** Develop rating curves between water level and discharge at both the upstream and downstream sites.

**BCRET Response:** A USGS gage and rating curve has been installed at the downstream sampling site. The upstream sampling site lacks a rating curve and discharge measurements. This recommendation reflects the importance of being able to match water quality results to stream discharge and calculate loads or flow-weighted concentrations. Rating curves allow stream stage to be converted to stream discharge. The use of the watershed area ratio to estimate flow and loads at the upstream site is likely not applicable because the flow relationship between the two sites is not linear due to karst surface water/groundwater interactions affecting surface flow. Without discharge at the upstream site, verification of the accuracy of the watershed ratio method, or development of nonlinear relationships between flow at the upstream and downstream sites, is not possible.

**Recommendation #8:** Conduct traces with multiple dyes. The first set of traces should be qualitative to identify the potential connections between points of recharge and discharge. Once established, quantitative traces should be conducted with both conservative and non-conservative dyes to establish travel times and dispersion characteristics. Results of the traces, for example from the sinkhole in Field #1 to the spring downslope, may help revise the area for manure application.

**BCRET Response:** Dye tracing studies have not been conducted by BCRET. BCRET has used GIS techniques to delineate the watersheds contributing to their monitoring sites. These estimates are likely in error because this simplistic view of watersheds often does not apply to karst basins with extensively developed subsurface drainage networks (Aley, 1982; Aley and Aley, 1989; Aley, 1999; Aley and Aley, 2000; Mott et al., 2000). This is especially applicable to the BCRET downstream sampling site. The actual recharge area for the upstream and downstream sampling sites, and Left Fork of Big Creek, should be delineated using common dye tracing techniques. BCRET has not delineated the recharge area for the spring they are monitoring.

**Recommendation #9:** The Dry Creek watershed includes an estimated 1/3 of the proposed land area approved for manure application from C&H Farms. An automated sampling and gauging station should be installed as close to the confluence with Big Creek.
**BCRET Response:** Between November, 2014, and May, 2015, Dry Creek was sampled seven times. The small sample set from a limited time period makes the data of little value in assessing Dry Creek’s contribution to Big Creek.

**Recommendation #10:** The Panel recognizes the need to monitor surface runoff and recommends that more emphasis be placed on a sampling protocol to better capture flow-weighted samples during runoff events.

**BCRET Response:** The BCRET sampling strategy does not appear to have changed to increase emphasis on surface runoff sampling. There is limited surface runoff data from three flumes. Only two of the fields draining to the flumes receive swine waste. C&H has refused to supply waste application results by date to BCRET limiting interpretations of the results.

**Recommendation #11:** Use commonly available geophysical techniques to characterize the subsurface conditions that could potentially contribute to preferential flow of water and contaminants from fields receiving swine waste applications. If these procedures document significant subsurface features that can affect water flow, subsurface investigations (i.e., drilling) should be conducted to confirm these observations.

**BCRET Response:** Ground penetrating radar and electrical resistivity methods have been employed by BCRET collaborators. Follow-up investigations of karst features using borehole investigations at the waste application fields showed many profiles dominated by sand and gravel. One borehole was drilled near the waste storage ponds, this borehole confirmed the presence of a karst preferential flow path (a solutionally enlarged fracture). The electrical resistivity surveys identified concerns related to preferential flow paths in the subsurface karst. Identified concerns based on karst hydrology were not used by the permit planner (Hancock et al., 2016) or the draft permit approver to appropriately design or condition waste storage and application as required by the AWMFH (NRCS, 2012).

**Recommendation #12:** If buildup of soil phosphorous levels is noted, the results of the manure solids and liquid separation trials that are being conducted as part of the project may offer an opportunity to better match waste applications to specific crop and soil fertility needs. In general, the manure solids will have a lower N:P ratio than the liquid fraction. Ideally, the dryer solid fraction could be applied to fields where soil P levels are low or transported out of the watershed altogether. In light of C&H Farm’s use of additives to enhance the function of the waste storage ponds, a regular sampling of storage ponds is important to understand the effects of the additives and to determine variability in nutrient concentrations.
BCRET Response: BCRET’s efforts to study ways to ameliorate high P levels in the waste stream have been abandoned. BCRET has noted significant stratification of nutrients in waste holding ponds. Buildup of phosphorus levels in soils has been noted by BCRET in recent years (bigcreekresearch.org). ADEQ studies of CAFO facilities in the Buffalo River watershed in the 1990s and early 2000s identified sludge build up and disposal as the most significant concern at Regulation No. 5 permitted facilities (ADEQ, 2002; Mott, 2016). The current NMP and permit do not address sludge buildup or waste stream treatment, or the need to refine NMP calculations based on “as applied” testing results.

Recommendation #13: Source tracking of nutrients and bacteria. While this is time consuming and can be prohibitively expensive to conduct on a routine basis, if elevated contaminant levels are noted at the downstream site relative to the upstream monitoring locations, source tracking using isotopic or PCR methods may provide additional information needed to establish whether activities associated with C&H are a contributing factor.

BCRET Response: No evidence was found that any source tracking methods have been employed by BCRET. BCRET data shows statistically significant increases in several parameters at the downstream site (Mott, 2016).

Recommendation #14: Supplemental chemical parameters. The study of watershed hydrology and geochemistry is regularly enhanced by combining a multi-parameter approach. For example, the use of multiple water quality parameters may provide additional information on flow paths, residence times, and sources that may otherwise be difficult to interpret on limited sources of data. Therefore, the Panel recommends that the Team consider, if practical, the following additional analytes: - Principal ions – Alkalinity – Appropriate trace metals – Environmental isotopes (including C/N ratios) – Ammonia, Nitrite, and Nitrate fractions of total N – Emerging contaminants (caffeine, hormones, antibiotics, etc.).

BCRET Response: BCRET added several parameters to their sampling regime based on the review team’s recommendations. However, some obvious parameters are still lacking such as dissolved oxygen and quantification of discharge concurrent with sample collection at the upstream site. The base flow database BCRET has developed is substantial and lab reports reflect high standards of quality. Unfortunately, the other short comings of the study design and execution limit the intended use of the base flow data to interpret the impacts of C&H Hog Farms.
Recommendation #15: Storm event sampling. Wide-ranging studies of watershed processes and contaminant transport demonstrate the importance of storm events. In this particular investigation, the transport of waste offsite may be strongly correlated to periods of overland flow on application fields. While the Panel is encouraged to see instrumentation specifically designed to capture this overland flow, it would be beneficial to capture more than a single composite sample, particularly for long lasting storms.

BCRET Response: BCRET has not modified their sampling strategy to focus on critical storm event runoff sample collection. ADEQ is proceeding with their decision on this permit in the absence of critical storm loading information or a peer reviewed analysis of the limited storm event results. The Big Creek sampling strategy employed by BCRET primarily utilizes an upstream of C&H activities and below C&H activities (upstream/downstream) approach. Their stated purpose of this monitoring is to assess potential declines in water quality occurring in the intervening reach where the production facility, swine excrement holding ponds, and swine excrement land application fields are located (bigcreekeersearch.org). Samples are collected on a set weekly basis independent of hydrograph considerations. In agricultural basins, it is well known that nonpoint source contamination is rainfall generated, and transport to surface streams is primarily in conjunction with storm hydrographs, as the review panel noted.

In a report prepared for the EPA looking at studies from across the country (https://www.bae.ncsu.edu/programs/extension/wqg/issues/loadestimation.pdf) the relationship between parameter concentrations and storm loading is discussed.

“Especially for particulate pollutants of non-point origin, the flux varies drastically over time, with fluxes during snowmelt and storm runoff events often several orders of magnitude greater than those during low flow periods. It is not uncommon for 80 to 90% or more of the annual load to be delivered during the 10% of the time with the highest fluxes, as is illustrated in Table 1. Clearly it is critical to sample during these periods, if an accurate load estimate is to be obtained.”

Table 5 compares base flow median instantaneous loads (flux) at BCRET’s downstream sampling site compared to flux during a period of storm flow at the same site. The results show analyzing storm flow loads as recommended by the expert panel, EPA, USGS, and other researchers is very applicable to the study of C&H Hog Farms. It is critically important to accurately quantify the storm loads. BCRET collects approximately 80 percent of its stream samples from periods of base flow water quality, and 20 percent of its samples are collected from storm runoff periods (bigcreekeersearch.org). BCRET prepares quarterly update reports based on these data and presents this information on their website.
(bigcreekresearch.org), but there is no analysis of loads presented. Not only is it critical to sample during times of storm runoff, the data collection and analysis must be conducted in a specific manner to calculate accurate, scientifically accepted, loads (Haggard et al., 2003; https://toxics.usgs.gov/pubs/of-2007-1080/methods.html; https://pubs.usgs.gov/tm/2005/tm4A5/pdf/508final.pdf; https://pubs.er.usgs.gov/publication/sir20115172).

After nearly four years of monitoring, BCRET has not subjected its data or interpretations of such data to independent peer review. ADEQ has not asked BCRET to prepare such an analysis prior to making its permit decision. We submit that subjecting the BCRET study to peer review would reveal that:

- If BCRET anticipates developing load calculations for the downstream sampling site in the future, it is unclear how loads will be compared in this upstream/downstream study?
- BCRET and USGS should coordinate sampling and prioritize storm event data collection and analysis with the goal of quantifying the offsite impacts of C&H on the water quality of Big Creek, Buffalo National River, and the karst aquifer.
- Does BCRET plan to compare their load estimates at the downstream site to the USGS loads at Carver? How will these loads be comparable if USGS uses different sampling techniques and load development procedures?
- BCRET is not planning to sample storm-event runoff in Big Creek at intervals throughout the rising and falling limbs of a storm hydrograph(s) to allow for integration analysis.
- BCRET flags storm and base flow samples in their database, these flags sometimes contradict behavior of the USGS hydrograph at the Mt. Judea gage.
- BCRET data may show increasing nitrates in base flow over time, this result has not been detected or reported by BCRET in their quarterly reports. BCRET should use more commonly accepted and refined water quality assessment techniques and peer review processes to interpret data and state conclusions.
- E. coli concentrations are not measured from storm samples collected with ISCO samplers.

The findings and recommendations of the expert review panel show the water quality monitoring approach being employed by BCRET is missing important aspects of a carefully designed study tailored to “the complexity of the landscape and the farming operation.” BCRET has not adequately responded to the recommendations made by the expert review panel (and others) to focus on Big Creek and karst aquifer monitoring, especially during storm flow periods, nor has it conducted a proper scientific assessment of the facility’s impact through accepted scientific peer review processes. Without this information, it is impossible for ADEQ to make an informed decision regarding the level of water
quality impacts to Big Creek, Buffalo National River, and the karst aquifer caused by C&H.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

Response: The Department did not review or approve BECRT’s study design and has no authority over the day-to-day activities of BCRET. While the Department may consider the research conducted by the University of Arkansas, questions regarding the study should be more appropriately directed to the University of Arkansas.

Response: The Department amends its previous response. Pursuant to the Memorandum of Agreement between the Board of Trustees of the University of Arkansas System for and on behalf of the University of Arkansas System-Division of Agriculture and the Arkansas Department of Environmental Quality, the study performed by BCRET is being carried out for the use and benefit of ADEQ; however, the study shall be funded and conducted independently of ADEQ and shall meet the requirements of an independent study conducted by professionals in the field of water quality.

Comment 209: The AWMFH requires the planner to complete a site evaluation as part of the waste management plan and consult with the decision-maker regarding findings. Section 651.0200 states:

“Planning an agricultural waste management system (AWMS) involves the same process used for any type of natural resource management system, such as an erosion control system. Each system includes a group or series of practices planned, designed, and installed to meet a need. However, different resource concerns, management requirements, practices, environmental effects, and economic effects must be considered.

Planning an AWMS requires the collaboration and combined efforts of a team of people. The decision-maker for the property involved, NRCS specialists and conservationists, county agricultural extension agents, and other professionals often make up the team. Specialists include engineers, geologists, soil scientists, and agronomists.”

The firm that prepared the original Notice of Intent (NOI) did not assemble the team of professionals required. It did not involve a geologist or geohydrologist, a water quality specialist, or NRCS specialists. In fact, the original NOI developers were located in North Dakota, and did not even mention the site’s karst geology or its proximity to the Buffalo River. Failure to consider these important factors leads one to question whether the original NOI planners ever stepped foot on the
C&H site? C&H failed to submit a complete site evaluation with its original NOI, nor has it submitted one with its current permit application.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit. The geologic investigation of the waste storage ponds does not comply with AWMFH Chapter 7.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to the degradation of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.
Comment 210: Section 651.0201 “Planning for Protection of Natural Resources” states: “The major objective of the NRCS in planning an AWMS is to collaborate with the producer to achieve wise use of natural resources. The NRCS must assure that the decisionmaker recognizes the nature, extent, and importance of natural resource conservation.

…

Consideration of soil, water, air, plant, animal, and energy resources and the interrelationships in the planning process has increased the complexity for decisionmakers. Implemented as a system, practices and appropriate interactions of practices must be in place to fully address the resource concern.” (Emphasis added).

This section makes it clear that to conform with the AWMFH, the NRCS must direct the planning process and must follow the internal planning requirements and inform the decision-maker regarding the full environmental consequences of any decision to implement an AWMS. For a large CAFO producing a large volume of waste, and disposing of that waste in a sensitive setting, such as karst geology near Buffalo National River, coordinated planning documents are required. These documents include:

- Conservation Plan; and
- Agriculture Waste Management System Plan

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

Response: According to APC&EC Regulation 5.201, a waste management plan must be developed by one of the following: the United States Department of Agriculture NRCS, an ANRC water quality technician, the University of Arkansas Cooperative Extension Service, or a professional engineer licensed in the State of Arkansas. Site management plans may be prepared by the United States Department of Agriculture NRCS, an ANRC water quality technician, Certified Nutrient Management Planner, the University of Arkansas Cooperative Extension Service, or a professional engineer licensed in the State of Arkansas. The preparation of these plans is not limited to only NRCS technical staff.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

Comment 211: Section 651.0201 of the AWMFH describes planning for protection of natural resources and states:

“Maintaining or improving the quality of surface and groundwater generally is critical in the planning of an AWMS. Potential groundwater contaminants from agricultural operations include nutrients such as nitrates; salts; waste pesticides; pathogens, generally bacteria; and pharmaceuticals. Potential surface water contaminants from agricultural operations are nutrients, usually nitrates or other agriculture chemicals in solution; phosphorus and other agricultural chemicals attached to soil particles; organic matter; and bacteria.

Water, both clean and contaminated, must be considered in an AWMS. The usual objective in planning an AWMS is to exclude unneeded clean water and capture polluted water for storage or treatment for subsequent use when conditions are appropriate.”
Section 651.0202 of the AWMFH describes the conservation planning process and states:
“The NRCS nine steps of planning include:
Step 1 Identify the problem.
Step 2 Determine the objectives.
Step 3 Inventory the resources.
Step 4 Analyze the resource data.
Step 5 Formulate alternative solutions.
Step 6 Evaluate alternative solutions.
Step 7 Client determines a course of action.
Step 8 Client implements the plan.
Step 9 Evaluation of the results of the plan.
Although the steps are listed in order, the process is often nonlinear (fig. 2–3). To thoroughly and efficiently plan an AWMS, each planning step must be considered.

An AWMS plan can and should be part of the overall conservation plan for a farm. The overall plan identifies the concerns and opportunities related to all the soil, water, air, plant, animal, energy, and human resources. Often, it will briefly address the issues related to animal waste (such as type and number of livestock, and location, type and construction dates for any manure storage facilities), and leave many of the specific details to be covered by the AWMS plan. It is especially important the conservation plan assesses the potential for nutrients to be transported offsite through runoff (where nutrients attached to soil particles that erode), by leaching through the soil profile to groundwater and by volatization into air. If a potential problem is identified, the plan should include appropriate conservation practices and management activities. (emphasis added).

Following is a description of the planner’s activities and responsibilities in each planning step as it relates to an AWMS.

(a) Identify the problem
Decisionmakers need to know what problems, potential problems, and Federal, State, and local laws and regulations affect their operation. This information can help them recognize the need to develop an AWMS that will protect the resource base.

(b) Determine the objectives
…
A decisionmaker’s objective to bring the operation into compliance with laws and regulations may result in an AWMS that is not as extensive as one where the
objective is to minimize the effect on the environment and enhance public acceptance of the system.

(c) **Inventory the resources**

Inventory or collecting appropriate natural resource, economic, and social information about the planning area …the planner must assure that the resource inventory data are complete to the extent that they can be used to develop AWMS alternatives.

Planning an AWMS requires gathering a great deal of information. A partial list of items that must be inventoried or evaluated follows. These items are described in more detail in their specific chapter.

(3) **Site location**

…

The location of lakes, streams, wells, and other receiving water should be noted and actions designed to minimize the negative effect of an AWMS on the water. In addition, land application of agricultural wastes should not be made during periods when flooding normally occurs unless the waste is injected or tilled to mix and combine with soil immediately.

(5) **Land availability**

Adequate amounts of agricultural land are needed for application of nutrients and other constituents in agricultural wastes to assure crop utilization and protection (emphasis added).

(6) **Soil**

Soils must be evaluated to determine if they are appropriate for AWMS components and activities, such as land application, construction, mortality disposal, and associated traffic, soil physical and chemical characteristics, nutrient levels, water table level, depth to bedrock, and other soils features are included in the evaluation.

…

(9) **Geology**

The geology of a site plays an important part in selecting an appropriate AWMS. For this reason, the geology of the area in which the AWMS will be located must be evaluated. The groundwater table, variations in depth to bedrock or in soil depth, potential for sinkholes, and fractured or cavernous rock often eliminate use of some types of AWMS components. Geologic information, including depth to the water table and geologic reports, should be reviewed for any given site. Onsite geologic investigations with the assistance of a qualified geologist should be given a high priority, especially where storage or treatment components are involved (emphasis added).
(10) Crops

... To achieve appropriate use and avoid offsite pollution, the planner and decisionmaker must determine the best time for land application. A tentative schedule for land application of waste should be prepared during planning to determine if the system that has been selected will work.

(17) Water quality

... The sensitivity of lakes, streams, or groundwater aquifers to contaminants in the agricultural waste should be evaluated and made part of the decision process of whether to allow discharge. Receiving water sensitivity must also be considered when establishing the intensity of management and level of efficiency needed to avoid or minimize accidental spills and to assure that the designated water use is protected (emphasis added).

(d) Analyze the resource data

In step 4 of the planning process, the resource data collected in the previous planning step is analyzed. The inventory data are cataloged into one of the six functions and then interpreted, analyzed, and evaluated in preparation for developing alternatives.

(e) Formulate alternative solutions

Step 5 of the planning process, formulate alternative solutions, is used to develop alternative AWMSs based on the analysis of the inventory data as cataloged into one of the six functions of an AWMS.

(f) Evaluate alternative solutions

Alternative solutions need to be evaluated to determine if they meet the objectives, solve the problem, and are socially, culturally, and economically acceptable.

(g) Client determines a course of action

... The decisionmaker must select one system from among the alternatives developed by the planner; however, the planner needs to guide the decision-maker by presenting cost effective, environmentally sound, and socially acceptable alternatives. If the preceding planning elements are properly carried out, the decisionmaker will have all of the information available, including the private and public objectives, on which to make the needed decision.
Numerous worksheets and guides are presented in various sections of this handbook to aid in documenting information used in planning. Resource information and data that need to be documented provide a basis for the decisions that are made.

**651.0203 AWMS plan**

An AWMS plan is prepared as an integral part of and in concert with conservation plans. It is prepared in consultation with the producer and is formulated to expressly guide the producer in the installation, operation, and maintenance of the AWMS (emphasis added).

(a) Purpose of the plan

The purpose of the AWMS plan is to provide the producer with all the information necessary to manage agricultural wastes in a manner to protect the air, soil, water, plant, animal, and energy resources. The plan may be necessary to comply with State regulation or law.

(b) Contents of the plan

The AWMS plan should include:
- a description of all system components or practices planned
- the sequence and schedule of component installation
- the operation and maintenance requirements including a time schedule
- engineering design and layout information on location, size, and amounts
- nutrient management plans, including an accounting of the nutrients available, crops and fields where applied, and amount and timing of application
- biosecurity measures and CAM response plan
- information showing the relationship between the AWMS and the other management systems.

The plan is to guide the actions of the producer in a way that provides for protection of all natural resources. It must have adequate information to accomplish this purpose.” (Emphasis added).

These are but a few of the requirements imposed by the AWFMH in conducting the required planning process. However, the Draft Permit does not include a NRCS Conservation Plan and shows minimal onsite investigations, far less that that required by the AWMFH. The primary concern associated with the ongoing waste management activities at C&H is nutrient disposal at the waste application sites.
Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 212:** The AWMFH devotes an entire chapter (Chapter 11) to responsible “waste utilization” and contrasts waste utilization with the ongoing waste disposal being conducted at C&H:

**651.1100 Introduction**

Water and air quality protection requires proper management of organic waste from agricultural operations. Recycling of agricultural waste materials by land application for plant uptake and crop production is a traditional and proven waste utilization technique. Properly done, recycling by land application and crop uptake is an environmentally sound method of waste management.

This chapter describes “how manure can be applied to land to use nutrients for crop production while minimizing negative water quality impacts.”

**651.1102 Land application**

(a) **The conservation plan**

Land application of agricultural waste for crop production requires careful planning. Conservation plans developed for animal-feeding operations should include a plan for agricultural waste management needs and must address the overall nutrient management requirements for the farm or ranch operation. … The
goal of the manure management portion of the conservation plan should be to recycle nutrients in the manure as fertilizer in amounts that can be used by the crop without degrading the environment.

The nutrients in the manure to be land applied must be accounted for in the nutrient management plan for the farming operation.

Later, there is a discussion of management considerations:

(iv) Management considerations—Waste must be applied in a manner that
• Prevents runoff or excessive deep percolation of the wastewater,
• Applies nutrients in amounts that do not exceed the needs of the crop.”

C&H is violating these important management considerations by applying phosphorus to soils where soil tests show optimum or above optimum levels of phosphorus. The completion of the mandated conservation plan would have identified this concern and required development of appropriate AWMS alternatives.

Section 651.1105 Nutrient management states:

“A variety of factors must be considered in designing nutrient management programs. Production and environmental goals need to be balanced, and these goals might not always be compatible. Crop nutrient requirements should be met, and soil limiting features must be considered.

…

Nutrient management applications must be planned for a limiting nutrient, which is usually either nitrogen or phosphorus. The ratio of phosphorus to nitrogen in manure is not the ratio needed by the crop. Applying manure to meet crop nitrogen needs of the crop will usually result in excess application of phosphorus needs of the crop. This is not often a problem if the soil has the ability to retain excess phosphorus for future crop use. However, once the soil has sufficient phosphorus, there is no production gained by adding more and as the phosphorus content of the soil increases so also the risk of the phosphorus leaving the field and reaching a sensitive water resource also increases.

…

A nutrient management plan must consider all likely pathways of manure nutrient transformation and transport…Plans should be based on soil tests, crop yields, manure nutrient analyses, and environmental concerns of the farm enterprise. The
plan must account for the nutrients available in the manure, the crop residues, and the soil residues, the crop’s requirement for the nutrients, and timing and method of application. The plan should be formulated to minimize the potential offsite losses of nutrients by runoff, leaching, and volatilization. (emphasis added)

(c) Nutrient requirements

Manure can provide part, all, or even excessive amounts of the nutrients required for plant production. The amount of nutrients required by plants must be determined as part of the nutrient management program.

Two strategies can be used for manure utilization: management for maximum nutrient efficiency, and management for maximum application rate of manure.

**Strategy 1 — Management for maximum nutrient efficiency.** This strategy best realizes the value of the nutrients in the manure. The rate of application is based on the nutrient available at the highest level to meet the crop’s needs. This element is often phosphorus. The manure rate is calculated to meet the requirement of phosphorus, and additional amounts of nitrogen and potassium are added from other sources (generally commercial fertilizers). This rate is most conservative and requires the greater supplement of fertilizer, but applies nutrients in the quantities that do not exceed the recommended rates for the crop.

**Strategy 2—Management for maximum application rate of manure.** This is the strategy employed when the land available for application is limited, and it fails to fully realize the value of the nutrients in the manure. The most abundant element in the manure, generally nitrogen, is used to the greatest extent possible. The manure rate is calculated to meet the nitrogen need of the crop. Often the crop is chosen to maximize the nitrogen uptake. This maximizes the application rate of manure, but will overapply phosphorus and potassium for the crop’s requirement. Over the long term, this will lead to an undesirable accumulation of phosphorus in the soil. Once a phosphorus threshold is reached, another strategy will need to be employed and manure will need to be applied elsewhere. (emphasis added)

Given the risks of developing a legacy phosphorus issue in the Buffalo River watershed, and the potential long-term environmental consequences, the AWMFH clearly recommends the use of Strategy 1. However, this obviously more resource responsible approach has not even been considered as an alternative to the AWMS at C&H, most likely because no alternatives have been explored since the required planning process has not been followed. Soil test phosphorus is
increasing in the waste spreading fields, and total phosphorus is significantly higher downstream of the waste spreading fields and in storm runoff leaving the waste spreading fields, as discussed in detail elsewhere in these comments. This could and should have been avoided through adherence to the AWMS planning, design, and operational requirements of the AWMFH. At pp. 11-28-29, the AWMFH (210–VI–AWMFH, Amend. ___, September 2013) states:

“In some situations the amount of land available is not adequate to use the total quantities of nutrients in the waste. Alternatives should be explored to use the excess manure produced. Some possibilities are additional land acquisition, agreement to apply on neighboring farms, decrease in animal numbers, composting and off-farm sales, and treatment to increase the nutrient losses in environmentally safe ways.

... If no solution is apparent, a more detailed planning effort should be considered to formulate another alternative for the agricultural waste management system.”

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

The API has been adopted by the NRCS Conservation Practice Standard, Nutrient Management Code 590 to manage the application of phosphorus in the State of Arkansas. Therefore, the API is an appropriate tool for determining phosphorus-based application rates for nutrient management. Chapter 11 of the AWMFH describes the utilization of phosphorus indexes for various states to manage phosphorus application and refers nutrient management to the local NRCS Conservation Practice Standards since nutrient management varies at the local level.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA1029\(^5\), “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA9516\(^6\) states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

The NMP submitted by C&H Hog Farms, Inc. does not fully address how manure can be applied to the land to furnish nutrients for crops without degrading the environment as stated in AWMFH 651.1102.

**Comment 213:** In addition, the Harbor Drilling Study, a limited investigation of the geologic materials underlying C&H, demonstrates that this CAFO is surrounded by karst geology. This is consistent with the available evidence that indicates it is underlain by karst. Karst areas have features that allow contamination to move easily through multiple pathways to cause widespread surface- and groundwater quality impacts (United States Environmental Protection Agency [U.S. EPA] 2002). Thus, areas with karst geology are especially sensitive to water pollution. A dye study conducted in the area showed in detail the interconnectedness of Big

\(^5\) [https://www.uaex.edu/publications/pdf/FSA-1029.pdf](https://www.uaex.edu/publications/pdf/FSA-1029.pdf)
\(^6\) [https://www.uaex.edu/publications/PDF/FSA-9516.pdf](https://www.uaex.edu/publications/PDF/FSA-9516.pdf)
Creek and the Buffalo National River basins (Van Brahana et al. 2014). The data indicate that contamination from C&H into shallow groundwater can easily spread throughout the Big Creek area and into the Buffalo National River. Even though the Harbor report shows evidence of karst geology underlying C&H CAFO, that study is apparently being used by ADEQ to assert, wrongly, that the area where C&H is located is not karst.

However, the core samples from the Harbor Drilling Study definitely show that karst is present. In Exhibit C of Harbor’s final report, Tai T. Hubbard, the Senior Geologist of Hydrogelogy Inc. assessed the subsurface geology below the manure ponds. Through chemical analyses and examination of the core samples he determined that the limestone bedrock between 13.8 feet and 28 feet below ground level had the characteristics of epikarst and that, as expected there was Boone Formation limestone bedrock between 28 feet and the drilling termination depth of 120 feet, some of it with fractures. “Epikarst” or “epikarst zone” is defined as a relatively thick (the thickness may vary significantly, but 15 to 30 meters thick is a good generalization) portion of bedrock that extends from the base of the soil zone and is characterized by extreme fracturing and enhanced dissolution. (“A Lexicon of Cave and Karst Terminology with Special to Environmental Karst Hydrology, “EPA/600/R-02/003, 2002, EPA: Washington, DC.) The bottoms of the waste storage ponds are at essentially the same level where the epikarst begins. This supports our earlier comment that the waste ponds should be replaced with tanks. It would be an unacceptable situation for synthetic liners to sit atop epikarst. Tearing and rupturing would almost certainly occur.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

Response: The Department made this permitting decision in accordance with state laws and the APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.
**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst.

While no losing/gaining study has been performed to date on Big Creek between BC6 and the confluence with the Buffalo National River, BCRET notes seasonal dryness and rewatering between these two sites. Thomas Aley notes in his expert report of May 24, 2018, that “Big Creek also goes dry during much of the year where it passes over the Boone Formation near C&H Hog Farms.” Dye studies performed by Brahana et al. (2016)\(^7\) and hydrologic studies by Murdoch et al. (2016)\(^8\) in the Big Creek watershed indicate the connectivity of karst hydrology of the Boone Formation. Thomas Aley’s May 24, 2018 expert report thoroughly explains karst geology and provides supporting evidence of the deficiencies of C&H Hog Farms, Inc.’s Regulation 5 application to address land application in karst topography.

**Comment 214:** The Harbor Drilling Study was completed on 21-23 September 2016 by Harbor Environmental and Safety in an attempt to address major public concerns after a BCRET member noted a possible major fracture and movement of waste near the waste holding ponds. The drilling study analyzed the data from only one drill site upslope from the waste ponds, whereas multiple drill holes, including holes down-slope from waste ponds, would be needed for a rigorous evaluation of whether karst is present in a given area and whether the waste ponds were contaminating groundwater.

Karst landscape has direct hydraulic connections between surface water and groundwater (Brahana et al. 2014). Karst topography is formed by dissolution of underlying carbonate rocks (limestone and dolomite), and/or other soluble rocks such as gypsum (Alpha et al. 2013). Karst soil or bedrock is permeable because air and water can move through them easily, making karst systems “very vulnerable to groundwater pollution….” (Alpha et al. 2013). Limestone (calcium

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carbonate) is known to strongly adsorb phosphorus (Stumm and Morgan 1996, Wetzel 2001); thus, recent work indicates that on an annual basis, up to ~70% of the total phosphorus (TP) flux (movement into/through the karst material) and ~90% of the soluble reactive phosphorus flux (highly bioavailable P) is retained by the karst material (Jarvie et al. 2014). However, as Jarvie et al. (2014) also noted, subsequent P remobilization and release from the karst material may serve as a long-term source of P to surface waters.

The Harbor Drilling Study was limited for evaluation of karst and the presence/absence of swine waste pollutants in C&H area for two basic reasons:

- It was based entirely on one drill hole as stated above. **Karst areas are known to be spatially variable over short distances** (Mellander et al. 2012, Knierim et al. 2015). The northwestern Arkansas area is part of one of the major karst terrains in the U.S., and karst features are often poorly developed because of a thick mantle of residual chert fragments and insoluble clays (Adamski et al. 1995, Criss et al. 2009).

- The investigation was conducted during a dry period. There had been no rain for the previous four days, and only 0.34 inch of rain over the previous ten days (National Weather Service data). It is well known that variability in pollutant concentrations over both space and time in karst is “due to groundwater flow path heterogeneity, **storm-event antecedent conditions** [emphasis added], seasonality of temperature and **precipitation** [emphasis added, and]…nitrate and bacteria can pool at the epikarst boundary and flushed out once storm-event water creates a hydraulic connection between the soil and epikarst zones…”(Knierim et al. 2015 and references therein; also see Mellander et al. 2012 and references therein).

A third point concerns evidence from the Harbor Environmental and Safety (2016) report. There is a brief description indicating that the grouting of the bore hole required much more grout than had been planned, suggesting that larger fractures were present in various zones, and that the area is karst. This finding also suggests that the area is susceptible to groundwater (and surface water) contamination from waste ponds leaks, and with application of liquid swine wastes to fields. It is accepted that waste ponds with clay liners commonly leak substantial pollutants into shallow groundwater (e.g., Huffman and Westerman 1995, Ham and De Sutter 2000). Swine CAFOs (both the land application practices and waste pond leakage) additionally pose a significant threat to well water via contamination by other harmful substances and pathogenic microbes (e.g. Stone et al. 1998, Krapac et al. 2002).

Mr. Tai Hubbard, P.G., of Hydrogeology, Inc., was hired by ADEQ to evaluate the study. He found it to be inadequate because only one drill hole was analyzed,
and noted other serious limitations in the study design, methods, and data interpretation as well. In Appendix C to the report Mr. Hubbard states:

Other questions concern the apparent void detected at a depth that closely corresponds to the depths of the pond floors. The void was detected during drilling and again when difficulty was encountered while sealing up the hole above a depth of 25 feet below the ground. Water for lubricating the drilling process was lost at this depth and the final grouting of the shaft required almost 50% more in cement than what the driller had calculated. The report provided little discussion regarding this seemingly significant karst feature [emphasis added]. The report and the cores show that karst is indicated throughout most of the 120 ft. range of the drilled shaft.…*this facility and its waste ponds are clearly sitting atop karst* [emphasis added].

The U.S. Geological Survey has published information about the general area which supports karst underlying C&H (Hudson et al. 2001, 2011). Both documents describes pervasive occurrence of karst features. Other peer-reviewed publications such as Knierim et al. (2015) have noted that abundant chert, which has been found in C&H site, is characteristic of the general karst area of northwestern Arkansas. An electrical resistivity imaging (ERI) analysis of fields 5a and 12 at the CAFO was conducted by scientists from Oklahoma State University. The ERI surveys have confirmed soil thickness, extent, and depth of epikarst features and bedrock material. *The average epikarst thickness underlying the two fields was highly variable*, ranging from 6 to 75 feet. *A large doline feature was detected, which is a closed topographic depression in karst areas*, caused by dissolution or collapse of underlying rock or soil within the weathered bedrock underlying one, but not all three fields (Fields and Halihan 2015).

ADEQ appears to interpret the results of the Harbor Drilling Study as adequate support to conclude that although C&H is surrounded by karst geology, there is no karst underlying the CAFO. The report *did not* reach that conclusion. Rather, it states that karst features were not encountered in the zone from 70 to 90 feet below the ground surface (p. 7). Attachment C to the report states, “The highly weathered limestone bedrock and unconsolidated clay intervals observed between 13.8 and 28.0 feet below the ground surface appeared to have the characteristics of epikarst.” This depth would correspond to at or just below the bottom of the waste holding ponds; thus, the pond leakage would move directly into the epikarst layer. The U.S. EPA (2002) defines epikarst or epikarst zone as a relatively thick portion of bedrock that extends from the base of the soil zone and is characterized by extreme fracturing and enhanced dissolution. Significant water storage and transport occur in the epikarst zone.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross
**Response:**  APC&EC Regulation 5, Liquid Animal Waste Management Systems, does not prohibit liquid animal waste management systems or associated land application from being located in karst.

The Department acknowledges the comment about the drilling study. This issue was previously covered during the work plan comment period and final report comment period for the Harbor Environmental Drilling Study.

**Response:**  The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require compliance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to the degradation of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Although the analytical data from the Harbor Drilling Study did not indicate a leak at the borehole drilling location at the time of the sampling, the Study does not support the conclusion that there is not any leakage from the ponds.

**Comment 215:**  Water quality monitoring downstream of the facility shows an increase in nutrient concentrations as well as other contaminants, including, but not limited to chlorides, total suspended solids and total coliform bacteria. (Mott, 2016). There is evidence that shows it is more probable than not that a portion of these contaminants are from waste generated at C&H and disposed of at the waste
application sites. The contribution of nutrients and harmful bacteria from C&H is causing or contributing to water quality degradation in Big Creek and the Buffalo National River. By causing or contributing to the degradation of water quality in both Big Creek and the Buffalo River, C&H is violating state and federal anti-degradation provisions. See, APCEC Reg. 2, Chapter 2: the Clean Water Act § 303 (33 U.S.C. § 1313) and 40 CFR § 131.12.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

BCRET data analyzed by Mott (2016) indicates the following: nitrates increased from a median value of 0.10 mg/L to 0.23 mg/L from upstream to downstream, respectively; median total suspended solids (TSS) increased by 0.05 mg/L; and chloride concentration increased from 1.6 mg/L to 1.9 mg/L. The APC&EC Regulation 2 ecoregion value for chloride is 13 mg/L. While total coliform bacteria showed an increase of 891 MPN/100 mL, *E. coli* decreased by 23 MPN/100 mL.

Nitrate values upstream and downstream are comparable to the Boston Mountain median values. With regards to domestic water supply uses, nitrate values observed in Big Creek, both upstream and downstream, are well below most groundwater and source water intake nitrate values. For example, the Arkansas Department of Health reports in the 2016 Annual Drinking Water Quality Report for the City of Jasper a mean nitrate value of 0.36 mg/L, with a range from 0.12 mg/L to 0.59 mg/L (ADH, [http://www.healthy.arkansas.gov/eng/ccr/397.pdf](http://www.healthy.arkansas.gov/eng/ccr/397.pdf)). The source water intake for the City of Jasper is located in Bull Shoals Lake.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

In the April 1 to June 30, 2018 Quarterly Report, BCRET presents data that documents a statistically significant increase of nitrate-N in the ephemeral stream (BC4) since 2014. However, BCRET notes that chloride, a conservative tracer, did not show a statistically significant increase. Four years of data also indicate a steady increase of geometric mean nitrate-N within the house well (W1) (BCRET April–June 2018, Figure 24). Increased nitrate-N in both the ephemeral stream
and the house well does suggest that these systems may be hydrologically connected to areas where farm activities take place. APC&EC Regulation 5 requires the design and waste management plans for liquid animal waste management systems be in accordance with the AWMFH. The AWMFH requires a detailed, geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. Detailed geologic investigations are necessary to determine that the ephemeral stream and house well are not influenced by the waste storage holding ponds, on-farm activities, or waste management practices. A dye tracing study may be necessary to understand the movement of groundwater in this complex geologic system.

BCRET data document that nitrate-N is variable; however, Figure 12 of the April 1 to June 30, 2018 BCRET Quarterly Report demonstrates that nitrate-N is higher downstream (BC7) than upstream (BC6). Chlorides and nitrates follow similar seasonal fluctuations in that they are higher during summer and autumn months when stream discharge is most influenced by groundwater. ADEQ reviewed Jim Petersen’s May 31, 2018 expert report, which presents an analysis of temporal trends among nitrate-N and \textit{E. coli} from January 2014–December 2017 at BC6 and BC7. Mr. Petersen’s analysis presents decreasing trends of ammonia and chlorides and increasing concentrations of \textit{E. coli} at BC6. Yet, increasing concentrations of nitrate-N were observed downstream at BC7. The conflicting temporal analysis prompted Mr. Petersen to further review trends upstream to downstream. By analyzing paired concentration data (collected same day) at BC6 and BC7 from January 2014 through December 2017, Mr. Petersen reports significant increases in total nitrogen, ortho-phosphorus, and chlorides, but non-significant changes in \textit{E. coli} and nitrate-N. The significant increase of nitrate-N in the house well and ephemeral stream does correspond to increases of total nitrogen at BC7. Mr. Petersen’s analysis illustrates the complexities of evaluating water chemistry in karst systems.

**Comment 216:** The watersheds that adjoin the Buffalo National River watershed to the north and the west are designated as Nutrient Surplus Areas and/or contain impaired stream reaches. According to the Arkansas Natural Resources Commission:

“A Nutrient Surplus Area (NSA) is an area that has been designated by the Arkansas General Assembly as having such high concentrations of one or more nutrients that continued unrestricted application of the nutrient could negatively impact soil fertility and waters of the state.”

(http://www.anrc.arkansas.gov/divisions/conservation/nutrient-management-program/nutrition-management-planning)
Despite decades of efforts to reverse the effects of over application, conditions do not appear to be improving in these NSAs. (https://www.adeq.state.ar.us/water/planning/integrated/303d/list.aspx; Scott et al., 2016).

The cause of the water quality impairment and public concerns are well documented and linked to agricultural activities, including CAFOs (Winthrop Rockefeller Foundation, 2008; http://arkansas-water-center.uark.edu/, Haggard et al., 2017). Dr. Andrew Sharpley explains that prior to World War II, nutrients were mainly recycled on the farms where they were produced. In the last 75-years, a major shift has been occurring regarding the transportation of nutrient-rich agricultural feed products to areas of the nation where animal agriculture and CAFOs dominate (Sharpley, 1993). These same areas now experience water quality declines, and in some cases, water quality impairment due to the large volumes of wastes that have been generated and disposed of in these areas.


ADEQ has developed Total Maximum Daily Loads (TMDLs) for some of the impaired streams in northwest Arkansas. (https://www.adeq.state.ar.us/water/planning/integrated/tmdl/) Agriculture is often the single largest source of nutrients and bacteria causing stream impairments. (https://www.adeq.state.ar.us/water/planning/integrated/303d/list.aspx).

TMDL tools and processes could have been used by ADEQ to better inform this permit decision. Prior to granting the initial authorization to C&H Hog Farms (C&H), ADEQ should have inventoried existing agriculture activities in the Big Creek basin and collected a meaningful baseline of existing water quality, especially during times of storm induced runoff when 80 to 90 percent of the agricultural waste is transported to Buffalo National River
Source inventory information and water quality data would have allowed ADEQ to develop a water quality model for the Big Creek basin. C&H waste application volumes could have been added to the water quality model, and the results could have been quantitatively evaluated, and forecasts made concerning water quality responses at various locations and scales (McCarty et al., 2016). However, this was not done. This complicates the task of researchers, including BCRET, to determine the impacts C&H is having on water quality.

The graphs labeled as 4.3.4 and 4.3.8 are copied from a recently completed report by the Watershed Conservation Resource Center, 2017, and confirm previous observations of the relationship between land use and nitrate levels at Buffalo National River (Mott, 1997; Mott and Laurans, 2004). The Watershed Conservation Resource Center analysis shows increases in nitrate over time in both the Buffalo River and its tributaries. These results correlate with agricultural land-use conversion from forest to pasture. This information is not new as these relationships were described in reports 20-years ago (Mott, 1997). As the agency whose mission is to “protect, enhance and restore the natural environment for the well-being of Arkansans,” (www.adeq.state.ar.us) ADEQ has the duty to demonstrate that permitting a facility land applying 69,470 pounds of nitrogen per year (Hancock et al., 2016) will not contribute to additional elevation of nitrate concentrations in the Buffalo River. It has not done this.

ADEQ has long been aware of the nexus between water quality and nutrient issues and has stated:

“The greatest threat to surface and ground water quality in northwest Arkansas is nonpoint source pollution from confined animal operations. Northwest Arkansas has the greatest percentage of broiler houses, hog farms, and dairies than any other area of the State. In conjunction with having some of the highest production rates in the United States, northwest Arkansas is also listed as one of the most vulnerable areas of the State to potential ground water pollution (Arkansas Soil and Water Conservation Commission, 1994).”

“Practically all of the waste generated from these animal production facilities is land applied and, as a result, nitrate levels measured from this region are atypically high (Arkansas Department of Pollution Control and Ecology, 1993).”

Due to the widespread and significant water quality impacts in northwest Arkansas, ADEQ had a duty to conduct a rigorous water quality assessment.
previous to permitting this large CAFO. Given the State and National significance of Buffalo National River, its Outstanding National Resource status, and the vast body of science that shows the impacts of CAFO waste runoff on water quality, ADEQ also has a duty to model the water quality changes that are and will occur, under all hydrologic conditions. Because source inventories, baseline water quality, and modeling has not been conducted, ADEQ does not know the linkages between dissolved oxygen (D.O.) minima levels at Big Creek at Carver, or what is the source of the E. coli numeric standard criteria exceedances observed in the BCRET data, or if the nuisance algae blooms in Buffalo National River were or were not contributed to by C&H. ADEQ should deny this permit until it can develop an unbiased, peer reviewed, water quality model, and use it to test its assumptions that C&H is retaining all of its nutrients, chlorides, trace metals, solids and bacteria from the applied swine waste load.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The Buffalo National River watershed is not a designated Nutrient Surplus Area. Soil and Water Assessment Tool (SWAT) models are currently under development by ANRC contractors for the Buffalo River Watershed Management Plan. Land use models, such as SWAT, are better suited for developing meaningful results for watersheds or hydrologic units code, rather than single field application sites. The API considers inputs from on-site variables to assess the runoff risk of phosphorus. The API has been adopted by the NRCS Conservation Practice Standard Nutrient Management Code 590 to manage the application of phosphorus in the State of Arkansas.

Consideration of non-regulated agricultural land use is not within the Department’s regulatory authority.

The ADEQ Office of Water Quality Planning Branch routinely collects and evaluates water quality data from approximately 300 stations across the state. The Department is required every two years by 40 CFR 130.7(b)(5) to assess all readily available data for attainment of water quality standards. The EPA did not include Big Creek or the Buffalo National River on the approved 2016 303(d) list.

The Department has received multiple comments regarding algae concerns in the Buffalo National River Watershed. The Department and the NPS are in the
process of designing an algal monitoring program for the Buffalo National River and its tributaries.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

ADEQ is working to support a collaborative study with the Arkansas Game and Fish Commission, US Geological Survey, and the National Park Service focused on the distribution and causation of the rapid expansion of filamentous algae in the Buffalo River.

Comment 217: Buffalo National River is recognized as an Outstanding National Resource Water under provisions of the Clean Water Act. The anti-degradation policy prohibits degradation of water bodies to the point where they no longer meet their most restrictive designated use. CFR 40 § 131.12 states:

(3) Where high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

Anti-degradation regulations help to ensure the following: “(1) all waters continue to support their designated uses; (2) waters with higher quality than the minimum are protected, unless there are important benefits associated with carefully
considered actions that could cause additional degradation; and (3) **highly valued, high-quality waters are not degraded at all**” (USEPA, undated).

Under ADEQ Regulation No. 2 the Buffalo River is listed as an Outstanding Resource Water with two designated uses: Extraordinary Resource Water (ERW) and Natural and Scenic Waterway (NSW). Where high quality waters constitute an ORW, those uses and water quality for which the outstanding waterbody was designated **shall be protected** by (1) water quality controls, (2) maintenance of natural flow regime, (3) protection of instream habitat, and (4) **encouragement of land management practices protective of the watershed.**

Based on the work of Mott, 1990; Steele and Mott, 1998; Galloway and Green, 2004; White et al., 2004, it is understood that nutrients and bacteria will be delivered from the C&H waste application fields to Buffalo National River primarily during periods of storm generated runoff. The EPA (https://www.epa.gov/sites/production/files/2016-05/documents/tech_notes_8_dec_2013_load.pdf) estimates that 80 to 90 percent of nonpoint pollution loads are delivered to rivers in the 10 to 20 percent of the time surface runoff is occurring. Another complicating factor in the Big Creek basin, the fifth largest tributary to the Buffalo River, is the karst subsurface drainage system, which in some situations can deliver bacteria and nutrients to surface streams nearly as rapidly as through surface runoff (Brahana et al., 2016).

ADEQ is making its decision to issue this permit without analyzing storm runoff water quality conditions at BCRET’s upstream or downstream monitoring sites near Mt. Judea, or the USGS monitoring site at Carver. As a result, ADEQ is not assessing the most significant concern presented by this decision, and is unable to answer questions about the water quality impact of field runoff from the waste application sites operated by C&H. Evidence is presented here regarding runoff of nitrate that is measurably impacting the water quality of the Buffalo River. This data has been obtained from the USGS continually recording Hach® Nitratax sensor located at Big Creek at Carver, ½ mile upstream from the confluence with the Buffalo River (https://waterdata.usgs.gov/ar/nwis/uv?site_no=07055814).

In most aquifers, water travels at the rate of feet per year. In karst aquifers, groundwater velocities achieve feet per second. Infiltrating rainwater moves rapidly towards a discharge point at springs or directly within adjacent surface streams (Brahana et al., 2016). Based on a detailed analysis (Mott, 2016), the upper karst aquifer near Mt. Judea has elevated nitrate concentrations. In this setting during significant rain events, storm runoff is merging with the land applied waste, and carrying some component of this waste to surface streams, either through sheet flow or discrete conduits such as gullies, ditches or rivulets. Flow in karst conduits is also responding to the rain, and groundwater with elevated levels of
Nitrate is discharging at greater volumes to surface streams. These combined elevated sources of nutrients and bacteria are then carried downstream toward Buffalo National River.

It is possible to estimate the travel time for a peak of nitrate concentration generated upstream of the USGS Mt. Judea stream gage to the USGS Big Creek at Carver gage using an equation given in a link provided by the USGS https://pubs.usgs.gov/sir/2004/5064/SIR2004-5064.pdf. The distance from the USGS Mt. Judea gage to the USGS Big Creek at Carver gage is approximately 4-miles (Figure 2). Travel time for the arrival of a peak nitrate concentration generated from the area of C&H’s waste application fields to the Big Creek at Carver gage can be forecast by inserting the required values in the equation in the document referenced above. Values used were an average discharge of 150 cfs, a stream slope of 0.00118 ft/ft, and a drainage area of 89.9 miles. The equation yielded an average velocity for the nitrate peak of 1.07 ft/s, and calculated a gage to gage travel time of 5.5 hours.

Figure 1 shows the storm hydrograph response from a rain event with sufficient volume, intensity, and duration to generate surface runoff and karst conduit flushing in the Big Creek basin. This event was not a major flood or runoff event. The horizontal axis minimum starts at 00:00 hours on Oct. 12, 2016. Surface runoff began passing the Big Creek at Carver gage at 17:00 hours and stream discharge rises. Figure 1 also shows nitrate concentration every 15 minutes. Nitrate increased from 0.035 mg/L pre-storm runoff to 0.065 mg/L (about twice as high) during the first 4 hours of runoff. The first 4 hours represent runoff from the mostly forested lower portion of the Big Creek basin (bigcreekresearch.org, Figure 2). After the first 4 hours the nitrate concentration began to increase and peaked 6 hours after runoff started (Lag 1).

The discharge curve in Figure 1 shows three periods of peak rainfall generated three peaks in the hydrograph. The time between when the discharge began to rise in response to surface runoff, and the arrival of the peak nitrate concentration (lag time), ranges from 5.5 to 7 hours, and is a reasonable approximation of the 5.5 hours estimated by the travel time equation. Nitrate concentration peaks at 1.97 mg/L (about 56 times higher than the pre-storm nitrate value). Travel time lag analysis provides evidence that the source of the peak nitrate is the developed portion of the Big Creek basin where C&H and its waste application fields are located as little as 0.7 miles above the USGS Mt. Judea gaging station. This is a simplified analysis intended to portray a glimpse of the critical information contained in storm runoff data. Better evidence would be attained if a tracer was injected into the flow of Big Creek at the Mt. Judea gage when surface runoff first begins passing this location, and its arrival time physically detected at the Big
Creek at Carver gage while simultaneously collecting water quality samples to be analyzed for all parameters of concern.

Routine water quality monitoring programs that grab a sample on a predetermined schedule are likely to miss short-duration peak concentrations, and conclude the water quality is little affected by agricultural sources. The storm event data shows that the existing water quality in the Buffalo River will be measurably increased in nitrate by the surface runoff and groundwater moving out of the Big Creek basin. This example is not unique, and storm event concentration spiking can be shown for storm after storm with the USGS data (Figure 3).

Quantifying the total mass of a substance being transported down Big Creek and loaded into the Buffalo River is critical to analyzing C&H’s impact on the water quality of Buffalo National River (Haggard et al., 2003; https://bigcreekresearch.org/project_reports/docs/Review%20Panel%20Report%20-%20May%2019%202014.pdf). Loads can be expressed in many forms, but typically they are represented as pounds per day or tons per year. For nutrients, the load is most useful when examining how aquatic systems will respond to nutrient stimulation, and the potential for nuisance algae development. For streams draining agriculturally developed basins, loads are typically orders of magnitude greater on days with storm runoff than on base flow days. (McCarty et al., 2016; Shujiang et al., 2008; Lohman and Jones, 1998; Scott et al., 2016, Steele and Mott, 1998).

Before a storm load can be calculated, the interval of storm flow must be isolated within the hydrograph. Inflection point analysis employing asymptotic lines matched to the falling side of the hydrograph and the base-flow tail was used in hydrograph separation (dashed lines in Figure 4). Where these lines intersect is a good approximation of when surface runoff has stopped dominating the hydrograph, and subsequent stream discharge is composed primarily of discharging ground water (https://www.slideshare.net/DirkKassenaarMScPEng/characterizing-change-in-baseflowinteractions-with-urbanization-through-eventbased-hydrograph-separation-and-analysis).

In the case of the October 12 - 13, 2016 storm event, the storm hydrograph spans 19 hours. To calculate the load, the concentration at time x is multiplied by the discharge at time x to derive an instantaneous flux, or a load of nitrate in milligrams carried past the sampling station each second. Because discharge and nitrate data are collected by the USGS every 15 minutes, the flux is multiplied by the time interval and converted, in this example, to express a load in pounds per 15 minutes. These 15 minute loads are then summed over the 19 hours of the
storm runoff hydrograph to derive a total storm load. The nitrate load for this storm was calculated to be 310 pounds of NO3+NO2 as N.

During the 24-hours prior to storm runoff initiation, the load was 0.5134 pounds per day. This storm loaded the equivalent of 607 pre-storm days of nitrate into the Buffalo River. C&H produces an estimated 92,611 pounds of nitrogen per year (DeHaan, Grabs & Associates, 2012). The USGS discharge and nitrate concentrations are readily accessed at, https://waterdata.usgs.gov/ar/nwis/uv?site_no=07055814.

Figure 6 shows median nutrient values in field runoff and at Big Creek stream sampling sites. Field runoff median values are higher in nutrients than the receiving stream, with the exception of nitrate at Big Creek downstream, which is receiving a constant elevated level of nitrate via groundwater contributions (bigcreekresearch.org; Mott, 2016). Note that nitrate is coming off the waste application fields at concentrations similar to the median concentration at BCRET’s downstream sampling site. Also note that much of the total nitrogen leaving the fields would not be detected with the nitrate probe at Big Creek at Carver. Therefore, the total nitrogen load, once calculated by USGS, will be much larger than the nitrate spike used in this example.

Another observation in the flume data is that 60 percent of the total phosphorus coming off the waste application fields is in the plant available dissolved form, while in the surface streams the DP/TP ratio is closer to 30 percent. This means during each rainstorm runoff episode, especially during summer thunderstorms, dissolved phosphorus is being supplied to the Buffalo River’s aquatic plant community.

Bacteria levels are also observed exceeding state numeric criteria in Big Creek at both BCRET sampling stations (bigcreekresearch.org; Mott, 2016). The sampling station on Big Creek at Carver (Figure 7), and in the Buffalo River below the confluence with Big Creek (Figure 7) can also show high bacteria levels (Mott, 2016).

ADEQ has not explained the source of these high bacteria levels or addressed the issues identified by BCRET, USGS, or NPS monitoring.

In summary, we believe the available evidence demonstrates C&H is contributing measurably to water quality degradation of the Buffalo River in violation of the ONR status and associated anti-degradation policy. While nitrate was the only nutrient parameter reviewed due to limited storm flow data availability, the results indicate a compelling need for ADEQ to understand how storm runoff is impacting water quality in order to make an informed decision. Because ADEQ
has failed to conduct a meaningful analysis of the high flow data, it lacks the ability to characterize water quality impacts to Buffalo National River attributed to the continued operations of C&H.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

Response: The Buffalo National River meets the requirements of an Outstanding Resource Water. The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2 Chapter 2. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to dictate regulatory authority over private land within the watershed, other than what exists under local, state, or federal law.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The Department considered all relevant scientific data submitted during this permitting process. APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.”

While nitrate concentration peaks as well as other nonpoint source pollutant peaks could be noted in the watershed, several potential sources of nonpoint source pollution other than land applied hog waste exist in the watershed, including but not limited to animal grazing, poultry litter, wild animals, lawn maintenance, and failing septic systems. ANRC is currently developing a watershed plan for the Buffalo National River.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department is actively engaged in developing an antidegradation implementation procedure to address the revision of 40 CFR § 131.12. The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2 Chapter 2. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to dictate regulatory authority over private land within the watershed of an ERW, other than what exists under local, state, or federal law.

In the April 1 to June 30, 2018 Quarterly Report, BCRET presents data that documents a statistically significant increase of nitrate-N in the ephemeral stream (BC4) since 2014. However, BCRET notes that chloride, a conservative tracer, did not show a statistically significant increase. Four years of data also indicate a
steady increase of geometric mean nitrate-N within the house well (W1) (BCRET April–June 2018, Figure 24). Increased nitrate-N in both the ephemeral stream and the house well does suggest that these systems may be hydrologically connected to areas where farm activities take place.

BCRET data document that nitrate-N is variable; however, Figure 12 of the April 1 to June 30, 2018 BCRET Quarterly Report demonstrates that nitrate-N is higher downstream (BC7) than upstream (BC6). Chlorides and nitrates follow similar seasonal fluctuations in that they are higher during summer and autumn months when stream discharge is most influenced by groundwater. ADEQ reviewed Jim Petersen’s May 31, 2018 expert report, which presents an analysis of temporal trends among nitrate-N and E. coli from January 2014–December 2017 at BC6 and BC7. Mr. Petersen’s analysis presents decreasing trends of ammonia and chlorides and increasing concentrations of E. coli at BC6. Yet, increasing concentrations of nitrate-N were observed downstream at BC7. The conflicting temporal analysis prompted Mr. Petersen to further review trends upstream to downstream. By analyzing paired concentration data (collected same day) at BC6 and BC7 from January 2014 through December 2017, Mr. Petersen reports significant increases in total nitrogen, ortho-phosphorus, and chlorides, but non-significant changes in E. coli and nitrate-N. The significant increase of nitrate-N in the house well and ephemeral stream does correspond to increases of total nitrogen at BC7. Mr. Petersen’s analysis illustrates the complexities of evaluating water chemistry in karst systems.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the Buffalo River Watershed and to protect the vitality of the Buffalo National River as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018. Watershed management plans are recognized by EPA as comparable, state-led management approaches expected to result in the attainment of water-quality standards.

**Comment 218:** Because BCRET is not collecting water quality samples in a way that allows a systematic assessment of storm runoff, the BCRET data is most applicable to analyzing base-flow concentrations. BCRET is not gathering discharge data at the upstream site. Because of this oversight, instantaneous flux, storm flow, base flow and annual load calculations and comparisons between sites are either compromised or not possible. BCRET has not systematically evaluated
high flow data collected with the ISCO automated samplers, or presented peer reviewed interpretations of the ISCO data to decision makers.

Nutrients and bacteria are delivered to Big Creek during both base and storm flows, although the base flow load contribution is typically smaller in agricultural settings. BCRET data shows elevated nitrate and total nitrogen concentrations at the downstream sampling site (bigcreekresearch.org). This result is expected in agriculturally developed basins on karst terrain (Steele et al., 1990; Scott et al., 2016; Mott et al., 2000; Petersen et al., 1998; Petersen et al., 2014; Adamski, 1997) and this finding likely pre-dated C&H to some extent. However, the extent to which C&H has caused or contributed to elevated nitrate levels is difficult to quantify in the absence of baseline data. A recent analysis of nitrate and total nitrogen trends shows these parameters increasing downstream of C&H since initiation of C&H swine waste spreading (Mott, 2016).

Nutrients can affect water quality in many ways, including reduction of dissolved oxygen levels https://www.uaex.edu/publications/PDF/FSA-9517.pdf. ADEQ is aware that the USGS continuous dissolved oxygen (D.O.) monitoring probe at the Big Creek at Carver site records D.O. minima values below state standards during summer/fall low-flow conditions (Figure 8). It is likely that nutrients from C&H are contributing to the eutrophication of the stream reach between the BCRET downstream station and the Big Creek at Carver site near the confluence with the Buffalo River (Mott, 2016; https://pubs.usgs.gov/fs/fs11803/; Sharpley et al., 2006; https://www.pca.state.mn.us/sites/default/files/wq-iw3-22.pdf). ADEQ has not analyzed this relationship following EPA guidance. ADEQ has not sought or presented an alternative explanation for these low D.O values (https://www3.epa.gov/caddis/ssr_do_int.html).

Although several parameters are elevated at statistically significant levels downstream from C&H when comparing the upstream BCRET testing site to the BCRET downstream testing site, the most concerning is an elevation of nitrate and total nitrogen concentrations (Mott, 2016). Median nitrate concentrations are over twice as high at the BCRET downstream site as compared to the upstream sampling site. Total nitrogen median concentration is 70 percent higher at the downstream site. Nitrate/total nitrogen ratios are also higher at the downstream site Id.

Nitrate levels are more elevated in late summer and early fall and result from ground water elevated in nitrate discharging from the karst aquifer into Big Creek above the downstream sampling site. Id. Base flow concentrations of nitrate and total nitrogen increased from one summer low-flow period to the next at the downstream site, but not at the upstream site. Id. According to the results of numerous studies, nitrate derived from CAFOs and other agriculturally generated
wastes readily migrates to groundwater in karst settings (see the vast body of research cited in NRCS, 2012). Nitrate is little attenuated in karst aquifers and discharges to surface streams through springs and gaining reaches (Musgrove et al., 2016; Vesper et al., 2003, NRCS, 2012).

Nutrients infiltrate groundwater at C&H through leaking lagoons and from waste application fields (DeHaan, Grabs & Associates, 2012; NRCS, 2012; https://www.uaex.edu/publications/PDF/FSA-9517.pdf; Tesoriero et al., 2013; Shujing et al., 2008; Musgrove et al., 2016; Vesper et al., 2013; Adamski, 1997; Aley, 1982). As a result of geologic factors, the groundwater nitrate load resurges above the BCRET downstream sampling site, and is subsequently transported the 4-miles toward the Big Creek at Carver gaging station. Within this 4 mile reach, during base flow conditions assimilation and dilution (and possibly loss of flow to the karst strata), processes appear to measurably reduce soluble nitrate concentrations. Nitrate concentrations were typically much lower at the Big Creek at Carver site than at the BCRET downstream sampling station (Mott, 2016).

The dissolved oxygen (D.O.) record (Figure 8) at the Big Creek at Carver site shows the effects of eutrophication caused by this constant supply of agriculturally derived nutrients. In recent summers during warm weather and low-flow conditions, the diurnally fluctuating dissolved oxygen values dip below ADEQ Regulation #2 numeric standard of six milligrams per liter at the Big Creek at Carver site (https://waterdata.usgs.gov/ar/nwis/uv?site_no=07055814).

A plausible explanation for these observations is that algae production, driven by increased nutrient concentrations and subsequent die-off, is resulting in low dissolved oxygen levels (Mott, 2016). ADEQ is aware of the D.O. minima observations, but hasn’t offered an explanation regarding water quality violations. Nor has ADEQ conducted any assessments of possible impacts to aquatic communities in the effected reach. Other complicating factors include the possibility that stream flow in the reach between the gages is being pirated to the karst units below the Boone Limestone. This flow could move directly to the Buffalo River in a karst distributary process (Mott, 2016; Taylor and Greene, 2008). Increasing nitrate values as observed by Watershed Conservation Resource Center (2017) in the Buffalo River at Woolum and Mitch Hill Spring could be associated with karst interactions between the Big Creek Valley and the Buffalo National River (Mott, 2016; Moix and Galloway, 2014). Karst hydrologic processes in the area have not been assessed by ADEQ or BCRET.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

Response: The Department did not review or approve BECRT's study design and has no authority over the day-to-day activities of BCRET. While the
Department may consider the research conducted by the University of Arkansas, questions regarding the study should be more appropriately directed to the University of Arkansas.

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

While nitrate concentration peaks as well as other nonpoint source pollutant peaks could be noted in the watershed, several potential sources of nonpoint source pollution other than land applied hog waste exist in the watershed, including but not limited to animal grazing, poultry litter, wild animals, lawn maintenance, and failing septic systems. ANRC is currently developing a watershed plan for the Buffalo National River.

The Department and the National Park Service are in the process of designing an algal monitoring program for the Buffalo National River and its tributaries. If an algal bloom is reported, the Office of Water Quality may conduct an investigation.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and
the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

In the April 1 to June 30, 2018 Quarterly Report, BCRET presents data that documents a statistically significant increase of nitrate-N in the ephemeral stream (BC4) since 2014. However, BCRET notes that chloride, a conservative tracer, did not show a statistically significant increase. Four years of data also indicate a steady increase of geometric mean nitrate-N within the house well (W1) (BCRET April–June 2018, Figure 24). Increased nitrate-N in both the ephemeral stream and the house well does suggest that these systems may be hydrologically connected to areas where farm activities take place.

BCRET data document that nitrate-N is variable; however, Figure 12 of the April 1 to June 30, 2018 BCRET Quarterly Report demonstrates that nitrate-N is higher downstream (BC7) than upstream (BC6). Chlorides and nitrates follow similar seasonal fluctuations in that they are higher during summer and autumn months when stream discharge is most influenced by groundwater. ADEQ reviewed Jim Petersen’s May 31, 2018 expert report, which presents an analysis of temporal trends among nitrate-N and E. coli from January 2014–December 2017 at BC6 and BC7. Mr. Petersen’s analysis presents decreasing trends of ammonia and chlorides and increasing concentrations of E. coli at BC6. Yet, increasing concentrations of nitrate-N were observed downstream at BC7. The conflicting temporal analysis prompted Mr. Petersen to further review trends upstream to downstream. By analyzing paired concentration data (collected same day) at BC6 and BC7 from January 2014 through December 2017, Mr. Petersen reports significant increases in total nitrogen, ortho-phosphorus, and chlorides, but nonsignificant changes in E. coli and nitrate-N. The significant increase of nitrate-N in the house well and ephemeral stream does correspond to increases of total nitrogen at BC7. Mr. Petersen’s analysis illustrates the complexities of evaluating water chemistry in karst systems.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the Buffalo River Watershed and to protect the vitality of the Buffalo National River as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018. Watershed management plans are recognized by EPA as comparable, state-led management approaches expected to result in the attainment of water-quality standards.
ADEQ is working to support a collaborative study with the Arkansas Game and Fish Commission, US Geological Survey, and the National Park Service focused on the distribution and causation of the rapid expansion of filamentous algae in the Buffalo River.

**Comment 219:** Phosphorus is another nutrient of concern with total phosphorus significantly elevated at the BCRET downstream site. The current magnitude of increase in phosphorus is less than for nitrogen in the base-flow data at this time due to issues associated with “legacy phosphorus” (Sharpley et. al., 2013). According to Dr. Sharpley, “outmigration of phosphorus from a basin is a slow process, but once it begins it is very hard to reverse and lasts a long time.” (Sharpley et al., 2006). This statement does not apply to storm flow conditions when phosphorus outmigration is accelerated.

(https://www.epa.gov/nutrientpollution/sources-and-solutions-agriculture; https://pubs.ext.vt.edu/424/424-029/424-029_pdf.pdf). Outmigration of phosphorus begins with the first storm event following the application of high phosphorous swine waste on waste application fields. Coupled with surface runoff, this first storm event, and each subsequent one, can yield large loads of dissolved and total phosphorus to receiving streams (Figure 6). It has been determined that 33 percent of soluble phosphorus found in swine manure applied to test plots was transported in runoff after two simulated storms (Smith et al., 2000).

Stream ecosystems can be stimulated by phosphorus inputs before reaching “legacy phosphorus” conditions. Phosphorus is the primary limiting nutrient in the Buffalo River watershed (Meyer and Rippey, 1976). Under natural conditions, aquatic plant growth is limited by very low phosphorus concentrations in the Buffalo River and its tributaries. Nitrogen and potassium, the two other essential plant nutrients, are typically more plentiful and do not limit aquatic plant metabolism.

When phosphorus is added to phosphorus limited aquatic systems, the dissolved portion will stimulate plant growth and be removed from the water column and incorporated into plant tissue. The labile and organic phosphorus bind to the surface of particles in the stream bed. These compounds can subsequently be converted to the dissolved form in an aquatic environment, and further stimulate plant growth. If enough dissolved phosphorus is consistently added to a stream by storm events, discharging ground water, and dissolution from stream deposits, phosphorus will no longer be the primary factor limiting plant growth (http://edis.ifas.ufl.edu/sg118). At this point, base flow water samples will show elevated phosphorus as well as the storm flow samples (http://pubs.acs.org/doi/abs/10.1021/es403160a; https://www.ncbi.nlm.nih.gov/pubmed/24216410;
https://water.usgs.gov/edu/phosphorus.html;

The ultimate sources of elevated phosphorus in streams draining agricultural basins are phosphorus in land applied waste and phosphorus enriched soils that have received excessive nutrients for many years. Over time, elevating soil phosphorus increases phosphorus in ground water and stream deposits. If it increases enough, it is no longer the primary limiting factor in plant growth. Plants will not immediately absorb dissolved phosphorus, and it can then be consistently measured at elevated levels in water samples, especially in winter when plant growth is limited by light and temperature. However, this increasing phosphorus will be stimulating aquatic plant growth and eutrophication processes years before Sharpley’s legacy phosphorus concept becomes manifest in base flow water sampling results. At that time, even if efforts to control (or eliminate) the phosphorus in land application practices are applied, the “legacy phosphorus” in the soils and stream deposits will result in elevated phosphorus levels in water samples, and it is “very hard to reverse and lasts a long time.” (Sharpley et al., 2006).

ADEQ appears to be satisfied waiting up to ten-years for these base flow legacy phosphorus signatures to appear in the data. This is an unacceptable management and monitoring approach and is inconsistent with ADEQ’s stated mission “to protect, enhance, and restore the natural environment for the well-being of all Arkansans” (https://www.adeq.state.ar.us/ ) and the goals of the Beautiful Buffalo River Action Committee to “jump start” improvements in water quality in the Buffalo River watershed. (https://www.adeq.state.ar.us/water/bbri/bbrac/ ). In truth, it is exactly the opposite.

Another problem relating to phosphorus buildup concerns seven waste management sites (Fields 3, 5, 6, 7, 9, and 12) that C&H’s original NOI indicate are “occasionally flooded” by Big Creek. The fields currently have phosphorus levels above optimum according to C&H’s Reg. 5 permit application and the runoff and erosion caused by a flood could remove several inches of soil and transport it rapidly to the Buffalo River. Depending on how recent waste applications occurred, other contaminants including nitrogen and pathogens would be discharged along with the phosphorus. There may be additional waste management sites that have a flooding potential since some of the fields added to the original seventeen are along Big Creek or the Left Fork of Big Creek.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

BCRET’s 2017 second quarter (April 1-June 30, 2017) report discusses the relationship of nutrient concentrations to land use within Big Creek watershed and the more agriculturally developed Ozark Highland watersheds. Results indicated that total phosphorus geometric mean concentrations from 2013–2017 upstream to downstream of C&H Hog Farms demonstrated a minimal increase.

The API is used to develop loading rates for land application based on phosphorus. The API has been adopted by the NRCS Practice Standard Nutrient Management Code 590 to manage the application of phosphorus in the State of Arkansas. There are many factors taken into account to determine whether land application on a specific field is allowable. While the soil test phosphorus, referred to as “above optimum” by the commenters, is one of those factors, it is not the determining factor. A field with high soil test phosphorus may still be appropriate for land application. The Department only permits land application when the API value is a low or medium class.

APC&EC Regulation 5.406(B) prohibits land application when soil is saturated, e.g. during a precipitation event, or when significant precipitation is reasonably anticipated in the next 24 hours. The AWMFH does not prohibit land application in areas where flooding frequency is occasional or frequent.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ evaluated total phosphorus concentrations in Big Creek according to the 2016 Assessment Methodology and the 2018 Assessment Methodology. For the

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2016 assessment cycle, Big Creek (BUFT06, AU 11010005_020) mean total phosphorus and total nitrogen were 0.026 mg/L and 0.33 mg/L, respectively. The assessment methodology for APC&EC Reg. 2.509 screens the monitoring station’s mean total phosphorus and total nitrogen concentration to the 75th percentile for a given ecoregion for the assessment cycle period of record. Screening values for the Boston Mountain ecoregion for 2016 total phosphorus and total nitrogen were 0.036 mg/L and 0.46 mg/L, respectively. The 2018 screening values were 0.036 mg/L and 0.55 mg/L for total phosphorus and total nitrogen. The mean values for 2018 for BUFT06 were 0.028 mg/L total phosphorus and 0.297 mg/L total nitrogen. All mean total phosphorus and total nitrogen for Big Creek were below the Boston Mountain ecoregion 75th percentile. At this time, neither the Buffalo National River nor Big Creek have been identified as impaired for phosphorus based on the EPA-approved Assessment Methodology.

Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA1029, “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA9516 states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3 are necessary to demonstrate that

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12 [https://www.uaex.edu/publications/PDF/FSA-9516.pdf](https://www.uaex.edu/publications/PDF/FSA-9516.pdf)
this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

The AWMFH does not prohibit land application in areas where flooding frequency is occasional or frequent, but the API compensates for flooding as a factor in its calculations.

Comment 220:  

*E. coli* data from BCRET also shows the potential for bacteria standard violations in Big Creek (Mott, 2016). A review of BCRET data shows little sampling of *E. coli* concentrations during storm flow conditions, as holding times are not met when using the ISCO samplers. We are unable to find *E. coli* data regarding the waste storage ponds, and cannot determine if this indicator species survives in the lagoon environment. There is nothing to show that ADEQ has investigated the source of water quality impairment as evidenced by *E. coli* data exceeding State numeric criteria, and ADEQ has not made a determination of exceedance, even though bacteria levels are a concern for the public and the Arkansas Department of Health (Arkansas Department of Health, 2013).

Since ADEQ does not have the information it needs to make informed determination regarding the extent this facility is causing stream impairment the permit should be denied. Approving this permit for C&H will allow it to continue to contribute to the degraded water quality conditions observed in Big Creek and the area’s karst aquifers. Unless the steps outlined above are taken, ADEQ will have failed to satisfy its obligations to protect Big Creek and Buffalo National River from further degradation as required by law. Completion of a nonpoint source inventory and development of a water quality model to estimate contributions of nutrients and bacteria from these inventoried sources, including C&H, is long overdue.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

The ADEQ Office of Water Quality Planning Branch routinely collects and evaluates water quality data from approximately 300 stations across the state. The Department is required every two years by 40 CFR 130.7(b)(5) to assess all
readily available data for attainment of water quality standards. The EPA did not include Big Creek or Buffalo National River on the approved 2016 303(d) list.

The Department has received multiple comments regarding algae concerns in the Buffalo National River Watershed. The Department and the National Park Service are in the process of designing an algal monitoring program for the Buffalo National River and its tributaries.

ANRC is currently developing a watershed plan for the Buffalo National River. Soil and Water Assessment Tool (SWAT) models are currently under development by ANRC contractors for the Buffalo River Watershed Management Plan. Land use models, such as SWAT, are useful for developing meaningful results for watersheds or hydrologic units code.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the Buffalo River Watershed and to protect the vitality of the Buffalo National River as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018. Watershed management plans are recognized by EPA as comparable, state-led management approaches expected to result in the attainment of water-quality standards.

ADEQ is working to support a collaborative study with the Arkansas Game and Fish Commission, US Geological Survey, and the National Park Service focused
on the distribution and causation of the rapid expansion of filamentous algae in the Buffalo River.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

**Comment 221:** Karst hydrogeologic studies have been conducted in the Buffalo River basin and provide useful information relative to this permit decision (Aley, 1982; Aley and Aley, 1989; Aley, 1999; Aley and Aley, 2000; Brahana et al., 2016; Mott et al., 2000). This work was not cited as a source for preparing permit 5264-W by ADEQ or by Hancock et al., 2016, though it directly relates to the karst ground water concerns in the area. The two main sources of potential ground water contamination are (1) infiltration and discrete recharge from the waste application fields, and (2) seepage from the waste holding ponds. (NRCS, 2012; DeHaan, Grabs & Associates, 2012; Aley and Aley, 1982; Tesoriero et al., 2013; Shujing et al., 2008; Nolan et al., 1998; Almasri and Kaluarachchi, 2007; https://bigcreekresearch.org/project_reports/docs/Review%20Panel%20Report%20-%20May%2019%202014.pdf).

At nearly 50-percent of the acreage available for land application, alluvial material (stream deposits) covers the Boone Formation. Stream deposits draining the Boston Mountains commonly contain higher proportions of sand (https://soilseries.sc.egov.usda.gov/OSD_Docs/R/RAZORT.html). Sand is relatively inefficient at capturing phosphorus (NRCS, 2012). Under these stream deposits, dissolution and erosion processes have formed a “cutter and pinnacle” bedrock surface typical of karst, and the water table is relatively close (5 - 6.5 feet) to the surface (Halihan and Fields, 2015). The higher elevation fields are also located on the Boone Formation and can contain a high gravel fraction which increases permeability and has little adsorptive capacity (https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/arkansas/AR101/0/Newton.pdf). Electrical resistivity survey results showed “The potential for rapid transport pathways in the underlying bedrock as joints or potential karst features were observed as conductive electrical features in a resistive background.” (Halihan and Fields, 2015).

Nitrate dissolves and moves with water and does not readily adsorb onto, or absorb into, soil particles (NRCS, 2012; https://www.uaex.edu/publications/PDF/FSA-9517.pdf). According to the NRCS, even when application rates target plant consumption levels, nitrogen is the most difficult nutrient to manage because of the many pathways it can follow to get
into ground and surface waters (NRCS, 2012). BCRET data shows a negative correlation between nitrates and stream flow at the downstream sampling site (Mott, 2016). This inverse relationship to discharge indicates groundwater is elevated in nitrate, as is the aquifer discharging to Big Creek (Tesoriero et al., 2013; Shujing et al., 2008). The C&H house well, trench, and spring monitored by BCRET show similar elevated nitrate levels (Mott, 2016). It would be informative if BCRET would conduct a statistically valid trend analysis of nitrate and total nitrogen concentrations at their sampling sites to determine if these values are increasing in the aquifer.

ADEQ should evaluate the elevated nitrate concentrations in the karst aquifer, and the potential for C&H to further increase nitrate levels in groundwater. Nitrate discharging with ground water to Big Creek is likely contributing to the eutrophication and low D.O. values at Big Creek at Carver (https://water.usgs.gov/edu/nitrogen.html; https://pubs.usgs.gov/fs/2003/fs091-03/; https://archive.epa.gov/water/archive/web/html/vms57.html; http://www.arkleg.state.ar.us/assembly/2017/Meeting%20Attachments/470/I14350/3%2029%2016%20BITTING%20%20Nat%20Park%20Svs%20%20Big%20Creek.pdf). Groundwater is also mobilized during storm events and contributes to the storm flow loads exported to Buffalo National River, as previously addressed. In these interconnected karst aquifers, groundwater flow could also be migrating to unknown discharge points in adjoining watersheds (Mott et al., 2000; Mott, 2016)). Since there is elevated nitrate at the BCRET downstream sampling site, ADEQ should deny this permit.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

The Department did not review or approve BERCRT’s study design and has no authority over the day-to-day activities of BCRET. While the Department may consider the research conducted by the University of Arkansas, questions regarding the study should be more appropriately directed to the University of Arkansas.

The ADEQ Office of Water Quality Planning Branch routinely collects and evaluates water quality data from approximately 300 stations across the state. The
Department is required every two years by 40 CFR 130.7(b)(5) to assess all readily available data for attainment of water quality standards. The EPA did not include Big Creek on the approved 2016 303(d) list.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While no losing/gaining study has been performed to date on Big Creek between BC6 and the confluence with the Buffalo National River, BCRET notes seasonal dryness and rewatering between these two sites. Thomas Aley notes in his expert report of May 24, 2018, that “Big Creek also goes dry during much of the year where it passes over the Boone Formation near C&H Hog Farms.” Dye studies performed by Brahana et al. (2016) and hydrologic studies by Murdoch et al. (2016) in the Big Creek watershed indicate the connectivity of karst hydrology of the Boone Formation. Thomas Aley’s May 24, 2018 expert report thoroughly explains karst geology and provides supporting evidence of the deficiencies of C&H Hog Farms, Inc.’s Regulation 5 application to address land application in karst topography.

Pursuant to the Memorandum of Agreement between the Board of Trustees of the University of Arkansas System for and on behalf of the University of Arkansas System-Division of Agriculture and the Arkansas Department of Environmental Quality, the study performed by BCRET is being carried out for the use and

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benefit of ADEQ; however, the study shall be funded and conducted independently of ADEQ and shall meet the requirements of an independent study conducted by professionals in the field of water quality.

Comment 222: An extensive body of literature exists describing the process of eutrophication in aquatic systems, and its effects on dissolved oxygen, aquatic ecosystems and aesthetics (Lohman and Jones, 1998; https://www.epa.gov/nutrientpollution/harmful-algal-blooms; https://www.epa.gov/nutrientpollution/problem;). Once transported to surface streams, nutrients stimulate increased plant production and are a primary driver of nuisance algae blooms. Of the various factors that control the development of algae blooms, nutrient stimulation is the primary factor influenced by human activities. The Buffalo River is more susceptible to nuisance algae blooms than many other Ozark streams due to its unique flow and temperature regimes, hydrogeology, and channel dimensions (Watershed Conservation Resource Center, 2016; Panfil and Jacobson, 2001; McKinney, 1997; Mott, 2016).

During some summers, the Buffalo River can become aesthetically degraded due to nuisance aquatic plant stimulation with nutrients, -- a/k/a “algae blooms” (Meyer and Rippey, 1976). Aquatic plant over-production can lead to dissolved oxygen depletion as observed at the Big Creek at Carver sampling site. Stimulation of primary production also leads to changes in aquatic communities. Permitting a facility that adds measurable increases of nutrients to Buffalo River will result in increased nuisance algae production and related affects.

While nutrient loading is happening with every storm, the worst case scenario involves a summer thunderstorm developing over the Big Creek basin generating a surface runoff load of mostly soluble, plant available, nutrients (https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/crops/?cid=nrcs143_014202; http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-4676/BAE-1521web.pdf). It is not unusual for the Buffalo River to remain at base flow while a tributary carries its load of runoff generated nutrients, bacteria, and sediments out of the Boston Mountains, Springfield, or Salem Plateaus. The incoming nutrient slug will “tail out” in the Buffalo River, and stimulate the growth and abundance of aquatic plants. Agricultural development of the Buffalo River basin has already resulted in measurable increases in nitrate (Watershed Conservation Resource Center, 2017), and this large CAFO is adding to that trend. Because the Buffalo River is an ONRW, granting this permit causes or contributes to a violation of the anti-degradation regulations, and the nuisance species clause of Regulation No. 2.

Nuisance algae blooms have social and economic consequences. They degrade the visitor experience, which harms the area’s tourism business. If enough algae
blooms are encountered, tourists and locals alike will lose the perception of the Buffalo River as being a pure and unpolluted stream. APC&EC has not set numeric nutrient criteria for waterbodies in Arkansas, but does have narrative criteria. This criteria is subjective and not well defined, and can be argued as being “in the eye of the beholder” (Figure 9).

The Agricultural Waste Management Field Handbook (AWMFH) states:

“Manure and other waste associated with livestock production can be important sources of aesthetic degradation. For example, they can be the source of objectionable deposits, floating scum, bad odors, and nutrients that promote growth of nuisance aquatic life. Local regulations are often aimed at maintenance of aesthetic quality of watercourses. To maintain aesthetic water quality, all water should be free from substances that produce undesirable or nuisance aquatic life.”

ADPC&E Regulation No. 2 General Standards are applicable to all waters at all times unless a waterbody is specifically excluded. These standards state that man-made pollution cannot produce undesirable aquatic biota or result in the dominance of nuisance species. The standards also discuss the use of biological integrity assessments to determine if a waterbody’s ecological condition has declined relative to a reference waterbody or a list of key species. To our knowledge ADEQ has not conducted such an assessment and cannot demonstrate through water quality modeling, supported by robust water quality data and load calculations, that C&H is not the source of nutrient pollution to the Buffalo River.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2 Chapter 2. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to dictate regulatory authority over private land within the watershed, other than what exists under local, state, or federal law.

The Department does not have numeric nutrient criteria and utilizes narrative criteria in APC&EC Regulation 2.509. However, the Department does interpret APC&EC Regulation 2.509 through quantitative translators for the purposes of water quality attainment decisions.

The Department has received multiple comments regarding algae concerns in the Buffalo National River Watershed. The Department and the National Park Service
are in the process of designing an algal monitoring program for the Buffalo National River and its tributaries.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

The ADEQ Office of Water Quality Planning Branch routinely collects and evaluates water quality data from approximately 300 stations across the state. The state is required every two years by 40 CFR 130.7(b)(5) to assess all readily available data for attainment of water quality standards. The EPA did not include Big Creek on the approved 2016 303(d) list.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

ADEQ is working to support a collaborative study with the Arkansas Game and Fish Commission, US Geological Survey, and the National Park Service focused on the distribution and causation of the rapid expansion of filamentous algae in the Buffalo River.

The Department is actively engaged in developing an antidegradation implementation procedure to address the revision of 40 CFR § 131.12. The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2 Chapter 2. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to dictate regulatory authority over private land within the watershed of an ERW, other than what exists under local, state, or federal law.

**Comment 223:** In a letter to ADEQ, the Arkansas Department of Health expressed its concern for potential pathogen risk for park visitors stating “…we have concerns that water borne pathogens – including E-coli and Cryptosporidium - from the proposed land application sites may pose a risk for full-body contact on the BNR, a popular recreational destination” (Arkansas Department of Health, 2013). The
excreta from warm-blooded animals have countless micro-organisms, including bacteria, viruses, parasites, and fungi. Some of the organisms are pathogenic (disease causing), and many of the diseases carried by animals are transmittable to humans (NRCS, 2012).

Many states, including Arkansas, use fecal coliform and/or *Escherichia coli* (E. coli) bacteria as indicators of pollution from warm-blooded animals, including humans. The EPA reports that a direct relationship between the density of *E. coli* in water and the occurrence of swimming-associated gastroenteritis has been established, resulting in numeric criteria defining recreational water standards (EPA, 2012; NRCS, 2012). There is no estimate of bacteria production or attenuation in the NMP as there is for nutrients (DeHaan, Grabs & Associates, 2012).

*E. coli* counts range from near zero to over 20,000 in Big Creek at the BCRET monitoring sites. ADEQ has not assessed the source of the high *E. coli* levels and potential exceedances of State water quality criteria in Big Creek (Mott, 2016). ADEQ has not reviewed the potential for C&H to further contribute to the bacteria levels and bacteria loading in Big Creek. As pointed out by the review panel, source tracking methods could be employed as a means of assessing the source of the high bacteria counts in Big Creek. ADEQ should determine the source of the high bacteria readings and quantify bacteria levels during storm runoff conditions.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

The ADEQ Office of Water Quality Planning Branch routinely collects and evaluates water quality data from approximately 300 stations across the state. The state is required every two years by 40 CFR 130.7(b)(5) to assess all readily available data for attainment of water quality standards. The EPA did not include Big Creek on the approved 2016 303(d) list.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other
subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

Comment 224: The authors of an Agricultural Research Services report examining agricultural phosphorus (P) and eutrophication state: “P loss can lead to significant off-site economic impacts, which in some cases occurs many miles from P sources. By the time these water-quality impacts are manifest, remedial strategies are difficult and expensive to implement; they cross political and regional boundaries; and because of P loading, improvement in water quality will take a long time (Sharpley et al., 1999).”

Eutrophication problems associated with stimulation of aquatic vegetation with nutrients, especially phosphorus, are well documented (Sharpley et al., 1999). If the Buffalo National River becomes perceived as nuisance algae dominated in low flow conditions, or as receiving E. coli and pathogens from waste runoff, visitation and economic stimulus will decline. One of the primary draws of the Buffalo National River is the perception that it remains a “pure” waterway. Many believe it to be a safe and beautiful place for all seasons and all recreational activities. Visitors of many generations gather on the banks, and the economic benefits from tourism are on an upward trend (National Park Service, 2014). ADEQ should work with the Arkansas Department of Parks and Tourism and the National Park Service, and their staff economists, to evaluate the potential loss in tourism revenue that could result from a large source of contaminants.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 225: Based on the available data, C&H is contaminating surface and groundwater with pollutants from swine wastes. The data from an ongoing three-year study being conducted by the Big Creek Research and Extension Team (BCRET) of the University of Arkansas cannot be used to assert that there is no evidence of environmental impacts from C&H. While the study design is compromised and the approaches and methods have major limitations, nevertheless, the available data provide clear evidence that this CAFO is contaminating Big Creek (tributary to the Buffalo National River) and other surface waters with pollutants such as nitrate, suspended solids, and the harmful fecal bacterium Escherichia coli. Nitrate can travel substantial distances and, therefore, likely is contaminating the Buffalo National River as well.

These findings were expected; they are similar to findings of impacts from other CAFOs on surrounding natural resources (Burkholder et al. 2007 and references therein). C&H utilizes a waste management system characterized by waste holding ponds (in this instance located in a karst environment) at or near the groundwater table that allow solids to settle, with waste liquids applied to nearby waste application fields. This type of waste management system has been shown to cause unavoidable water, soil, and air pollution (see U.S. EPA 1998, 2013a; Evans et al. 1984; Westerman et al. 1985; Payne et al. 1988; Ritter and Chirnside 1990; Dewi et al. 1994; Huffman and Westerman 1995; Burkholder et al. 1997; Mallin et al. 1997; Stone et al. 1998; Ham and DeSutter 2000; Mallin 2000;
Krapac et al. 2002; Spellman and Whiting 2007; and Rothenberger et al. 2009). Yet, ADEQ has publicly stated that the BCRET study has found no pollution from this CAFO.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Land application of liquid animal waste is an authorized method of disposal under APC&EC Regulation 5.

The Department did not review or approve the study design and has no authority over the day-to-day activities of BCRET. While the Department may consider the research conducted by the University of Arkansas, questions regarding the study should be more appropriately directed to the University of Arkansas.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Pursuant to the Memorandum of Agreement between the Board of Trustees of the University of Arkansas System for and on behalf of the University of Arkansas System-Division of Agriculture and the Arkansas Department of Environmental
Quality, the study performed by BCRET is being carried out for the use and benefit of ADEQ; however, the study shall be funded and conducted independently of ADEQ and shall meet the requirements of an independent study conducted by professionals in the field of water quality.

Comment 226: The most recent state permit under Regulation 6 (under the national pollution discharge elimination system, NPDES) for C&H expired in October 2016. The company has applied for a new permit from ADEQ but, this time, under Regulation 5 as a “no discharge” operation. C&H is already permitted to apply the equivalent amount of untreated sewage effluent (~2.6 to 2.8 million gallons of manure, process water, and litter; ADEQ Annual Report Forms for C&H) as would be contributed by a population of about 25,000 people (derived from U.S. EPA 2004) to adjacent fields that lie very close to receiving surface waters. ADEQ gave tentative approval for the permit in February 2017. If approved, the new permit would allow C&H to operate permanently in the Buffalo National River watershed as a “no discharge” facility. This permit would allow ongoing major pollution from C&H to surrounding natural resources in perpetuity. Moreover, the state has already approved a separate area known as EC Farms to spread up to 6.4 million gallons of waste from C&H onto 30 different land parcels (total area more than 500 acres) within the Buffalo National River watershed (see ADEQ Permitting Section at http://www.adeq.state.ar.us/home/pdssql/pds.aspx#dis). Based on the analysis below, this CAFO is contaminating Waters of the State with swine waste pollutants, meaning that it is discharging pollutants. It should not be classified as “no-discharge,” based on U.S. EPA (2004).

The BCRET study (BCRET 2014a-d, 2015a-d, 2016a-d) and other available data (Nix 2016) shows that C&H is indeed discharging pollutants from swine wastes into Waters of the State. A review of the information related to karst in the drilling study (Harbor Environmental and Safety 2016) reflects the karst hydrogeology underlying C&H, making the area much more sensitive to pollutant contamination and dispersal.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.”
APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

**Comment 227:** The control stream and field sites, which are supposed to be minimally affected by pollution and are critical for data interpretations, are receiving substantial swine and/or poultry waste pollution. C&H and BCRET study site are shown in Figures 13 and 14, taken from BCRET quarterly reports. Note that Big Creek flows from south to north. Figure 13 is the only map published in all of the BCRET quarterly progress reports which shows the locations of the 17 fields in C&H, 15 of which are used for swine waste application. This CAFO extends for approximately three river miles along the stream. Note that the downstream site is “buffered” or somewhat protected from swine wastes considering that fields #5 and #6, which do not receive swine waste applications, are nearest to and just upstream from the downstream station. In contrast, the field numbers circled in red (#15, #16, and #17) are near the so-called “upstream” station and, given the karst character of the area, could easily be contaminating it. The “upstream” station is in quotes because the BCRET data show that its waters are degraded and thus is not an acceptable “upstream control.”

The Big Creek “upstream control” - The BCRET study of possible surface water quality impacts from this CAFO on Big Creek entirely rests on comparison of the one “upstream” station and the one downstream station. The combination of a seriously compromised “upstream control” station and a downstream station that is buffered from swine waste pollution skews the findings by artificially “minimizing” any upstream vs. downstream differences in surface water quality. See Tables 6 and 7 below for information on swine waste (mostly liquid effluent or “slurry”) applications to fields in 2014 (Table 6) and in December 2013-October 2014 near the compromised “upstream control” station (Table 7). Appropriate upstream controls are important in that they make or break the
scientific validity of studies such as this (Bartram and Balance 1996, Maybeck et al. 1996a,b). The BCRET study lacks adequate, uncompromised controls.

In May/June 2015, an additional monitoring station was belatedly established in a tributary of Big Creek, Left Fork Creek. The watershed (about 38 square miles in area, ~25% larger than the Big Creek watershed) of Left Fork Creek does not have a CAFO, but the area in urban development is about double that in the Big Creek watershed. The BCRET data from several stations on Left Fork Creek indicate that *E. coli* levels frequently are much higher than recommended for human health protection, especially after storm events. Of 27 samples taken in May-October of 2014-2016, 26% of them exceeded state regulatory limits for primary contact regulation (single samples, 410 colonies per 100 mL; Arkansas Pollution control and Ecology Commission 2011), with *E. coli* levels as high as 3,100 colonies per 100 mL. Without additional detailed, quantitative information, attempts by the BCRET to use the Left Fork as another “control” site are highly questionable.

The field “control” - A total of 2,614,059 to 2,786,908 gallons of swine wastes (manure, process water, and litter) were produced at C&H in the first two years of operation (ADEQ Annual Report Forms, 2013 and 2014, for C&H CAFO operations under NPDES General Permit ARG590000). Two of the 15 fields receiving swine waste applications from C&H, fields #1 and #12, are being monitored by the BCRET. A third monitored field, field #5 (or #5a), does not receive C&H CAFO wastes but it cannot be considered a “control” because the polluted surface runoff data for that field indicate that it is compromised.

The “application area” in Table 8 refers to the cumulative total number of acres to which swine effluent was applied in a given field, and “volume” refers to the total volume of effluent applied to the field. From this table, the mean volume of swine effluent or slurry applied per field among the 15 fields was **160,023 gallons** during December 15, 2013 to January 15, 2015. The two fields selected for monitoring received 46,000-48,000 gallons, or only about one-third of the average volume of swine effluent applied per field. Monitored field characteristics are strongly dependent on the frequency of effluent applications, as well as the total amount of effluent applied. The average number of waste applications was 4.3 over that period. The two fields selected for monitoring received only 1-2 applications.

Thus, the BCRET team’s assertion that the monitored fields were “representative” for characterizing the impacts of swine effluent on receiving lands, surface runoff, and groundwater is false. Also note that, as explained in the legend for Table 8 below, the two fields with red arrows (#15, #17), close to the highly compromised “upstream” station, received 13 to 15 applications and more total effluent than
any other field except fields #7 and #13. Another field close to the “upstream” station, #16, received the highest average rate of swine waste applied per acre. As another example of the lack of “representative” character of the two fields selected for monitoring, unmonitored field #13, immediately west of monitored field #12, received ten-fold more applications of swine effluent and about 10 times more total effluent than field #12. The BCRET has informed the general public that the three fields being monitored are the only fields that it has received permission to monitor from the private landowners leasing the fields to C&H. This is clearly a major, serious problem in the study design because the fields are far from “representative” regarding the relatively small amount of swine waste they receive, and the fact that only two of the three monitored fields (#1 and #12) receive C&H CAFO swine wastes:

Field #5a (called Field #5 in the first BCRET quarterly progress report dated October 1 to December 31, 2013) is the third field being monitored by the BCRET team. However, as mentioned above (see Figure 14 legend), swine effluent from C&H is not applied to it; the quarterly progress report states that nutrient runoff and leaching from all three fields (#1, #5a, and #12) captures whatever field management is being done by the land owners, including swine effluent application (fields #1 and #12 only) as well as grazing and mineral fertilizer application. The water quality degradation in fields #1 and #12 can be ascribed mostly or at least partially to swine effluent application from C&H, whereas the source(s) of water quality degradation in the surface runoff from field #5a cannot be related to swine effluent application. Also as explained above, field #5 cannot be considered as a “control” because the degraded surface runoff from that field shows that it is highly compromised.

A very small number of sites (6-7) is included for sampling surface water quality, and are supposed to be representative of surface water quality in a CAFO with 17 fields for realized or potential swine waste application that sprawls along Big Creek for ~3 river miles – including only one site downstream from the CAFO on Big Creek itself, and no sites on the Buffalo National River. Thus, the sites are sparse for use in providing an overall assessment of the impacts of this CAFO on water quality. The “one upstream versus one downstream station” approach used by the BCRET team to evaluate whether the CAFO is polluting Big Creek, is confounded by the fact that the “upstream control” is compromised (above), and also because the CAFO is in a karst area.

The only spring being sampled is adjacent to field #1. Yet, water quality data show that this spring was frequently degraded in 2013, before the CAFO began application of swine wastes to field #1 (March-June 2014), in total suspended solids (TSS, e.g. 21.2 mg/L), nitrate-N (~2.5 to 3.3 mg/L), total coliform bacteria, and E. coli densities. The BCRET progress reports do not once mention this
serious problem. Thus, the area has been described as containing numerous springs, yet only this spring is being sampled, and its water quality was clearly compromised prior to use of adjacent fields for swine effluent application. Nevertheless, when field #1 received swine wastes, runoff from the field was extremely degraded (see below). The runoff from fields #1, and from other nearby fields such as fields #2, #3, and #4, would be expected to have contributed to contamination of this spring.

The study does not include diel sampling of dissolved oxygen (DO), despite the fact that the high biochemical oxygen demand of swine wastes is known to cause severe oxygen deficits in contaminated receiving surface waters. Reports (e.g., by Dr. Van Brahan et al. 2014) describe a decrease in DO concentrations in Big Creek below C&H in both summer and winter. Swine CAFO pollution is well known to drive the DO in receiving streams down to levels that can stress or kill beneficial aquatic life (Burkholder et al. 1997, 2007; Mallin 2000, and references therein). Dissolved oxygen is of fundamental importance to the biota of the Big Creek and Buffalo National River ecosystems; its measurement is straightforward using well accepted techniques (e.g. Reed et al. 2010); and it should have been included in the BCRET study. It has been wrongly argued that nitrate, which is being measured, can serve as a “surrogate” for DO – that nitrate levels would indicate conditions that could decrease DO levels. That assertion has no scientific basis. High nitrate concentrations and high amounts of oxygen-demanding organic materials are being added to surface waters by swine waste pollution (below). Respiration of decomposing microbes causes a high oxygen demand that drives down the oxygen concentrations, and the high ammonia levels in swine wastes also cause oxygen demand (Mallin 2000, Mallin et al. 2006). As the ammonia is oxidized by DO from the overlying air during waste/runoff travel overland, it is transformed to nitrate. The nitrate concentration does not indicate conditions that could decrease DO levels in the water. It indicates nothing about whether the DO concentration was adequate to prevent stress, suffocation, and death of beneficial aquatic life.

The study lacks use of tracking methods which, together with the poor study design and compromised “controls,” prevent rigorous evaluation of impacts from C&H. As previously explained, in various portions of the datasets shown in the BCRET quarterly progress reports, the one “upstream” location in Big Creek commonly has higher concentrations or comparable concentrations of some parameters than the station “downstream” from C&H. According to the reports, the project team has failed to ensure that its selection of an “upstream control” station location is not so compromised by local pollution or land disturbance that C&H influence in the stream cannot be detected. Thus, the pollution from upstream needs to be isolated from the pollution being contributed by the C&H operation, which can be done using various techniques such as microbial source
tracking (e.g. Heaney et al. 2015, and references therein) and nitrogen/oxygen stable isotopes (e.g. Michener and Lajtha 2007, Eppich et al. 2012, Pastén-Zapata et al. 2014, and references therein). There is a critical need for use of these techniques in the BCRET study. A false “conclusion” that could easily result from the inadequate BCRET study design would be, “Nothing above ‘upstream background’ could be detected in terms of water quality impacts from the C&H operation.” The BCRET project team thus far has elected not to use source tracking or stable isotope techniques which are essential to verify the CAFO impacts, given the seriously inadequate study design.

Based on the “upstream vs. downstream” evaluation criteria being followed by the BCRET, there is a significant impact of C&H in contaminating Big Creek with nitrate pollution at levels that would stress and kill sensitive aquatic life. The nitrate levels reported at the “downstream” station sometimes exceed levels known to stress or kill sensitive aquatic life (Camargo and Alonso 2005). In a presentation (August 11, 2015, University of Arkansas), Dr. A. Sharpley, the BCRET team leader, acknowledged that statistical analysis had shown that nitrate levels were significantly higher downstream than “upstream.” Peer-reviewed science repeatedly has demonstrated that high levels of ammonia in swine wastes are oxidized to nitrate as the wastes move away from the site of origin, resulting in high levels of nitrate pollution to receiving waters (e.g. Evans et al. 1984; Stone et al. 1995, 1998; Ham and DeSutter 2000; Mallin 2000; Krapac et al. 2002). The data show that C&H is a major source of nitrate located immediately upstream from the “downstream” sampling site.

Sensitive stream biota have been shown to be adversely impacted by low dissolved oxygen caused by swine CAFOs, and also adversely affected by the disease-causing microbes, high nutrient levels, high suspended solids, and other pollutants added by CAFOs (U.S. EPA 1998, Mallin 2000). Beneficial macroinvertebrates have been adversely affected by nitrate concentrations as low as 0.23 mg/L nitrate-N (Camargo et al. 2005, Camargo and Alonso 2006). Endocrine functioning in vertebrates such as reptiles, amphibians, and fish has been damaged, as well (Guillette and Edwards 2005). Moreover, nitrate is well known to be capable of traveling long distances (up to 200 miles or more), much farther than the approximately 5-mile distance from this CAFO to the confluence of Big Creek with the Buffalo National River (Mallin et al. 1993, Houser and Richardson 2010). Thus, nitrate impacts from this CAFO should be assessed in the larger river as well as the other surface waters.

The excessive ammonia-N concentrations in Waters of the State affected by C&H, as noted in Tables 9 and 10, are much higher than levels reported to stress and kill sensitive aquatic life (Camargo and Alonso 2006), and in violation of levels required to sustain sensitive biota as recommended by the U.S. EPA
Thus, ammonia impacts from this CAFO on sensitive aquatic life should be evaluated as well.

The data also show frequent, high contamination of other surface waters by C&H. Evidence of frequent, high contamination and degradation of surface waters by C&H is illustrated in the following examples. For comparison:

- **Total phosphorus (TP) and nitrate-nitrogen** (NO3-N, here also including nitrite-N or NO2-N, as they typically are measured together) – Surface flowing waters in the area should have approximately 5.6 μg of total phosphorus/L (or 0.056 mg TP/L) and 30 μg nitrate-N/L (or 0.03 mg NO3-N/L) or less as a minimally impacted (“reference” or unpolluted) condition (U.S. EPA 2000 – level III nutrient sub-ecoregion 38). Median concentrations over a ~decadal period in the Buffalo National river near Big Creek during surface runoff events were 21 μg TP/L (0.021 mg TP/L and 140 μg NO3-N/L (0.14 mg nitrate-N/L) (White et al. 2004).

- **Total suspended solids (TSS), dissolved phosphorus (DP), and ammonia-N (NH3N)** – Median concentrations over a ~decadal period in the Buffalo National River near Big Creek during surface runoff events were 30 mg TSS/L, 10 μg DP/L (or 0.01 mg DP/L), and 20 μg NH3N/L (White et al. 2004).

- **Dissolved organic carbon (DOC)** – is typically less than 7 mg/L in streams draining small forested watersheds during stormflow, or streams draining agricultural cropland watersheds (e.g. Hinton et al. 1998, Hood et al. 2006, Warner et al. 2009, Biden 2013, and references therein).

- **Total coliform bacteria** – in potable waters, no more than 5.0% of samples should be positive for 1 or more total coliform bacteria within one month; or, for systems that collect fewer than 40 routine samples per month, no more than one sample can be total coliform-positive per month (U.S. EPA; see http://water.epa.gov/drink/contaminants/basicinformation/pathogens.cfm). Note that total coliform bacteria are no longer recommended as an indicator for recreational waters (U.S. EPA; see http://water.epa.gov/type/rls/monitoring/vms511.cfm). In the 1950s studies conducted by the U.S. Public Health Service reported adverse human health effects when total coliform density was ~2,300 per 100 mL (Stevenson 1953).

- **Escherichia coli** – According to the ADEQ, the following limits apply (taken from the BCRET January to March 31, 2015 quarterly progress report, p.56): Primary Contact Maximum allowable is 126 colonies/100 mL as a geometric mean; (May–Sept) maximum for a single-sample is 298 colonies/100 mL (Extraordinary Resource Waters [ERWs], Ecologically Sensitive Waterbodies
[ESWs], and Natural and Scenic Waterways [NSWs]), or 410 colonies/100 mL (all other streams).

The geometric mean is calculated from 5 or more samples collected within 30 days at evenly spaced time intervals. No more than 25% of samples from a group of 8 or more samples per contact season may exceed these limits (Arkansas Pollution Control and Ecology Commission 2011, p.5-5).

* Ephemeral Streams – A culvert sampled by the BCRET was described as an “ephemeral stream” (April 1 to June 30, 2014 quarterly progress report, pp. 30 and 63) (see Table 9). It is atypical because it drains the subwatershed containing a portion of C&H. It may drain other pollution source(s) as well, but the CAFO is a source mentioned by the BCRET. Data are also included in the BCRET quarterly progress report dated April 1 to June 30, 2015 for an ephemeral stream that drains the area containing the animal holding units (“barns”) of C&H (Table 10; and see Figure 13).

Ephemeral streams, which flow for only part of an annual cycle, are generally small and represent the majority of river miles in the U.S. (U.S. EPA; see http://water.epa.gov/type/rsl/streams.cfm). The U.S. EPA (above website) described them as “the very foundation of our nation’s great rivers.” They play a significant role in the hydrological and ecological integrity of river ecosystems, and provide critical habitat for certain important fauna (McDonough et al. 2011).

Based on the data in Tables 9 and 10, the two sites examined by the BCRET are extremely degraded. The data for the “culvert” ephemeral stream show very high total suspended solids, extreme values ranging from more than 900 to more than 2,400 mg TSS/L (Table 9). Considering that 30 mg TSS/L has been characteristic of surface waters in this area during storm/ runoff events. Consistently at both stations, nitrate-N is excessive (Tables 9 and 10). The culvert station also has several excessive ammonia-N, total nitrogen (TN), *Escherichia coli*, and total coliform levels. The second site, described in Table 10, also had consistently high levels of nitrate and frequent high levels of total coliform bacteria, up to 241,920 MPN/100 mL.

* Surface runoff from fields #1 and #12 was highly contaminated during and after swine effluent application, and would have been expected to contribute to the contamination of nearby waters –

As mentioned, the spring below field #1, part of C&H, was degraded in water quality when it was sampled in 2013 prior to the C&H swine effluent application. Nevertheless, during and following the period of swine effluent application in 2014, runoff from field #1 (and from field #12, based on sparse data) revealed
excessive levels of some pollutants (DP, TP, NH4+N, NO3-N, TSS, and DOC) which would be expected to have contributed to the poor water quality of receiving waters such as the spring (Table 11; note that fecal bacteria were not measured in these important runoff samples).

Thus, regardless of the source of degraded spring water in 2013, during 2014 surface runoff from the fields containing C&H swine effluent was clearly contaminated with various pollutants during the effluent application period and for some time thereafter, and would have contributed to degradation of nearby waters such as the spring. Contaminated subsurface flow from field #1 likely also contributed to the degraded water quality of nearby shallow groundwaters.

The data also indicate frequent, high contamination of other surface waters and groundwater by C&H. Data from the BCRET study on a trench (Figure 15) and a well indicate that groundwater quality is being adversely affected by this CAFO. Water quality in the north and south ends of a long trench (“Interceptor Trench 1 [South], Interceptor Trench 2 [North]”) near the swine waste holding ponds which, the BCRET team stated (July – Sept. 2014 quarterly progress report, p.2), was installed to monitor potential leakage. The trench samples are confusingly labeled as indicated above, implying that there are two trenches when instead there is one trench that is being sampled at each end. The trench location is shown in Figure 15 below; the holding ponds are shown and described in Figure 16. The water quality data for the trench are summarized in Table 12. Such findings are supported by various peer-reviewed studies in the science literature (e.g. Huffman and Westerman 1995, Westerman et al. 1995, Ham and DeSutter 2000).

Water quality in the north and south ends of a long trench (“Interceptor Trench 1 [South], Interceptor Trench 2 [North]”) near the swine waste holding ponds which, the BCRET team stated (July – Sept. 2014 quarterly progress report, p.2), was installed to monitor potential leakage. The trench samples are confusingly labeled as indicated above, implying that there are two trenches when instead there is one trench that is being sampled at each end.

The trench location is shown in Figure 15 above; the holding ponds are shown and described in Figure 16. The water quality data for the trench are summarized in Table 12 below. Such findings are supported by various peer-reviewed studies in the science literature (e.g. Huffman and Westerman 1995, Westerman et al. 1995, Ham and DeSutter 2000).

The data from monitoring of a groundwater well (“house well”) adjacent to the CAFO buildings show that the well water would be unsafe for human or animal consumption unless treated, as indicated by 1 or more total coliform bacteria or Escherichia coli bacteria detected (U.S. EPA; see
The water also has commonly contained substantial densities of coliform bacteria, including *Escherichia coli* (see the April 1 to June 30, 2015 BCRET quarterly progress report). The BCRET reports offer no information about the potential for sources other than C&H that could contribute to the contamination of the well water. It also is not known whether the groundwater source for the well was contaminated before the waste holding ponds were installed. The close proximity of the well to the animal holding units and the swine waste holding ponds, considered together with the data showing high leakage of the waste holding ponds, indicate that C&H is a major contaminant source. Nevertheless, it is uncertain as to whether the data can be used to provide information about impacts of this CAFO because no information about the actual sampling procedure is provided in the BCRET reports. The reports should have stipulated whether the well samples were taken from the wellhead; if not, the data may not be useable.

The above examples mostly were taken from BCRET reports from 2013 through September 2015. The BCRET reports for the last quarter of 2015 through 2016 (BCRET 2015, 2016a-d) show very similar patterns as the data as those described above: Nitrate commonly was significantly higher at the downstream station in comparison to the upstream station, despite the fact that the upstream station was compromised (see section B-I above). Total coliform bacteria and *E. coli* were also commonly higher downstream than at the upstream station. And, as expected since this CAFO is a major source of pollution to surface waters, the ephemeral stream and trench stations within the CAFO area typically had much higher pollutant levels (nitrate, TSS, fecal bacteria) than the upstream or downstream sites. Analyses conducted by water quality specialist Dr. Nix (Nix 2016) also indicated that nitrate pollution from C&H is contaminating Big Creek.

Interpretations of the data by the BCRET reveal a lack of scientific understanding about how/when swine wastes contaminate adjacent waters. BCRET incorrectly maintains that absent consistent or prolonged trends in nutrient or bacteria levels, the CAFO is not causing significant impacts (e.g. BCRET 2014d, p.2). This statement is incorrect. Studies show that the concentrations of a given pollutant from a CAFO that is added to receiving surface waters and groundwaters should not be expected to be consistent; that is the nature of water pollution from CAFOs (Westerman et al. 1985, Huffman and Westerman 1995, Stone et al. 1998, U.S. EPA 1998, Ham and DeSutter 2000, Huffman 2004). Parameter levels vary depending on location with respect to swine waste practices at the CAFO, storm/runoff conditions, and soil characteristics (U.S. EPA 1998, 2013b – pp. 22-24). Extreme spikes in pollutant levels commonly occur during storm/runoff events (e.g. Mallin et al. 2014); they may or may not be detected depending on the sampling location and frequency relative to the runoff. BCRET’s position that pollutant levels “must be consistently elevated” for the CAFO to cause impacts
has resulted in ADEQ either ignoring or downplaying ongoing water quality impacts.

Inadequate use of statistics has been reflected in data interpretations by the BCRET. Compounding the incorrect belief that there must be consistent trends in water quality degradation is BCRET’s inadequate or incorrect use of statistics. BCRET expects average pollutant concentrations to be significantly higher downstream from the CAFO under all conditions. It fails to separately consider data taken during or immediately after storm events. This conceals the adverse impacts of this CAFO. These results appear to be relied on by ADEQ to mistakenly conclude that there are no adverse impacts from this CAFO on nearby surface waters.

The proper use of a statistical analysis is described in a peer-reviewed, published study that tracked water contamination by nitrate and *Escherichia coli* (Knierim et al. 2015):

Non-parametric statistical procedures were applied in SigmaPlot v. 12.5 to characterize data and determine significant relations at an α of 0.05. Coefficients of determination (r²) between estimated discharge and *E. coli* were compared for untransformed and log–log transformed data. A non-parametric t test (Mann–Whitney Rank Sum Test) was used to determine if *E. coli* concentrations were significantly different between base-flow periods and storm events [emphasis added]. For the 2007 to 2013 period, storm hydrographs were analyzed graphically for a change in slope on the receding limb, which can correspond to a change from storm-event flow (i.e., quick flow) to base flow (Brodie and Hostetler 2005). Base-flow *E. coli* samples were additionally analyzed for seasonality [emphasis added] using a non-parametric analysis of variance (Kruskal–Wallis One Way ANOVA on ranks) to determine if concentration was significantly different among spring (March, April, May), summer (June, July, August), fall (September, October, November), and winter (December, January, February) periods....

No such analyses have been reported by BCRET. All seasons, flow regimes and weather conditions have been combined, thereby obscuring statistically significant differences in CAFO pollutants at a given site.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

**Response:** The Department did not review or approve BCRET’s study design and has no authority over the day-to-day activities of BCRET. While the Department may consider the research conducted by the University of Arkansas,
questions regarding the study should be more appropriately directed to the University of Arkansas.

Response: The Department amends its previous response. Pursuant to the Memorandum of Agreement between the Board of Trustees of the University of Arkansas System for and on behalf of the University of Arkansas System-Division of Agriculture and the Arkansas Department of Environmental Quality, the study performed by BCRET is being carried out for the use and benefit of ADEQ; however, the study shall be funded and conducted independently of ADEQ and shall meet the requirements of an independent study conducted by professionals in the field of water quality.

Comment 228: The Harbor report employs phrases that discount the importance of characteristic karst features such as the following: “Weathered and fractured, fossiliferous gray to buff limestone was encountered from 20 to 28.5 feet. The driller reported potable drilling water loss in this zone. Competent, fossiliferous gray limestone (consistent with the Boone Formation), with some minor fracturing and bedding planes was encountered at 28.5 feet bgs, which generally extended to the TD of 120 feet bgs. Zones of increased fracturing were encountered around 70 feet and 90 feet bgs; however, no Karst features such as dissolution features were encountered.” (p. 7 Harbor Report)

In spite of the previous statement, photographs in the record at the fractured depth (18.5-28.5) show evidence of such a karst dissolution feature where calcite crystals have developed in the void zone and can be seen at the level of drilling water loss:

Note this on page 8: “Due to fracture zones encountered in the subsurface, the borehole took more grout than calculated for its volume (see boring log in Appendix B). Borehole volume was estimated at 23.6 cubic feet (176 gallons). Total estimated grout placed in the borehole was approximately 280 gallons.”

Thomas Heutter, PG, Principal Senior Project Manager’s notes in the report indicate the difficulty cementing above 25 ft bgs on Friday, 9/23/16 due to the presence of a “void”. This becomes an issue when the ADEQ onsite independent senior geologist, Tai Hubbard, in his own report, in Table 1, states repeatedly, “No voids noted during drilling”.

Before issuing a conclusion that this study confirms that the site is acceptable for a Reg 5 CAFO, permitting over two million gallons of swine waste storage and land application, ADEQ must bring these experts together to discuss karst features, epikarst, groundwater flow, rock quality determination and other components of this difficult to assess hydrogeology that affects the transport of
liquids through karst terrain. Will they find a consensus of what they actually observed during the investigation? It is concerning that they report differing observations.

In the Report Appendix Tai Hubbard includes further evidence of the botched drilling study as documented:

-- Limitations of accomplishing the work plan: Limitations -- Based on that single boring location, certain limitations are inherent when assessing the Site geology. Limitations identified for this project include the following:
1.) Evaluation of lithologic contacts and bed orientations are limited, both horizontally and vertically, due to the inability to correlate observations collected at a single location to any other bore holes.
2.) The drilling method employed during this investigation consisted of a rotosonic drill rig without a high speed rotation implement used for typical rock coring. This limitation resulted in poor rock core quality, preventing the calculation of Rock Quality Determination (RQD) as proposed.
Based on the large percentage of mechanical breaks as a result of the drilling method, HGI did not perform Rock Quality Determination (RQD) calculations as the mechanical breaks would mischaracterize the formation competency. By definition RQD is intended to measure the degree of jointing and fractures in a rock formation. Mechanical breaks that were caused by the drilling process, specifically the collection and extrusion method, did not allow for an accurate representation of RQD.

The highly weathered limestone bedrock and unconsolidated clay intervals observed between 13.8 and 28.0 ft.bgs. appeared to have the characteristics of epikarst. With the understanding that epikarst is the weathered zone found at the interface of unconsolidated soils and bedrock, the Site setting would support this characterization.... The limestone bedrock at the Site is a part of the Boone Formation, a Mississippian aged limestone. Core analysis from 28.0 ft.bgs. to the final termination depth of 120 ft.bgs. confirmed the characteristics of the Boone Formation, with evidence of submembers such as the Short Creek Oolite and St. Joe Limestone member.... The primary karst feature during the drilling of B-1 is the previously identified epikarst zone noted between 13.8 ft.bgs. and 28.0 ft.bgs. (pp.3-4)

Note the mention of the calcite crystals shown in the previous photographic log, indicative of dissolution features in the chart below from the Rock Core drilling log:

Epikarst is cited many times in the Harbor Report without explaining that it is fragmented karst that varies widely and forms the main conduit for surface waters to flow laterally once they infiltrate below the thin soil in
**karst landscapes.** Due to this high variability, groundwater flow direction is an essential part of a competent drilling investigation as explained in the following document, and yet remember that the **Harbor Work plan specifically stated that groundwater flow direction evaluation would not be included.**

Original Commenter: Marti Olesen

**Response:** The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

**Response:** The Department amends its previous response. The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst.

**Comment 229:** Besides the arguments for denying the C&H permit on the basis of its inappropriate location, I will add that the economic value of ecotourism in the rural environment of the Buffalo National River watershed is the other elephant in the room that ADEQ ignores as a legitimate consideration. Almost a thousand people in this remote region make a living through tourism related employment. In 2016, over 1.7 million people visited Buffalo National River. Economic figures are not in for 2016, but they are for 2015. Economic figures for 2015 show that this translated to $62.2 million for BNR. These expenditures supported a total of 969 jobs, $24.5 Million in labor income, $40.2 Million in value added, and $72 Million in economic output in local gateway economies surrounding Buffalo National River. This is based on visitation of 1,463,304 visitors in 2015. The World Economic Forum’s 2015 Global Risk Report ranked water as the top societal risk facing the world in terms of potential economic impact. We are certainly seeing this on the local scale in the risk to the environment of the BR watershed. Water as a valuable economic resource is unequivocal for the state of Arkansas. The economic value of the water quality of the Buffalo National River for both public health and the tourism industry of state and local economies demands that ADEQ answer these environmental questions and deny the permit. Who will provide bottled water for Mt. Judea residents to drink when their wells test too high from pollutants? Why is ADEQ stretching its interpretations of its own regulations to permit a single operation, sited inappropriately, that employs under ten people in a risky business, when the income of almost a thousand residents in the area that is growing steadily through tourism related businesses relies wholly on the pristine water quality and beauty of the watershed?

Original Commenter: Marti Olesen
Response: Consideration of tourism and revenue is not within the Department’s regulatory authority.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

Response: The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

Comment 230: When I look further back in time at this resultant “harder look” Environmental Assessment ordered by Judge Marshall, contracted by Cardno, submitted by the USDA (SBA and FSA), and accepted by ADEQ, I observe more evidence of an apparent intentional dismissal of the significance of karst terrain. The introduction of the term “karst” doesn’t occur in the assessment document until 3.10, p. 34, and then only after many references to individual characteristic features and components of karst. For instance, such descriptors as the Ozark Aquifer, Ozark and Springfield Plateaus, Boone Formation, etc., are all made without remarking or associating the inclusive and comprehensive karst terrain of which each forms its part. Please note the following excerpts that distract from the severe limitations of placing CAFOs inherent in karst terrain. If the Harbor Report itself and the karst explanations given above do not satisfy, perhaps this report from the USDA will shed more light on how the complexities and issues of karst terrain have been essentially dismissed from consideration.

Despite the eventual detailing of karst terrain and its many variable features wherein the CAFO and its fields are located, this EA arbitrarily goes on to recommend that no action be taken beyond adhering to conditions already in the faulty permit. A “harder look” worthy of government expenditures of taxpayer dollars would certainly have incorporated the AWMFH karst guidelines as conditions of a CAFO permit to protect the karst terrain of the Buffalo National River, its watershed, and underlying aquifers. This necessarily would have required the recommended action of seeking an alternate location for the C&H
CAFO facility and its spreading fields since the entire operation is sited in the middle of the unstable, unpredictable, highly porous, faulted and fractured Boone formation of the Ozark Plateau karst terrain, which copious research and investigations have ascertained over and over again. Groundwater and surface water intermingle and are connected both laterally and vertically. Filtration is negligible. Flow directions are unpredictable without extensive and exhaustive subsurface studies. The site is documented as unsuitable for a Reg 5 permitted facility. Read what the Arkansas Pollution Control and Ecology Commission says about the BR watershed when it approved Reg 5.9. Since the APC&E commission understands the mistaken siting of C&H, the opportunity for ADEQ now exists to rectify that mistake by denying the permit. It must act responsibly, admit the mistake of having once erroneously and possibly through sheer ignorance of karst terrain, permitted a CAFO unsuitable for location in the pristine watershed of Arkansas’ only National River. With the advent of this new Reg. 5 permit application ADEQ has the regulatory authority, opportunity, and power to do what should have been done in 2012. ADEQ can now adhere to karst terrain AWMFH guidelines. They were written and published for ADEQ to implement in just such scenarios. They give substantial grounds for denying the permit, and fulfilling Arkansas’ duty and privilege to protect

Original Commenter: Marti Olesen

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

The Environmental Assessment is not required for the permitting process and was not provided as part of the permitting process. The Environmental Assessment was prepared by the United States Department of Agriculture Farm Service Agency and the United States Small Business Administration as part of their process in issuing loan guarantees.

The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included all APC&EC Regulation 5 permits.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other
subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 231: This permit should be denied because ADEQ failed to comply with specific standards as defined in Regulation 2.505 in the issuance of the original NPDES permit, demonstrating a lack of oversight that is not proportional to risk.

Under the Clean Water Act (U.S.C 33 Section 1362 (14)), CAFOs are defined as point sources. The original C & H permit# ARG590001 was a Regulation 6 NPDES permit under which CAFOs are considered a point source discharge. As a result, Regulation 2.505 applies for determining effluent discharge limits. The applicable part of the regulation reads as follows:

For purposes of determining effluent discharge limits, the following conditions shall apply:

(A) The primary season dissolved oxygen standard is to be met at a water temperature of 22°C (71.5°F) and at the minimum stream flow for that season. At water temperatures of 10°C (50°F), the dissolved oxygen standard is 6.5 mg/L.
(B) During March, April and May, when background stream flows are 15 cfs or higher, the dissolved oxygen standard is 6.5 mg/L in all areas except the Delta Ecoregion, where the primary season dissolved oxygen standard will remain at 5 mg/L.
(C) The critical season dissolved oxygen standard is to be met at maximum allowable water temperatures and at Q7-10 flows. However, when water temperatures exceed 22°C (71.6°F), a 1 mg/L diurnal depression will be allowed below the applicable critical standard for no more than 8 hours during any 24-hour period.

ADEQ in a stakeholder discussion regarding the Assessment Methodology which covers the same standards (as above), indicated that this is a standard methodology to be employed prior to approving a permit on streams that have a point source discharge. As this would have been a step required of ADEQ prior to approving the original permit ARG590001, data or evidence of a model run on Big Creek (Newton Co) using these effluent standards has been repeatedly requested. ADEQ has been unresponsive.

The Regulation 5 permit that is presently being applied for is a “no discharge” permit, so Regulation 2.505 is no longer applicable. What is notable is that ADEQ has not consistently followed Arkansas laws and regulations in regard to permitting this facility. As noted in comment A1 regarding risk, ADEQ has a critical role to play to ensure that special circumstances with significant consequences are engineered appropriately. When ADEQ demonstrates a disregard for the regulations in the permitting process, their ability to act in a role of independent oversight must be examined, particularly considering the risk factors as outlined in Part A.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC regulations.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

Comment 232: This permit should be denied as experts agree that Big Creek is a “losing stream” in that it loses significant water volume into groundwater

David Mott, an engineering geologist, former hydrologist with NPS, former regional hydrologist with the U.S. Forest Service, and having held various leadership positions with the USGS, produced a report entitled “Permitted Concentrated Animal Feeding Operation Assessment, Buffalo National River,
Arkansas” dated: November 2016. In the report’s Executive Summary Mott mentions the following data sources:

“Water quality and stream discharge information were analyzed from the in-park monitoring station on Big Creek at Carver, located 4-miles downstream from the BCRET sampling site below the CAFO and 1/2 mile above the confluence with the Buffalo River. These data came from BNR, USGS, and special studies being conducted by the University of Arkansas Geosciences Department and Ouachita Baptist University.”

Among other results listed, Mott points out that the data show that Big Creek is a “losing stream” (page 11):

“Discharge data from the USGS gaging stations at Big Creek near Mt. Judea and Big Creek at Carver revealed the intervening reach is a losing stream segment. It is likely that water entering the subsurface karst conduits in this losing reach of Big Creek resurfaces in the Buffalo River channel in a previously identified gaining reach below the confluence of Big Creek and the Buffalo River.”

A “losing stream” is one that loses significant water volume into groundwater as it flows downstream. Mott, 2016 states:

“...the discharge at Big Creek at Carver was sometimes less than the discharge at the upstream USGS gage, Big Creek near Mt. Judea, AR...In 2003 USGS staff conducted a flow gain and loss study and water quality sampling run along the length of the Buffalo River, including measuring flow and water quality at tributaries (Moix and Galloway, 2004). When examining flow patterns in the Buffalo River below Carver, USGS found discharge increased by 35 percent (7 cubic feet per second) in a 3-mile reach (Figure 34). Conductance also increased in this reach, and water temperature decreased, indicating ground water was discharging directly to the main channel of the Buffalo River. One possible source of this ground water recharge is the losing reach of Big Creek located between the two USGS gaging stations. This implies water with high nitrate concentration as observed at the BCRET sampling site downstream of the NMW could be entering the karst bedrock of either the Ordovician aged Fernvale/Plattin Limestone, or the Everton Formation, or both (Braden and Ausbrooks, 2003). Once in the subsurface drainage network, the water could travel through conduits and discharge directly to the Buffalo River main stem, bypassing the Big Creek at Carver sampling site.”

Losing streams are sources of groundwater recharge and are characteristic of karst environments. See comments E2, C2, C11, C12 regarding karst. Also refer to
Comment C1 regarding critical recharge areas. AWMFH 651.0703 Factors affecting groundwater quality considered in planning page 7-15 describes a number of engineering considerations for siting and planning a facility. Under this on page 7-18(i) is Proximity to designated aquifers, recharge areas, and well head protection areas in which the following is stated:

State water management and assessment reports and the following maps should be reviewed to ascertain the proximity of sensitive groundwater areas:

- sole source or other types of aquifers whose uses have been designated by the State
- important recharge areas
- Wellhead protection areas

Waters lost from “losing streams” often re-enter surface flows via springs and can also affect residential wells and water sources which are common in this rural area. The fact that Big Creek is a “losing stream” corroborates the overwhelming evidence of karst and the presence of rapid groundwater flows. The presence of numerous springs throughout the area confirms this characterization. Chapter 7 of the AWMFH does not require a review for sensitive ground waters, but the circumstances for which these suggestions are provided are clearly present. That this “losing stream” is not considered in the permit demonstrates a lack of investigative due diligence that is not proportional to the significant risk factors described in Part A.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located near losing stream segments. APC&EC Regulation 5 requires a 100-foot buffer from streams, including losing stream segments.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While no losing/gaining study has been performed to date on Big Creek between BC6 and the confluence with the Buffalo National River, BCRET notes seasonal dryness and rewatering between these two sites. Thomas Aley notes in his expert report of May 24, 2018, that "Big Creek also goes dry during much of the year where it passes over the Boone Formation near C&H Hog Farms." Dye studies performed by Brahana et al. (2016)\textsuperscript{15} and hydrologic studies by Murdoch et al. (2016)\textsuperscript{16} in the Big Creek watershed indicate the connectivity of karst hydrology of the Boone Formation. Thomas Aley’s May 24, 2018 expert report thoroughly explains karst geology and provides supporting evidence of the deficiencies of C&H Hog Farms, Inc.’s Regulation 5 application to address land application in karst topography.

**Comment 233:** BCRET monitoring program is not effectively measuring or reporting on water quality problems in their study of the C&H facility and therefore misleads decision makers and the public.

In 2014, a panel of experts reviewed the operational and monitoring activities taking place at C&H and analyzed BCRET’s study design and implementation (https://bigcreekresearch.org/project_reports/docs/Review%20Panel%20Report%20-%20May%202019.pdf). In their Summary of Findings the panel stated “The complexity of the landscape and the farming operation presents a challenging task for the Team.” They began their review by noting that conclusively demonstrating the impact of C&H on water quality is made difficult by “the fact that limited data on water quality are available prior to the onset of the farming operations. Additionally, within the Big Creek watershed there are a number of other ongoing land management and land use activities that can impact water quality.”

The panel immediately recognized the significance of monitoring storm events and stated “extreme events are often the driver of hydrologic responses to environmental stressors and we recommend that more effort be directed at sample collection during high-flow events.” The panel also “recognized three major potential threats to water quality associated with C&H. These include: 1) leakage from the two onsite waste storage ponds, 2) contamination of surface and


subsurface water due to land application of the wastes, and 3) potential long-term buildup of soil nutrient levels (primarily soil phosphorus) due to application in excess of crop needs and removal.”

Following is a list of specific recommendations made by the panel, and an assessment of the actions BCRET has taken in response to panel concerns:

1. A short-term, detailed water balance study should be conducted to determine the actual seepage rate of the storage ponds.
   • A water balance study has not been undertaken and pond seepage rates/volumes remain unquantified.

2. Water quality samples should continue to be collected from the house well on a routine basis. In addition, the Panel recommends that the detailed well driller’s log be obtained and that a slug test, pump test, or both be conducted on this well to determine characteristics of the aquifer from which water is drawn.
   • Water samples continue to be collected from the well but it was not apparent that aquifer testing was conducted. Well sample results showed problems with bacteria contamination and nitrate values are higher than in surface water samples.

3. A detailed walking survey of the slope down gradient from the waste ponds should be conducted to identify potential seeps and springs from perched aquifers. If perched aquifers are noted based on the driller’s log or by the identification of hillside seeps, one or more shallow monitoring wells should be installed to the depth of the perched aquifer within as short a distance as feasible from the storage ponds. If springs or seeps are noted on the hillside, these should be monitored on a routine basis to establish baselines and trends in water quality.
   • Not able to verify walking survey, no monitoring wells were installed. Because BCRET installed trenches below the pond, it might be assumed that seeps were found below the ponds during prolonged dry weather indicating perched water. In karst environments the pond seepage could be migrating vertically through solutionally enlarged fractures to the subsurface drainage network, and then discharge to springs and or surface streams. BCRET has not provided a peer reviewed report describing their trench study methods and results.

4. An inventory of the entire reach of Big Creek between the upstream and downstream sampling points with geo-referenced notes made on any significant changes in water flow due to tributaries or major springs. This inventory should include karst features located within the contributing area.
   • A karst inventory of the pond and spreading field areas could be useful, however the work of Halihan and Fields (2014) clearly shows the mature karst just below the spreading fields and near the ponds, and the fractures and conduits normally
associated with karst terrain, and directly supports the AWMFH concerns for citing CAFOs in such terrain. The recommended seepage runs in #6 below is a superior way to quantify and assess “changes in water flow” in Big Creek.

5. A detailed land use map that identifies all land uses within the contributing area of the watershed. This should include surveys of farmers to gauge land management practices, with particular emphasis on animal stocking practices, fertilization, and manure applications.
   • A land-use analysis has been conducted for the contributing watersheds to support the BCRET study objectives (bigcreekresearch.org). The analysis used GIS and remote sensing acquired sources. Unfortunately, the watershed boundary assumptions may be in error in this karst settings. A detailed inventory and survey of farmers as suggested by the panel would be expensive and time consuming and more appropriate to developing a stand-alone water quality model.

6. A seepage survey to include stream profile measurements and estimations of discharge. The stream survey should be repeated under high (if feasible), medium, and low flow conditions to capture the potential variability in groundwater recharge and discharge to the riparian zone, valley alluvium, and karst features (if present).
   • Sometimes referred to as a gain and loss flow study, seepage surveys are a critical recommendation. A seepage run in this karst setting would yield quantifiable and reproducible results concerning ground water/surface water interactions. Seepage study design should incorporate water quality measurements and sample collection. A seepage survey has been performed on the entire length of the Buffalo River (Moix and Galloway, 2004). Completion of a seepage run by BCRET was not identified.
   • Karst influence on surface flow is pronounced in Big Creek as this stream channel is often dry where it passes the C&H’s spreading fields and waste storage ponds during base flow conditions. It is dry during these times because, as commonly happens, the karst drainage network in the Boone Formation has pirated surface flow. By the time Big Creek reaches the upstream sampling site it has flowed across the Boone Formation for two miles. It is likely significant stream flow has already been lost to the subsurface drainage network before it reaches the upstream sampling site. This is confirmed by the times in the BCRET sampling record when the upstream site is dry while the downstream site is still flowing.
   • At the downstream site, it is likely karst hydrology is having the opposite effects on stream flow. The downstream site is located near the base of the Boone Formation. In the Big Creek valley, the lower Boone contains a relatively high quantity of chert (Braden and Ausbrooks, 2003). Chert is composed mainly of silica, and therefore is insoluble. Chert also interacts in complicated ways with the soluble limestone in which it is inter-bedded to affect hydrologic ground water
flow processes (Brahana et al., 2016). At the downstream sampling site, it is likely these chert layers form a continuous aquitard of undefined spatial distribution, disrupting the subsurface drainage network and forcing flow back into Big Creek’s surface channel. Instead of losing flow as happens at the upstream site, the downstream sampling site is likely capturing water from other basins, such as Dry Creek east of Mt. Judea, for example (bigcreekresearch.org).

7. Develop rating curves between water level and discharge at both the upstream and downstream sites.
   • This recommendation reflects the importance of being able to match water quality results to stream discharge and calculate loads or flow-weighted concentrations. Rating curves allow stream stage to be converted to stream discharge. A stream gage has been installed by the USGS at the BCRET downstream site. The upstream site lacks a rating curve, stream gage, and discharge measurements. This lack of discharge information is uncommon for such studies and will be discussed at length in association with panel recommendations #11 and #15.
   • Discharge data for the BCRET upstream site has not, and is not currently being collected. Even when BCRET technicians are on-site collecting water quality samples, they do not measure discharge.
   • At sampling sites lacking discharge data, storm loads cannot be developed. Only the BCRET downstream sampling site, co-located with the USGS gage at Big Creek near Mt. Judea, will have the requisite flow data to allow loads to be calculated. The lack of discharge at the upstream site in this upstream/downstream study of the effects of agricultural runoff is not a typical study design.
   • The use of the watershed area ratio to estimate flow and loads at the upstream site is likely not applicable because the flow relationship between the two sites is not linear due to karst surface water/groundwater interactions affecting surface flow. Without discharge at the upstream site, verification of the accuracy of the watershed ratio method, or development of nonlinear relationships between flow at the upstream and downstream sites, is not possible.

8. Conduct traces with multiple dyes. The first set of traces should be qualitative to identify the potential connections between points of recharge and discharge. Once established, quantitative traces should be conducted with both conservative and non-conservative dyes to establish travel times and dispersion characteristics. Results of the traces, for example from the sinkhole in Field #1 to the spring downslope, may help revise the area for manure application.
   • Dye tracing studies have not been conducted by BCRET. Dr Van Brahana has attempted to partially fill the need identified by this recommendation, but is not receiving funding from BCRET to assume what is their responsibility, and his studies were limited. His results and interpretations are currently in press. BCRET
states that dye tracing through the waste storage pond liners is not considered feasible.
• BCRET has used GIS techniques to delineate the watersheds contributing to their monitoring sites. These estimates are likely in error because this simplistic view of watersheds often does not apply to karst basins with extensively developed subsurface drainage networks (Aley, 1982; Aley and Aley, 1989; Aley, 1999; Aley and Aley, 2000; Mott et al., 2000). This is especially applicable to the BCRET downstream sampling site. The actual recharge area for the upstream and downstream sampling sites, and Left Fork of Big Creek, should be delineated using common dye tracing techniques.
• BCRET has not delineated the recharge area for the spring they are monitoring. Information from this spring is telling us what about the C&H use of the nearby pasture as a waste application site? What else is happening in the recharge area of this spring? What is the spatial extent of this recharge area? Is this spring pirating an upgradient surface stream? Does the spreading field even contribute recharge to this spring? Basic questions like these should have been answered prior to sample site selection and the start of sample collection.

9. The Dry Creek watershed includes an estimated 1/3 of the proposed land area approved for manure application from C&H. An automated sampling and gauging station should be installed as close to the confluence with Big Creek.
• Between November, 2014, and May, 2015, Dry Creek was sampled seven times.
10. The Panel recognizes the need to monitor surface runoff and recommends that more emphasis be placed on a sampling protocol to better capture flow-weighted samples during runoff events.
• The BCRET sampling strategy does not appear to have changed in any notable way to increase emphasis of surface runoff sampling. There is limited surface runoff data from three flumes. Only two of the fields draining to the flumes receive swine waste.
• See discussion in #15.

11. Use commonly available geophysical techniques to characterize the subsurface conditions that could potentially contribute to preferential flow of water and contaminants from fields receiving swine waste applications. If these procedures document significant subsurface features that can affect water flow, subsurface investigations (i.e., drilling) should be conducted to confirm these observations.
• Ground penetrating radar and electrical resistivity methods have been employed by BCRET collaborators. Follow-up investigations of karst features using borehole investigations at the spreading fields showed many profiles dominated by sand and gravel. One borehole was drilled near the waste storage ponds, this borehole confirmed the presence of a karst preferential flow path (a solutionally enlarged fracture).
• The electrical resistivity surveys identified concerns related to preferential flow paths in the subsurface karst, as discussed previously. Identified concerns based on karst hydrology were not used by the permit planner or the draft permit approver to appropriately condition waste storage and application as required by the AWMFH (NRCS, 2012).

12. If buildup of soil phosphorous levels is noted, the results of the manure solids and liquid separation trials that are being conducted as part of the project may offer an opportunity to better match waste applications to specific crop and soil fertility needs. In general, the manure solids will have a lower N:P ratio than the liquid fraction. Ideally, the dryer solid fraction could be applied to fields where soil P levels are low or transported out of the watershed altogether. In light of C&H’s use of additives to enhance the function of the waste storage ponds, a regular sampling of storage ponds is important to understand the effects of the additives and to determine variability in nutrient concentrations.

• Buildup of phosphorus levels in soils has been noted by BCRET in recent years (bigcreekresearch.org)
• ADEQ studies of CAFO facilities in the Buffalo River watershed in the 1990s and early 2000s identified sludge build up and disposal as the most significant concern at Regulation No. 5 permitted facilities.
• Dr. Sharpley’s efforts to study ways to ameliorate high P levels in the waste stream have been abandoned.
• The current NMP and permit do not address sludge buildup or waste stream treatment, or the need to refine NMP calculations based on “as applied” testing results.

13. Source tracking of nutrients and bacteria. While this is time consuming and can be prohibitively expensive to conduct on a routine basis, if elevated contaminant levels are noted at the downstream site relative to the upstream monitoring locations, source tracking using isotopic or PCR methods may provide additional information needed to establish whether activities associated with C&H are a contributing factor.

• No evidence was found that any source tracking methods have been employed by BCRET even though their data shows statistically significant increases in several parameters at the downstream site (Mott, 2016).

14. Supplemental chemical parameters. The study of watershed hydrology and geochemistry is regularly enhanced by combining a multi-parameter approach. For example, the use of multiple water quality parameters may provide additional information on flow paths, residence times, and sources that may otherwise be difficult to interpret on limited sources of data. Therefore, the Panel recommends that the Team consider, if practical, the following additional analytes: - Principal ions - Alkalinity - Appropriate trace metals - Environmental isotopes (including
C/N ratios) - Ammonia, Nitrite, and Nitrate fractions of total N - Emerging contaminants (caffeine, hormones, antibiotics, etc.).

- Several parameters were added based on the review team’s recommendations. However, some obvious parameters are still lacking such as dissolved oxygen and quantification of discharge concurrent with sample collection.
- The base flow database BCRET has developed is substantial and lab reports reflect high standards of quality. Unfortunately, the other shortcomings of the study design and execution limit the intended use of the base flow data to interpret the impacts of C&H.

15. Storm event sampling. Wide-ranging studies of watershed processes and contaminant transport demonstrate the importance of storm events. In this particular investigation, the transport of waste offsite may be strongly correlated to periods of overland flow on application fields. While the Panel is encouraged to see instrumentation specifically designed to capture this overland flow, it would be beneficial to capture more than a single composite sample, particularly for long lasting storms.

- The Big Creek sampling strategy employed by BCRET primarily utilizes an upstream of C&H activities and below C&H activities (upstream/downstream) approach. Their stated purpose of this monitoring is to assess potential declines in water quality occurring in the intervening reach where the production facility, swine excrement holding ponds, and swine excrement land application fields are located (bigcreekresearch.org). Samples are collected on a set weekly basis independent of hydrograph considerations. In agricultural basins, it is well known that nonpoint source contamination is rainfall generated, and transport to surface streams is primarily in conjunction with storm hydrographs, as the review panel noted. In a report prepared for the EPA looking at studies from across the country (https://www.bae.ncsu.edu/programs/extension/wqg/issues/loadestimation.pdf) the relationship between parameter concentrations and storm loading is discussed.

"Especially for particulate pollutants of non-point origin, the flux varies drastically over time, with fluxes during snowmelt and storm runoff events often several orders of magnitude greater than those during low flow periods. It is not uncommon for 80 to 90% or more of the annual load to be delivered during the 10% of the time with the highest fluxes, as is illustrated in Table 1. Clearly it is critical to sample during these periods, if an accurate load estimate is to be obtained."

- Table 2 compares base flow median instantaneous loads (flux) at BCRET’s downstream sampling site compared to flux during a period of storm flow at the same site. The results show the critical nature of analyzing storm flow loads as prescribed by the expert panel, EPA, USGS, and other researchers is very applicable to the study of C&H. It is literally tens, hundreds or even thousands of
times as important to accurately quantify the storm loads as compared to the base loads. BCRET collects approximately 80 percent of its stream samples from periods of base flow water quality, and 20 percent of its samples are collected from storm runoff periods (bigcreekrsearch.org). BCRET prepares quarterly update reports based on these data and presents this information on their website (bigcreekrsearch.org), but there is no analysis of loads presented. Not only is it critical to sample during times of storm runoff, the data collection and analysis must be conducted in a specific manner to calculate accurate, scientifically accepted, loads (Haggard et al., 2003;)


After 3.5 years of monitoring, BCRET has not subjected their data or interpretations to independent peer review. ADEQ has not asked BCRET to prepare such an analysis prior to making its permit decision. The BRWA believes a peer review of the BCRET study would reveal that:

- BCRET and USGS should coordinate sampling and prioritize storm event data collection and analysis with the goal of quantifying the offsite impacts of C&H on the water quality of Big Creek, the Buffalo River, and the karst aquifer.
- Does BCRET plan to compare their load estimates at the downstream site to the USGS loads at Carver? How will these loads be comparable if USGS uses different sampling techniques and load development procedures?
- BCRET is not planning to sample storm event runoff in Big Creek at intervals throughout the rising and falling limbs of a storm hydrograph(s) to allow for integration analysis.
- BCRET flags storm and base flow samples in their databases. These flag sometimes contradict behavior of the USGS hydrograph at Mt. Judea gage.
- BCRET data may show increasing nitrates in base flow over time. This result has not been detected or reported by BCRET in their quarterly reports. BCRET should use more commonly accepted and refined water quality assessment techniques and peer review processes to interpret data and state conclusions.
- E. coli concentrations are not measured from storm samples collected with ISCO samplers.

BRWA is concerned by the findings of the expert review panel, as the review appears to show the water quality monitoring approach being employed by BCRET missed many fundamentally important aspects of a carefully designed study tailored to “the complexity of the landscape and the farming operation.” BRWA has reviewed the BCRET data and the BCRET sampling activities and concluded that BCRET has not adequately responded to the recommendations made by the expert review panel and others to focus on Big Creek and karst
aquifer monitoring, especially during storm flow periods. ADEQ should deny the C & H permit until a proper scientific assessment of its impact is designed, conducted, and reported on through acceptable scientific peer review processes. This would allow ADEQ to make an informed decision regarding the level of water quality impacts to Big Creek, the Buffalo River, and the karst aquifer caused by C&H.

Original Commenter: Buffalo River Watershed Alliance

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

The Department did not review or approve BECRT’s study design and has no authority over the day-to-day activities of BCRET. While the Department may consider the research conducted by the University of Arkansas, questions regarding the study should be more appropriately directed to the University of Arkansas.

**Response:** The Department amends its previous response. Pursuant to the Memorandum of Agreement between the Board of Trustees of the University of Arkansas System for and on behalf of the University of Arkansas System-Division of Agriculture and the Arkansas Department of Environmental Quality, the study performed by BCRET is being carried out for the use and benefit of ADEQ; however, the study shall be funded and conducted independently of ADEQ and shall meet the requirements of an independent study conducted by professionals in the field of water quality.
Comment 234: The data from the single borehole Harbor (2016) and information provided by Mott (2016), Hubbard (2016) and numerous Arkansas Registered professional Geologists define the area underlying the waste lagoons as "pinnacles and cutters" which is a characteristic of epikarst and is a karst feature. Does ADEQ agree that karst underlies the two swine waste lagoons at the CAFO?

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

Response: The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst.

Comment 235: There are documented signs of degradation of Big Creek occurring since the CAFO has been in operation (Mott, 2016). Big Creek is losing stream in certain segments and is most likely discharging into the Buffalo National River (BNR) below the confluence of Big Creek and the BNR at Carver (Mott, 2016). ADEQ has stated "Practically all of the waste generated from these animal production facilities is land applied and, as a result, nitrate levels measured from this region are atypically high" (Arkansas Department of Pollution Control & Ecology, 1992). Big Creek has not been properly monitored by the Big Creek Research Extension Team (BCRET) because "the probability that the watershed ratio approach would yield unrepresentative flow volumes is therefore high. Instantaneous discharge data were also unavailable for the upstream site; making it impossible to spot check watershed ratio estimates. Big Creek flows across the Boone Formation for 2 miles before reaching the BCRET upstream sampling site, and is known to go dry between the sampling sites. After further analysis, flux comparisons between the upper and lower site are not presented because of the uncertainty introduced in discharge relationships by the karst interactions" Mott (2016). Obviously, Big Creek is a losing stream which has been previously
documented and commented on numerous times. There are interbasinal conduit connections in this area, numerous solution channels and fractures. Additionally, there are abundant surface and groundwater interactions within in the CAFO area (Murdoch, et. al. 2016).

However, the BCRET has continuously published data in their Quarterly Reports from upstream of the CAFO on Big Creek and compared it to downstream water quality of the CAFO and concluded that there was no significant changes in water quality from the upstream and downstream sampling locations. This is unattainable when monitoring a losing stream (e.g. Big Creek) in a karst environment.

The interceptor trench that was installed at the site to monitor potential leakage from the swine waste lagoons has been repeatedly called inadequate by Arkansas Professional Geologists since inception. Therefore, both surface and groundwater have not been properly monitored by the BCRET because of the complex hydrologic nature of groundwater flow in karst and $100,000's of taxpayers' money has been wasted. A proper groundwater monitoring network should be installed and sampled on a quarterly basis if a Regulation 5 permit is mistakenly issued.

Additionally, it is recommended that ADEQ design an aggressive and more frequent monitoring program to ensure run-off is not entering Big Creek and the Left Fork of Big Creek if a Regulation 5 permit is mistakenly granted.

Original Commenter: Ray Quick

**Response:** APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located near losing stream segments. APC&EC Regulation 5 requires a 100-foot buffer from streams, including losing stream segments. APC&EC Regulation 5 does not require the installation of surface or groundwater monitoring networks.

The Department did not review or approve the study design and has no authority over the day-to-day activities of BCRET. While the Department may consider the research conducted by the University of Arkansas, questions regarding the study should be more appropriately directed to the University of Arkansas.
The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

While no losing/gaining study has been performed to date on Big Creek between BC6 and the confluence with the Buffalo National River, BCRET notes seasonal dryness and rewatering between these two sites. Thomas Aley notes in his expert report of May 24, 2018, that “Big Creek also goes dry during much of the year where it passes over the Boone Formation near C&H Hog Farms.” Dye studies performed by Brahana et al. (2016) and hydrologic studies by Murdoch et al. (2016) in the Big Creek watershed indicate the connectivity of karst hydrology of the Boone Formation. Additionally, Dye studies performed by Brahana et al. (2016) and hydrologic studies by Murdoch et al. (2016) in the Big Creek watershed identify potential confounding factors that make direct upstream to downstream comparisons difficult, particularly given the uncertainty that comes with the connectivity of karst hydrology. Thomas Aley’s May 24, 2018 expert report thoroughly explains karst geology and provides supporting evidence of the deficiencies of C&H Hog Farms, Inc.’s Regulation 5 application to address land application in karst topography.

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1 Brahana, V.; J. Nix; C. Kuyper; T. Turk; F. Usrey; S. Hodges; C. Bitting; K. Ficco; E. Pollock; R. Quick; and others. 2016. Geochemical Processes and Controls Affecting Water Quality of the Karst Area of Big Creek near Mt. Judea, Arkansas. Journal of the Arkansas Academy of Science 70:45–58.

Pursuant to the Memorandum of Agreement between the Board of Trustees of the University of Arkansas System for and on behalf of the University of Arkansas System-Division of Agriculture and the Arkansas Department of Environmental Quality, the study performed by BCRET is being carried out for the use and benefit of ADEQ; however, the study shall be funded and conducted independently of ADEQ and shall meet the requirements of an independent study conducted by professionals in the field of water quality.

**Comment 236:** Issuance of this permit violates the Clean Water Act’s antidegradation policy. 40 CFR 131.12(a)(3) states that “where high quality waters constitute an outstanding National resource, such as waters of National and State parks…that water quality shall be maintained and protected.” The Buffalo National River is designated an Outstanding National Resource Water (ONRW) and is afforded the highest level of protections under the antidegradation policy. The Draft Permit does not insure the water quality of Buffalo National River will be maintained and protected.

Original Commenter: Anna Weeks

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2.203. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to dictate regulatory authority over private land within the watershed, other than what exists under local, state, or federal law.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department is actively engaged in developing an antidegradation implementation procedure to address the revision of 40 CFR § 131.12. The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2 Chapter 2. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to dictate regulatory authority over private land within the watershed of an ERW, other than what exists under local, state, or federal law.

**Comment 237:** The Buffalo National River is the nation’s first national river established in 1972. In 2015, the Buffalo National River received 1.46 million visitors who spent over $72 million dollars and employed 969 people to provide meals, outfitting services, cabins, gas and groceries for visitors to the river.
The goal of the Clean Water Act (CWA) is to eliminate the discharge of pollutants into the nation’s waterways. The CWA also includes an Anti-Degradation Policy that requires the state to “develop and adopt a statewide anti-degradation policy…that at a minimum shall be consistent with… (3) where high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water shall be maintained and protected.” Waters must be protected at a level reflecting the highest use achieved since November 1975 regardless of whether water quality has declined since then or whether that use is recoverable.

EPA has delegated authority to ADEQ to enforce the CWA and ADEQ has established the most protective designation under state regulations called Extraordinary Resource Water (ERW). According to ADEQ (Regulation 2.302), the ERW designation is defined as “…(The) beneficial use is a combination of the chemical, physical and biological characteristics of a waterbody and its watershed (emphasis added) which is characterized by scenic beauty, aesthetics, scientific values, broad scope recreation potential and intangible social values. “That definition embodies the Buffalo National River and its watershed.

ADEQ receives a significant portion of its operating, research, permit and project funding from the federal government. ADEQ may have been required to conduct a NEPA review prior to approval of C&H Regulation 6 and NPDES permit. The actions taken by the ADEQ in permit approval have environmentally significant impacts to a federal entity (BNR) and were a “federalized” action under the NPDES permit.

Original Commenter: Teresa Turk

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

Response: The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other
subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department is actively engaged in developing an antidegradation implementation procedure to address the revision of 40 CFR § 131.12. The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2 Chapter 2. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to dictate regulatory authority over private land within the watershed of an ERW, other than what exists under local, state, or federal law.

Comment 238: In 2012, C&H Hog Farms submitted a Notice of Intent (NOI) to ADEQ and obtained a NPDES Regulation 6 permit on August 3, 2012. The hog factory became operational in May 2013 and initiated manure application in the fall of 2013. C&H is located outside of Mt. Judea, AR at Lat 35°55’ 13.60’ N and Long 93°4.0’ 51.00’ W in Newton County, Arkansas. C&H is the largest hog Concentrated Animal Feeding Operation (CAFO) in the Ozark Region and the only large hog CAFO sited on karst limestone of the Boone Formation. The NOI indicates C&H planned to house 6500 hogs and to spread their manure containing high levels of phosphorous and nitrogen on 17 different fields. Many of these fields are adjacent to Big Creek and experience moderate flooding from time to time. Five of these fields, the CAFO barns and holding ponds are less than ½ mile from Mt. Judea elementary and high school. Many studies have shown an increase in health related issues such as MRSA and respiratory problems in workers and residents that live in close proximity to a CAFO. Since 2013, C&H has distributed an average of 2.5 million gallons of hog waste yearly onto the permitted fields. The phosphorous waste generated annually from C&H is equivalent to a human population of up to 23,000 people. According to the 2016 population estimate, the entire population of Newton County is 7,936 people. C&H generates over three times the amount of waste of all the people living in Newton County. The hog waste and manure application is concentrated in a discrete valley spread on thin soils fields underlain by karst and is untreated. A recent journal article noted that 60% of all human pathogens are transmitted by other species. Most notable, interspecies transfer accounts for the majority of the newly introduced infectious diseases to the human population.

C&H also submitted land use contracts signed by the asserted land owners giving permission to spread manure on approximately 630 acres. However, several of the landowner contracts were fraudulently signed without the landowners’ permission or the location of the field was misidentified. The proposed Regulation 5 permit bases its foundation of the Nutrient Management Plan and engineering designs on the information provided in the NOI for Regulation 6 (Section 2 & 3 C&H Permit Application Regulation 5). Therefore any comments citing the Regulation 6 permit are applicable to the new Regulation 5 permit application review herein.
Under the CWA’s Anti-Degradation Policy, ADEQ is required to determine if new or increased discharge would affect the Buffalo National River. ADEQ did not conduct an evaluation, investigation or review prior to issuing C&H’s Regulation 6 permit in 2012. The current Regulation 6 NPDES permit allows for discharge into Big Creek which flows 6 miles downstream into the Buffalo National River (ERW, Tier 3 water). ADEQ failed to follow the requirements of the CWA by not conducting a water quality or geological evaluation prior to the approval of C&H permit (#ARG-590001-ARR-153893).

Original Commenter: Teresa Turk

Response: The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to the degradation of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

The Department is actively engaged in developing an antidegradation implementation procedure to address the revision of 40 CFR § 131.12. The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2 Chapter 2. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to
dictate regulatory authority over private land within the watershed of an ERW, other than what exists under local, state, or federal law.

**Comment 239:** Over the past twenty-six years, the National Park Service (NPS) had conducted a state approved and utilized water quality monitoring program on the Buffalo National River. In the past, ADEQ used NPS data to determine water quality status with the national river.

The Watershed Conservation Resource Center (WRC) recently published a review of the water quality data collected throughout the BNR and selected tributaries during the past 26 years. During that time samples were collected on Big Creek (T-6) for dissolved oxygen, pH, conductance, water temperature, turbidity, fecal coliform, and nitrate. Phosphate information was collected from 1998-2011. Big Creek (T-6) in Newton County had very good water quality for all parameters collected from 1985-20011. Average fecal coliform levels from 1995-2011 were 20.4 colonies/100ml with an average geometric mean of 4.6. The state limit is 400 colonies/100ml for a single grab sample and 200 colonies/100ml for geometric mean during primary contact season. Fecal coliform levels at Big Creek were substantially lower than the state limit indicating very low pathogen rates. Similarly, Big Creek (T-6) had relatively low levels of nitrate (NO3-N) with a mean of .16 mg/L compared to other 23 tributary sites. Currently there are no state standards for nitrate, but the EPA limit for nitrate in drinking water is 10.0 mg/L. Average chloride and sulfate levels were 3.31 mg/L and 7.35 mg/L respectively, well below the state limit of 20 mg/L. Although very little data was collected for dissolved oxygen readings (n=102), three readings indicated low dissolved oxygen below the state standard of 6 mg/L. In sum, prior to 2014 Big Creek (T-6) Newton County appeared to be a healthy stream with good water quality indicators that were well below any state exceedance limits.

Original Commenter: Teresa Turk

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The Department considered all relevant scientific data submitted during this permitting process.

The Department is required every two years by 40 CFR 130.7(b)(5) to assess all readily available data for attainment of water quality standards.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

BCRET data document that nitrate-N is variable; however, Figure 12 of the April 1 to June 30, 2018 BCRET Quarterly Report demonstrates that nitrate-N is higher downstream (BC7) than upstream (BC6). Chlorides and nitrates follow similar seasonal fluctuations in that they are higher during summer and autumn months when stream discharge is most influenced by groundwater. ADEQ reviewed Jim Petersen’s May 31, 2018 expert report, which presents an analysis of temporal trends among nitrate-N and E. coli from January 2014–December 2017 at BC6 and BC7. Mr. Petersen’s analysis presents decreasing trends of ammonia and chlorides and increasing concentrations of E. coli at BC6. Yet, increasing concentrations of nitrate-N were observed downstream at BC7. The conflicting temporal analysis prompted Mr. Petersen to further review trends upstream to downstream. By analyzing paired concentration data (collected same day) at BC6 and BC7 from January 2014 through December 2017, Mr. Petersen reports significant increases in total nitrogen, ortho-phosphorus, and chlorides, but non-significant changes in E. coli and nitrate-N. The significant increase of nitrate-N in the house well and ephemeral stream does correspond to increases of total nitrogen at BC7. Mr. Petersen’s analysis illustrates the complexities of evaluating water chemistry in karst systems.

The Department reviewed data analysis by Watershed Conservation Resource Center (2017) of chlorides for the Buffalo River and its tributaries. This data reports mean base flow chloride concentrations for Big Creek at the confluence with the Buffalo National River (Monitoring station at Carver (BUFT06)) from 2003–2011 at 3.31 mg/L. Values reported by Mott (2016) are below the base flow average chloride concentration.

Comment 240: Multiple agencies and citizen science groups have begun or expanded water quality monitoring on Big Creek since C&H became operational. Currently there are two USGS gauging stations that record at 15 minute intervals up to nine different parameters (e.g., DO, pH, nitrates, water temperature, etc.); the NPS has three weekly water quality collection sites, a state funded water quality investigation from the University of Arkansas Division of Agriculture, (BCRET) has two weekly water quality collection sites—one upstream of the C&H manure spreading fields (site #6) and one below (site #7) C&H and a citizen science group (KHBNR) collects water on an intermittent basis.
Based on the information collected by the NPS from sampling locations at Carver, NPS submitted a request to ADEQ asking that three tributaries of the BNR be listed as impaired and placed on the 303(d) list in 2015. Big Creek-Newton County had exhibited declines in dissolved oxygen, high temperatures and very high E. coli readings.

ADEQ has an exceptionally high exceedance standard of 25% of all samples taken for E.coli throughout the year. The ADEQ standard is considerably more tolerant of high levels of E. coli than the EPA recommended 10% exceedance of 126 cfu/100ml during primary recreational season.

Analysis of the BCRET project data during the 303(d) period of record (April 1, 2010-March 31, 2015) supported the NPS findings that Big Creek experienced significant impairment particularly in 2014. Using ADEQ’s ERW limit in the primary recreational season (Regulation 2.507) for E.coli, at BCRET Station BC 7 the levels exceeded the geometric mean standard of 126 colonies per 100ml for ERW streams 76% of the time or 13 of 17 geometric mean values. Using the individual grab sample for ERW and non-ERW limits, the standard was exceeded 33% of the time during the 2014 primary contact season. Similarly at the BCRET site 6 upstream from C&H, during the primary contact season of 2014 the geometric mean for E. coli was exceeded 71% of the time or 12 of 17 geometric mean values. Using the single grab sample of the ERW standard, E.coli levels were exceeded 8 out of 21 samples for 38% of the time and using the less protection, non-ERW standard, E.coli levels were exceeded 6 out of 21 samples or 28% of the time. Even with the less protective ADEQ standards, E.coli consistently exceeded the state limits. Poor water quality of this nature during the primary recreational contact season presents a health risk to recreational users of Big Creek and the BNR.

The KHBNR team collected opportunistic E. coli samples during base and storm flow conditions starting in 2013. Sample sites were located down gradient from manure application fields on landowner approved areas or locations accessible by public roads. Data were collected using USGS protocols and analyzed by a state permitted laboratory. E.coli levels during storm flow conditions demonstrated consistently high of E.coli over 20,000cfu/100 ml at various sites along Big Creek. Although nutrient and E.coli data are provided an “agricultural exemption” under the CWA, these high levels show the conditions and timing for nutrient and pathogen transport into streams.

Original Commenter: Teresa Turk

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management.
Systems. The Department considered all relevant scientific data submitted during this permitting process.

The 2016 Assessment Methodology did not include data quality considerations or exceedance frequencies for continuously collected data. The Department did not have an EPA-approved methodology to allow assessment of the referenced data.

The EPA did not include Big Creek or the Buffalo National River on the approved 2016 303(d) list.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to the degradation of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 241: Data from the USGS station (USGS 07055814) indicated chronic low dissolved oxygen readings particularly during the summer of 2014. ADEQ ignored these data citing that they had no methodology available to assimilate or assess the so called “continuous” data, although samples were only collected every 15 minutes. It is almost unheard of for a scientific institution or management agency to reject and dismiss additional data that provides greater certainty and reduces error. Usually an agency does not have enough data, but in this instance, the ADEQ rejected extremely reliable information.

In the fall of 2016, ADEQ requested the United States Geological Service (USGS) to conduct a review of the current water quality standards for dissolved oxygen using the USGS 15 minute interval data for 5 different streams. The
USGS found that low dissolved oxygen (less than 6 mg/L) during the critical time period (temperatures were in excess of 22°C) occurred greater than 20% of the time in Big Creek-Newton County. ADEQ standard is 10% of the time during the critical period for streams with watersheds greater than 100 mi². Low DO was present 20.5% in Big Creek-Newton County thereby exceeding the ADEQ standard by more than twice and thus further demonstrating that Big Creek-Newton County is impaired.

According to ADEQ’s draft 2016 Integrated Water Quality and Assessment Monitoring Report, these data meet the standard of a Tier IV data quality and should be considered for Category 5 designation as impaired.

If ADEQ had listed Big Creek, Newton County as impaired on the EPA 303(d) list and with EPA concurrence, a Total Maximum Daily Load (TMDL) would be developed. A TMDL is designed to identify the sources of contamination affecting stream water quality throughout stream reach or section. Once a survey identifying the sources of contamination is completed, then actions are taken to reduce the discharge of the contaminants. ADEQ should follow the CWA-303(d) requirements and list Big Creek-Newton County as impaired. The state has violated the CWA by ignoring the sufficient and corroborative data from several sources that Big Creek is impaired.

Original Commenter: Teresa Turk

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

The 2016 Assessment Methodology did not include data quality considerations or exceedance frequencies for continuously collected data. The Department did not have an EPA-approved methodology to allow assessment of the referenced data.

The EPA did not include Big Creek on the approved 2016 303(d) list.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four
Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the Buffalo River Watershed and to protect the vitality of the Buffalo National River as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018. Watershed management plans are recognized by EPA as comparable, state-led management approaches expected to result in the attainment of water-quality standards.

Comment 242: Chloride is a naturally occurring mineral that is considered a “conservative tracer” because it is not readily absorbed by biota and is relatively inert. According to Mott, “chloride levels may become elevated in surface and groundwater receiving significant amounts of agricultural run-off and infiltration”. Data from BCRET indicate elevated chloride levels in the Left Fork of Big Creek and the BCRET site #7 downstream of the C&H. Comparisons between the upstream site #6 and downstream site #7 were statistically significant with derived concentrations 64% greater at the downstream site #7.

Original Commenter: Teresa Turk

Response: BCRET data analyzed by Mott (2016) indicate that chloride concentration increased from 1.6 mg/L to 1.9 mg/L. The APC&EC Regulation 2 ecoregion value for chloride is 13 mg/L.

Response: The Department amends its previous response. The Department reviewed data analysis by Watershed Conservation Resource Center (2017) of chlorides for the Buffalo River and its tributaries. This data reports mean base flow chloride concentrations for Big Creek at the confluence with the Buffalo National River (Monitoring station at Carver (BUFT06)) from 2003–2011 at 3.31 mg/L. Values reported by Mott (2016) are below the base flow average chloride concentration.

Comment 243: Nitrogen is present in hog manure and is an important plant nutrient. Excessive levels of nitrogen and/or phosphorous can create algal growth and cause stream impairment. Mott examined data from BCRET and found derived higher concentrations of nitrate over 300 times higher at the BCRET downstream
site #7 than BCRET upstream site #6. Median nitrate concentrations increased by 124 percent and the increase was statistically significant. Increases in nitrate concentrations are very common and often the first indicator of nutrient pollution from CAFOs. Nitrates often contaminant wells used for drinking water by local residents and pose a considerable health risk to infants and the elderly.

Original Commenter: Teresa Turk

**Response:** BCRET data analyzed by Mott (2016) indicate that nitrates increased from a median value of 0.10 mg/L to 0.23 mg/L from upstream to downstream, respectively. Nitrate values upstream and downstream are comparable to the Boston Mountain median values. With regards to domestic water supply uses, nitrate values observed in Big Creek, both upstream and downstream, are well below most groundwater and source water intake nitrate values. For example, the Arkansas Department of Health reports in the 2016 Annual Drinking Water Quality Report for the City of Jasper a mean nitrate value of 0.36 mg/L, with a range from 0.12 mg/L to 0.59 mg/L (ADH, [http://www.healthy.arkansas.gov/eng/ccr/397.pdf](http://www.healthy.arkansas.gov/eng/ccr/397.pdf)). The source water intake for the City of Jasper is located in Bull Shoals Lake.

In the Ozark Mountain karst region, nutrient concentrations in streams of the Buffalo, Upper Illinois, and Upper White River Watersheds increase as the percent of land in pasture and urban use increases. Averaged over the last three years, nutrient concentrations in Big Creek above and below the C&H Hog Farms are similar to concentrations found in other watersheds where there is a similar amount of pasture and urban land use.

The Department has received multiple comments regarding algae concerns in the Buffalo National River Watershed. The Department and the NPS are in the process of designing an algal monitoring program for the Buffalo National River and its tributaries. If an algal bloom is reported, the Office of Water Quality may conduct an investigation.

**Response:** The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

BCRET data document that nitrate-N is variable; however, Figure 12 of the April 1 to June 30, 2018 BCRET Quarterly Report demonstrates that nitrate-N is higher downstream (BC7) than upstream (BC6).
ADEQ is working to support a collaborative study with the Arkansas Game and Fish Commission, US Geological Survey, and the National Park Service focused on the distribution and causation of the rapid expansion of filamentous algae in the Buffalo River.

Comment 244: Dye tracing studies were conducted by KHBNR during 2014 in close proximity to C&H. C&H denied requests to inject dye into manure lagoons, wells and streams adjacent to the CAFO barns and manure application fields. Therefore alternative sites close to manure application fields were used as injection points as a proxy to the CAFO facility and fields. Brahana et al. demonstrated the rapid transport (approximately 660 meters/day) and connectivity (visual observation and instrumental recording from Big Creek downstream) from dye injected into a hand dug well (BS-39) 500 meters down gradient from the CAFO. A second dye injection location (BS-36) demonstrated wide hydrological connectivity (cross basin and cross formation) between the main fork of Big Creek and Left Fork of Big Creek with dye traveling approximately 800 meters/day. Dye from the BS-36 injection site was found upstream of BCRET “upstream of farm” sampling site #6. These data highly suggest the transport of nutrients from C&H upstream of BCRET’s presumed control sampling location #6. These results cast doubt on the results of C&H monitoring efforts, and invalidate the conclusions BCRET and other investigators have drawn from the upstream/downstream comparisons.

BS-36 dye injection also demonstrated the incredibly complex hydrology underneath C&H by finding positive tests for dye as far away as Mitch Hill Spring (approximately 10 miles NE straight line distance) on the North side of the Buffalo National River.

Original Commenter: Teresa Turk

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The Department considered all relevant scientific data submitted during this permitting process. The referenced dye tracing study has not been submitted to the Department for review, and thus the Department cannot comment on the validity of the referenced study and any correlation between the study and the results of C&H monitoring efforts.

The Department did not review or approve the study design and has no authority over the day-to-day activities of BCRET. While the Department may consider the research conducted by the University of Arkansas, questions regarding the study should be more appropriately directed to the University of Arkansas.

Response: The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC
Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to the degradation of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 245: Due to the complex hydrology noted in Mott, Brahana and other authors, waste from C&H is affecting an increase in algal growth in Big Creek, the BNR and especially the Left Fork of Big Creek. As previously discussed, dye tracing studies have shown the complex and diverse pathway from C&H manure spreading fields to Big Creek, the Left Fork of Big Creek, the BNR and Mitch Hill Spring. Regulation 2.509 states “Materials stimulating algal growth shall not be present in concentrations sufficient to cause objectionable algal densities or other nuisance aquatic vegetation or otherwise impair many designated use of the waterbody.” C&H is discharging nutrients to these streams that contribute to impairment and violated Regulation 2.509. Increase in algae and algal blooms are an additional indicator that C&H is discharging into the waters of the state and the nation.

Original Commenter: Teresa Turk

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.
The Department has received multiple comments regarding algae concerns in the Buffalo National River Watershed. The Department and the NPS are in the process of designing an algal monitoring program for the Buffalo National River and its tributaries.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to the degradation of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

ADEQ is working to support a collaborative study with the Arkansas Game and Fish Commission, US Geological Survey, and the National Park Service focused on the distribution and causation of the rapid expansion of filamentous algae in the Buffalo River.

**Comment 246:** ADEQ violated the CWA and the provision of the Anti-Degradation Act section of both federal and state (Reg. 2.203) by not maintaining Big Creek, Newton County, (HQW) and the Buffalo National River (ORW) to water quality standard of these streams in 1975 or to their highest water quality level achieved. In addition, prior to approval of the C&H Reg 6 permit, at a minimum, a water quality inspection and analysis for dissolved oxygen (Reg. 2.505) should have been conducted.

ADEQ is in violation of Regulation 2.303 in its designated uses for not including Big Creek, Newton County, and other tributaries of the Buffalo National River as an Extraordinary Resource Waters (ERW) when clearly the regulation includes the watershed of the ERW. The ERW designation for these tributaries is critical when evaluating the tributary’s water quality against state standards.

Review of the pre-CAFO and current CAFO water quality information from Big Creek shows a dramatic decline in water quality with increases in E. coli, nitrate, chloride, and decreases in dissolved oxygen. The appearance of C&H correlates to significant decreases in water quality. Any comparison between upstream and downstream levels of nutrients and E. coli are invalid because dye tracing results
Nutrients from manure application fields are contributing to Big Creek upstream of BCRET’s upstream site #6.

Algae have appeared in large quantities on the Left Fork of Big Creek. Brahana’s dye tracing study also demonstrated a nutrient pathway from a hand dug well immediately down gradient of C&H to springs on the Left Fork of Big Creek. The algae and the dye tracing studies indicate C&H is discharging to the Left Fork of Big Creek and contributing to low water quality and algal blooms in violation of Regulation 2.509.

The Regulation 5 permit should be denied until a peer reviewed report complete with full data analysis and interpretation from the BCRET is made available.

The Arkansas Department of Health should take samples in investigate new and existing pathogens on Big Creek and the BNR to ensure the water is safe for local residents to drink and recreate and tourist to enjoy the great experience of traveling along the BNR.

A river wide dye tracing study should be initiated immediately to better understand the complex and extensive hydrological connectivity within the BNR. From these studies, source of contamination can be mapped back to their origin, and nutrient and contamination reduction measures can be taken.

Original Commenter: Teresa Turk

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2.203. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to dictate regulatory authority over private land within the watershed, other than what exists under local, state, or federal law.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

While the definition of ERW is inclusive, all tributaries are not listed as ERW’s in Appendix D of APC&EC Regulation 2. The Department relies upon the streams designated as ERW within Appendix D of Reg. 2 in making permitting decisions. Big Creek in the Buffalo National River watershed is not listed as an ERW in Appendix D of Reg. 2.
Data collected by the Department shows no statistical difference in dissolved oxygen, E. Coli, or nitrates on Big Creek before and after prior permit issuance. The EPA did not include Big Creek on the approved 2016 303(d) list.

BCRET data analyzed by Mott (2016) indicate that chloride concentration increased from 1.6 mg/L to 1.9 mg/L. The APC&EC Regulation 2 ecoregion value for chloride is 13 mg/L.

The Department considered all relevant scientific data submitted during this permitting process. The referenced dye tracing study has not been submitted to the Department for review, and thus the Department cannot comment on the validity of the referenced study and any correlation between the study and the results of C&H monitoring efforts.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

The Department has received multiple comments regarding algae concerns in the Buffalo National River Watershed. The Department and the NPS are in the process of designing an algal monitoring program for the Buffalo National River and its tributaries.

The Department did not review or approve the study design and has no authority over the day-to-day activities of BCRET. While the Department may consider the research conducted by the University of Arkansas, questions regarding the study should be more appropriately directed to the University of Arkansas.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to the degradation of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.
BCRET data document that nitrate-N is variable; however, Figure 12 of the April 1 to June 30, 2018 BCRET Quarterly Report demonstrates that nitrate-N is higher downstream (BC7) than upstream (BC6). Chlorides and nitrates follow similar seasonal fluctuations in that they are higher during summer and autumn months when stream discharge is most influenced by groundwater. ADEQ reviewed Jim Petersen’s May 31, 2018 expert report, which presents an analysis of temporal trends among nitrate-N and E. coli from January 2014–December 2017 at BC6 and BC7. Mr. Petersen’s analysis presents decreasing trends of ammonia and chlorides and increasing concentrations of E. coli at BC6. Yet, increasing concentrations of nitrate-N were observed downstream at BC7. The conflicting temporal analysis prompted Mr. Petersen to further review trends upstream to downstream. By analyzing paired concentration data (collected same day) at BC6 and BC7 from January 2014 through December 2017, Mr. Petersen reports significant increases in total nitrogen, ortho-phosphorus, and chlorides, but non-significant changes in E. coli and nitrate-N. The significant increase of nitrate-N in the house well and ephemeral stream does correspond to increases of total nitrogen at BC7. Mr. Petersen’s analysis illustrates the complexities of evaluating water chemistry in karst systems.

The Department reviewed data analysis by Watershed Conservation Resource Center (2017) of chlorides for the Buffalo River and its tributaries. This data reports mean base flow chloride concentrations for Big Creek at the confluence with the Buffalo National River (Monitoring station at Carver (BUFT06)) from 2003–2011 at 3.31 mg/L. Values reported by Mott (2016) are below the base flow average chloride concentration.

Pursuant to the Memorandum of Agreement between the Board of Trustees of the University of Arkansas System for and on behalf of the University of Arkansas System-Division of Agriculture and the Arkansas Department of Environmental Quality, the study performed by BCRET is being carried out for the use and benefit of ADEQ; however, the study shall be funded and conducted independently of ADEQ and shall meet the requirements of an independent study conducted by professionals in the field of water quality.

ADEQ is working to support a collaborative study with the Arkansas Game and Fish Commission, US Geological Survey, and the National Park Service focused on the distribution and causation of the rapid expansion of filamentous algae in the Buffalo River.

The Department is actively engaged in developing an antidegradation implementation procedure to address the revision of 40 CFR § 131.12. The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2 Chapter 2. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to
dictate regulatory authority over private land within the watershed of an ERW, other than what exists under local, state, or federal law.

**Comment 247:** Please provide a copy of your economic assessment plan that ensures property values of land adjacent or in the vicinity of the BNR do not decline. Please include in your plan a guarantee that jobs will not be lost nor businesses impacted from your past decisions and any future decisions that allow C&H to remain operational in the Buffalo River Watershed.

Original Commenter: Teresa Turk

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

Consideration of property values, tourism, and revenue is not within the Department’s regulatory authority.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 248:** Please provide a copy of your emergency action plan if a waterborne disease outbreak occurs in Big Creek or the BNR.

Original Commenter: Teresa Turk

**Response:** The Arkansas Department of Health investigates disease outbreaks.

**Comment 249:** NMP states “soil samples are to be taken once every five years or when the nutrient management plan is revised”. Since addition of fields resulted in the revision of the nutrient management plan, recent soil samples should be available for existing fields as well. Please update this in the Permit Conditions, otherwise this is not an enforceable condition.

Original Commenter: Jessie J. Green

**Response:** During the development of the NMP, the plan writer used the most recent soil analyses at the time. APC&EC Regulation 5 states that “the soils of each field where liquid animal waste has been land applied shall be sampled and analyzed at least once every five (5) years for the following parameters: pH, Potassium, Phosphorus and Nitrates.” The applicant updated the NMP to state,
“[s]oils samples are to be taken once every five years or when the nutrient management plan is revised, whichever occurs first.”

Response: The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 250: While spreadable acreage on Fields 15 and 17 seem to exclude the limestone outcroppings that were noted during a 2013 inspection, shouldn’t buffers be added to those areas? The NW corner of Field 15B should be excluded from spreadable acreage, as the September 2013 Inspection report noted that this area had visible limestone outcroppings.

Original Commenter: Jessie J. Green

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

According to the applicant’s NMP site maps, the appropriate buffers have been applied to the limestone outcrops that are located outside the designated land application area for these fields. The limestone outcrops indicated in this comment are not located within the field boundaries of field 15B.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 251: First of all, for sufficient reason listed above, pH from holding ponds should be regularly monitored and reported. Preferably at different depth intervals to make sure there is an accurate depiction of the pH.

Original Commenter: Jessie J. Green

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5.407(B) state that “[a] representative sample of
the waste/wastewater to be land applied shall be collected periodically, at a minimum of once each year, and analyzed for the following parameters: pH, Total Nitrogen, Potassium, Total Phosphorous, Soluble Phosphorous and percent solids.”

Comment 252: This permit should not be issued on the basis that the permitted activity does endanger human health and the environment.

Original Commenter: Jessie J. Green

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The purpose of APC&EC Regulation 5 is to “establish the minimum qualifications, standards and procedures for issuance of permits for confined animal operations using liquid animal waste management systems within the state.”

The Department emailed public notice of the draft permit to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, the Department of Arkansas Heritage, and the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health or Endangered and Threatened Species from the agencies with the jurisdiction over these matters.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

Comment 253: The director has the authority to deny a permit based on a history of noncompliance. See above arguments for basis of noncompliance.

“A person with a history of noncompliance with the environmental laws or regulations of this state or any other jurisdiction is affiliated with the applicant to the extent of being capable of significantly influencing the practices or operations of the applicant that could have an impact upon the environment.” The integrator, JBS, has been accused multiple times of violating rainforest deforestation laws.
Original Commenter: Jessie J. Green

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 254: Please provide an explanation for why ADEQ is not adhering to the definition of an ERW in this permitting decision.

Original Commenter: Jessie J. Green

Response: While the definition of ERW is inclusive, all tributaries are not listed as ERWs in Appendix D of APC&EC Regulation 2. The Department relies upon the streams designated as ERW within Appendix D of APC&EC Regulation 2 in making permitting decisions. Big Creek in the Buffalo National River watershed is not listed as an ERW in Appendix D of APC&EC Regulation 2.

Response: The Department amends its previous response. The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 255: In reference to placement of the holding ponds and land application fields within karst topography, Ark Code 8-4-217(a)(2) states “it shall be unlawful for any person to place or cause to be placed any sewage, industrial waste, or other wastes in a location where it is likely to cause pollution of any waters of this state”.

The director shall not issue a permit under this chapter if the discharge or any term of the permit would violate the provisions of any federal law or rule or regulation promulgated thereunder, including the duration of such permit.

Original Commenter: Jessie J. Green

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5.102 states, “[t]his regulation provides
management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 256: Regardless of whether or not ADEQ acknowledged that data supported Big Creek was impaired for E. coli and dissolved oxygen during the 2016 305(b) integrated reporting cycle, these data and information should still be factored into the permitted decision when it comes to a facility likely to contribute to these impairments. This should especially be the case when it comes to sensitive waterbodies. Since the Department did not provide a justification as to why the 2016 Assessment Methodology and prior impairment decisions were not used as the basis for concluding there was not an impairment on Big Creek, then there is no reason to believe that EPA will not choose to list Big Creek as impaired when they approve the 2016 303(d) list. Please provide an explanation as to why it should be believed EPA will conclude that Big Creek is impaired and an explanation of how a determination that Big Creek is impaired will impact this permitting decision.

Original Commenter: Jessie J. Green
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The Department considered all relevant scientific data submitted during this permitting process.

The development of the 303(d) listing is outside the scope of this permitting decision.

The EPA did not include Big Creek on the approved 2016 303(d) list.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 257: As is pointed out in the 2011 Comprehensive Regulatory Review of CAFOs under the CWA, we would be doing a great disservice to our first national river to do anything other than acknowledge the truth of the matter:

As is clear from its divisive history, the federal regulation of CAFO-produced pollutants under the Clean Water Act has been, and continues to be, complex. Yet, the basic principle behind their regulation remains the same: CAFOs are categorized as point sources under the Clean Water Act; as such, they must obtain a valid NPDES permit to discharge any pollutants into waters of the United States, except in accordance with the agricultural stormwater exemption. To interpret that principle any other way would not only contravene the plain language of the Act, but it would also jeopardize the Act’s goal of “restor[ing] and maintain[ing] the chemical, physical, and biological integrity of the Nation’s waters” by eliminating the discharge of pollutants from point sources into those waters.

As the design plans allow for, and as the scientific community acknowledges, large CAFOs discharge waste. Simply refusing to acknowledge something doesn’t mean it’s not actually occurring. And I don’t actually believe the Department has a defensible enough case to prove that reasonably expected discharge is not
occurring. Estimates of holding pond leakage and loss of nutrients during runoff events could be calculated and would more accurately reflect current conditions. Estimating runoff through surface water monitoring is extremely complicated in karst topography without a comprehensive understanding of where and how water is transported from land surface to surface and groundwater sources. Assumptions of lamellar flow off of fields and into surface waters do not hold up in karst terrain. This is a huge problem when relying on surface water monitoring alone to inform the likelihood of pollution transport.

Original Commenter: Jessie J. Green

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of
Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 258: Although ADEQ ignores the “and its watershed” portion of the Extraordinary Resource Water definition due to difficulty in making management decisions in that regard, permitting of this large hog factory still undoubtedly ensures the degradation of Big Creek and the Buffalo River. By permitting a facility that is absolutely not sustainable in this watershed, ADEQ is thereby limiting the amount of sustainable farms that could potentially operate in the watershed. The necessity to continue adding land application fields will only persist in order to accommodate the waste generated from this one facility that only employs less than 10 individuals. Future options will either lead to transporting the waste out of the watershed entirely, which will result in burdensome costs to the permittee and pose a serious risk to the environment should a likely accident happen, OR will result in the conversion of more forest land to pasture. Permitting a facility that encourages the additional conversion of land to pasture should at least benefit more individuals than a measly few. In the event that ADEQ had an Antidegradation Implementation Plan in place and required an Analysis of Alternatives, I think it would be obvious that there are better options for both the permittee, the Buffalo National River, and Arkansas’ tourism industry.

Original Commenter: Jessie J. Green

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2.203. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to dictate regulatory authority over private land within the watershed, other than what exists under local, state, or federal law.

While the definition of ERW is inclusive, all tributaries are not listed as ERWs in Appendix D of APC&EC Regulation 2. The Department relies upon the streams designated as ERW within Appendix D of APC&EC Regulation 2 in making permitting decisions. Big Creek in the Buffalo National River watershed is not listed as an ERW in Appendix D of the APC&EC Regulation 2.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
The Department is actively engaged in developing an antidegradation implementation procedure to address the revision of 40 CFR § 131.12. The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2 Chapter 2. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to dictate regulatory authority over private land within the watershed of an ERW, other than what exists under local, state, or federal law.

Comment 259: By permitting a facility that is estimated to generate 1,897,635 gallons of waste annually with only 13,004,000 gallons that can be received by the currently proposed land application sites, the life expectancy of this facility to remain “sustainable” would be less than 7 years.

However, simply finding additional pasture land to spread waste on within this geographic area simply won’t solve the issues of the Arkansas Phosphorous Index not being appropriate for the geologic area. By relying on a method that allows the application of nutrients in excess of agronomic needs, the excess nutrients will either build up in the soil or be transported to surface and groundwater through overland and subsurface flow. Obviously phosphorous buildup in the soil has its own set of issues, but when we are talking about protecting the Buffalo National River which will ultimately be the sink for excess nutrients that are not up taken by terrestrial crops, it really is necessary to evaluate the risk to sensitive receiving streams. And it has been well accepted that measuring surface water nutrient concentrations is not as environmentally protective as measuring nutrient loads when trying to manage an entire watershed or groundwater basin, hence the necessity for calculating loads when developing a Total Maximum Daily Load to manage point and nonpoint sources of pollution.

Original Commenter: Jessie J. Green

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The volume of waste that could be received by the land application sites listed in the NMP is expressed as annual maximum volume. The API is used to develop loading rates for land application based on phosphorus. There are many factors taken into account to determine whether land application on a specific field is allowable. A field with high soil test phosphorus may still be appropriate for land application. The Department only permits land application when the API value is a low or medium class.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 260: The whole premise of regulating large scale productions versus small scale productions, whether it be through construction stormwater permits administered based on size of area disturbed or through NPDES or no discharge permits for CAFOs based on the number of animals at a facility, this is to limit infringement on individual landowner rights while insuring large corporations and industries do not disproportionately impact shared resources. This concept is also the very basis for antidegradation implementation policies and the necessary consideration for weighing social and economic impacts against environmental impacts. While some might take the majority of the comments focusing on the importance of preserving the scenic beauty of the Buffalo National River as simply appeals to emotion, drawing such conclusions fails to connect the dots between the purpose of actively managing watersheds through regulatory avenues and tools water quality administrators have been given to protect our Outstanding Natural Resource waters. There is generally no textbook approach to managing natural environments. Adaptive management and best professional judgement are always going to be necessary when protecting our resources. The Arkansas Department of Environmental Quality, as well as every other management agency, realizes this. That is why it is built in to virtually every single piece of law, regulation, and policy administered by the Department there is always some clause that allows discretion by the Director. Now is the time to use that discretion. Sustainability has majorly differing definitions depending on the context. Think of dams. We all recognize that dams may be a sustainable source of energy, but dams prevent a sustainable fishery. I have no doubt that the state of the art facility currently in operation at C&H Hog Farms is sustainable in the context of recycling water, feed, and air, or whatever it may be – but it is not environmentally sustainable if your goal is to protect the Buffalo River. You have to weigh the risks in every decision. We cannot protect the recreational sustainability of our first national river, which was designated for it’s recreation potential and scenic beauty, by permitting facilities that don’t even provide enough social or economic benefit to outweigh the negative environmental effects. Not only due to the tourist dollars that are brought into the state by the beauty of the Buffalo River, but also the number of jobs that rely on the Buffalo River remaining a favored destination, it’s imperative that we understand what we are managing this watershed for. We designate beneficial uses to our waterbodies in order to define our management goals and actions to achieve those goals. While I have no doubt denying this
permit for a facility that is already in operation, but never should have been permitted in the first place, will not be without it’s pushback; it must be acknowledged that we have already set our management goals for the Buffalo River watershed. We are to protect it for its “scenic beauty, aesthetics, scientific values, broad scope recreation potential and intangible social values”. Please, use your regulatory discretion to uphold the values that have been set by the Buffalo River region, and state as a whole, and deny this permit.

Original Commenter: Jessie J. Green

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department is actively engaged in developing an antidegradation implementation procedure to address the revision of 40 CFR § 131.12. The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2 Chapter 2. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to dictate regulatory authority over private land within the watershed of an ERW, other than what exists under local, state, or federal law.

Comment 261: Major Objection—The Groundwater Component of the Water Budget Is Large in Karst Areas, and Groundwater Was Ignored in Assessing Contamination from C&H.
The following documents showed none to very little discussion of groundwater flow or contaminant transport, although these are dominant in karst. Erroneous, incomplete, documents include: the Notice of Intent (Pesta, 2012); the Final Environmental Assessment (U.S. Department of Agriculture Farm Service Agency and U.S. Small Business Agency, 2015); Big Creek and the associated waste-spreading fields of C&H Farms are on the Boone Formation, which includes pure limestone and interbedded thin limestone and chert layers. The limestone has been intensively karstified (Braden and Ausbrooks, 2003; Hudson, 1998; Mott et al., 2000; Murdoch et al., 2016; Brahana et al., 2017). Being karstified means that much of the hydrologic budget of rainfall and wastes placed on the land surface moves underground as groundwater, and this part of the flow path is not easily seen. Multiple springs, wells, and contiguous surface-drainage basins are sampled using non-toxic dyes that are added to flowing groundwater.
Dye receptors are placed in wells along the potential flow path, and at the discharge points in rivers and streams to assess if dye input flowed past each point. Dye tracing is essential in showing the pathways of water movement in karst (Quinlan; Aley; Ewers), and in the Big Creek basin where C&H operates, multiple dye traces have been undertaken by the Karst Hydrogeology of the Buffalo National River (KHBNR) team of citizen scientists using scientifically accepted and approved methodologies. The results of these tests are currently being published in peer-reviewed scientific paper (U.S. Geological Survey Scientific Investigations Report) indicating that the groundwater flow moves underground to Big Creek, and underneath topographic divides into contiguous surface water drainage basins. It returns to the surface from springs, ultimately discharging into the Buffalo National River (Brahana et al., 2017a). In addition to flow path identification, dye tracing indicates that most groundwater flow rates are very rapid, about 2000 to more than 3000 feet per day. When the water has both surface and groundwater flow components, it can travel faster than 5 miles in a single day.

Original Commenter: John Van Brahana

Similar comments were received from: Grant Scarsdale

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

An Environmental Assessment is not required for the permitting process and was not provided as part of the permitting process. The Environmental Assessment was prepared by the United States Department of Agriculture Farm Service Agency and the United States Small Business Administration as part of their process in issuing loan guarantees.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other
subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 262: **Major Objection**—Intensive groundwater sampling from springs, wells and streams in the area is showing that water quality is degrading, with greatest impact occurring closest to the CAFO and springs draining its permitted spreading fields.

In addition to the dye tracing, KHBNR team members collected water-quality data, which indicate groundwater quality is degrading. The KHBNR team, which has been collecting groundwater quality data since 2013, found that the groundwater quality near the C&H Hog Farms and its spreading fields shows high concentrations of the trace metals zinc-66, copper-63, and copper-65, additives to pig food, and the isotope phosphorus-31 (Brahana et al., 2017), common in pig excreta. Additional water quality data are enlightening, with Escheria coli (E. coli) concentrations in receiving streams (Big Creek and Left Fork of Big Creek), having values of these indicator bacteria that range well above 20,000 colonies per 100 milliliters, expressed as most probable number per 100 milliliters (MPN/100 ml). Dissolved oxygen (DO) concentrations during the summer of 2015 were less than the lower limits of impaired streams (summertime values of 5.0 mg/L). E. coli is indicative of water contamination by warm-blooded animals, and DO concentrations are indicators of the overall ecological health of waters. Excessive algal blooms can be yet another indicator of impaired water quality. From the U.S. and around the world, CAFOs have a horrible record of contaminating environments unless they are properly sited and professional studies show that the feces and urine of the animal waste are properly contained.
Original Commenter: John Van Brahana  
Similar comments were received from: Grant Scarsdale

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The Department considered all relevant scientific data submitted during this permitting process.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 263: **Major Objection—The Final Environmental Assessment provided by the U.S. Department of Agriculture Farm Service Agency and the U.S. Small Business Agency is flawed and inaccurate.**

The Final EA continues to assert that the cherty section of the Boone Formation in the vicinity of the C&H hog factory is not karst. This claim of no Boone karst is based on “lack of identifiable surface features on topographic maps and areal photos” in the immediate area of the farm. This is a flawed interpretation based on an erroneous definition that karst is “karst topography”, or that karst topography is always an essential component of karst. Karst is a hydrogeologic term, wherein groundwater plays a greater role in the hydrologic budget. The CAFO study site is formally called mantled karst, which means that many of the internally drained depressions (sinkholes) the EA sought on maps were covered with a thin, nearly-flat layer of insoluble soil and regolith, and therefore not visible using the
methods employed by the Final EA. Furthermore, in the area of outcrop of the Boone Formation in northern Arkansas, karst topography is not visible at areal-photographic or map scales (1:24,000), because many of the karst features are too small to be seen on maps of this scale (figure 1), or below land surface (figures 2 and 3). However, Arkansas Geological Survey geologic mapping of the 7.5-minute Mount Judea quadrangle (Braden and Ausbrooks, 2003), was described and based on intensive field work. Description of the Boone Formation includes this statement: “Boone Formation (Lower Mississippian, Osagean and Kinderhookian) – Coarse-grained fossiliferous and fine-grained limestones interbedded with anstamosing and bedded chert. Light to medium-gray on fresh surface but usually weathers dark-gray. The chert varies in color from light-gray to dark-gray. Springs and sinkholes are abundant…” If sinkholes are present, so is karst.

A further claim that the Mt. Judea topographic map (U.S. Geological Survey, 1980) was used for identification of karst features visible on the land surface appears to be scientifically inconsistent, inasmuch as names of streams that drain the region within 1 mile of the CAFO have names shown clearly on the map as Dry Creek, Cave Spring Branch, and Dry Branch, strongly suggesting that the area is likely underlain by karst. This was not evaluated nor pursued in any of the documentation offered, including the Notice of Intent (NOI), the draft EA, or the Final EA.

Another field-observable feature, erroneously interpreted from the 7.5-minute topographic map (U.S. Geological Survey, 1980), interprets Big Creek near C&H Hog Farms and its spreading fields as a continuously flowing stream and Dry Creek as an intermittent creek. In fact, under varying recharge and seasonal conditions, both show dry-stream reaches, zones of continuous streamflow upstream of dry reaches where streamflow has ceased (Brahana and Hollyday, 1988). Dry-stream reaches reflect underlying karst, where all streamflow is captured in an interval that flows completely underground. The continued denial of the existence of karst in the Final EA not only fails to describe actual environmental conditions in Big Creek basin in the vicinity of the CAFO, it represents a serious flaw in the argument of a FONSI. The definition of karst in the Final EA ignores consideration of the key fact that the area is underdrained by interconnected zones of high permeability created by dissolution of the soluble bedrock. This is an essential component of the definition of karst, not the limited aspects of “karst topography” to which the Final EA erroneously and steadfastly adheres. Because the waste, the contamination, and the water have moved underground and bypassed many of the surface measuring sites that the Final EA used to establish a FONSI, this negates claims that there is no impact from C&H.

The Big Creek Extension and Research Team (BCRET) funded with tax dollars by Governor Beebe at the request of the Farm Bureau in 2013 acknowledges karst in some of their ancillary documents, but their focus is not karst. The Final EA
simply failed to sample the natural groundwater outlets (springs) downstream from the karst resurgences, water and waste derived initially from the hog-waste spreading fields.

Scientific data collection by the Karst Hydrogeology of the Buffalo National River (KHBNR) team included field-based sampling starting in July 2013, when fewer than 500 hogs were housed at C&H Hog Farm. The KHBNR team rigorously followed U.S. Geological Survey (USGS) and U.S. Environmental Protection Agency (EPA) protocols and procedures, conducting karst inventorying, dye-tracing studies, major constituent water-quality sampling, continuous groundwater level monitoring, trace-metal sampling, microbial sampling, and dissolved oxygen analyses with continuous-sampling probes. The Final EA claims to adhere to the “best science”, implying unbiased, fair assessment of all scientific facts that are readily available, but made no effort to pursue any data from KHBNR. KHBNR includes retired professors (Ph.D.s), professional geologists (P.G.s), previous employees of state and federal agencies (Arkansas Department of Environmental Quality [ADEQ], USGS, and National Park Service [NPS]), consultants, and graduate students. Discipline backgrounds are diverse, all are well-informed, honest, concerned citizens who pay the taxes that ultimately have provided funding for the EA, as well as for the BCRET study. The claim of “best science” is hollow unless the Final EA provides a full discussion of KHBNR data and interpretations, including the web address https://buffaloriveralliance.org under numerous headings of data, research and Dr. Van Brahana in red. This was done for BCRET webpage (page 3.8 of Section 3.2.1, Surface Water section of the Final Environmental Assessment), but not for KHBNR, the website where these important data and studies reside. The present Final EA reinforces the appearance of bias.

Field observation conclusively provides visual documentation that karst is indeed present in the immediate area of the CAFO and its spreading fields. The Final EA requires a thorough and adequate reevaluation of the karst groundwater prior to the finding of a FONSI. No groundwater nor karst studies were used nor studied, further discrediting the Final EA.

Another major flaw of the Final EA is the lack of discussion of the relation of surface and groundwater, clearly pointed out by Tom Aley (2015) and myself (Brahana, 2015) in the draft EA. Karst scientists understand that the degree of groundwater/surface water interaction in Big Creek basin is another major characteristic of karst. Stated simply, water and waste in karst lands are not confined only to surface streams, but flow underground along unseen pathways until resurgence as springs or baseflow to surface streams occur (Winter et al., 1998). Figure 7 shows the relation of precipitation measured at 10-minute intervals over the course of more than a year, as well as the timing of water level response in several key wells in the area, and the stream level in Big Creek. Cause
and effect are nearly coincident. The nearly identical timing of response of wells and the stream (near-identical lag times) clearly establishes the fact the water in the Boone Formation has moved from surface to groundwater amazingly rapidly, an essential characteristic of karst.

One reason for establishing the existence of close groundwater/surface water interaction concerns the economics of widely spreading dye on the waste-spreading fields. Dye injection into a point source ("dug" wells), rather than areally broadcasting a large amount of dye on the waste-spreading fields (for which we have not been given permission by the CAFO and spreading field owners) requires much less dye be utilized in the test. Because: 1) the KHBNR is operating on a meager budget that is based on donations of cash and pro bono contributions of field sampling and lab analyses; because the cost of the dye represents a large part of the KHBNR budget; because some of our fluorescent dyes photodegrade on land surface in sunlight; and because these "dug" wells offer direct access to flowing groundwater in the Boone aquifer, we can optimize our scientific study while minimizing our expenditures.

The third major flaw in the Final EA is the continued ignoring of dye-tracing studies that have been conducted and described in peer-reviewed literature (Brahana et al., 2014; Kosic et al., 2015), and the noted existence of these studies in my previous review of the preliminary EA (Brahana, 2015). One such study is shown here, with the injection occurring in a dug well surrounded by waste-spreading fields, and wide and rapid dispersal of the dye not only in Big Creek, but in contiguous drainage basins, and downgradient as far as the Buffalo National River (figure 8). It should be noted that within 24 hours of dye injection, a major storm of about 6 inches of rain fell, and this recharge facilitated the rapid groundwater level rise and mobilization of the dye.

Completely discounting the key details of the dye-tracing studies, including very rapid groundwater flow velocities and unexpected groundwater flow dispersal that the KHBNR team has established, ignores well-documented and important data that have a direct bearing on a FONSI. Dye tracing is an essential tool for studying karst hydrogeology, and the KHBNR dye studies utilize extensive experience involving project planning and objectives, challenging field conditions, thorough karst inventorying, and rigorous QA/QC (Aley, 2002). KHBNR studies were conducted to the highest of scientific standards (Brahana et al., 2014; Kosic et al., 2015). The importance of dye tracing in karst is that it documents where the water and waste flows in the subsurface (in this case, from a well immediately across the road from the pig factory, and another well surrounded by waste spreading fields near Dry Creek), how fast it flows (from about 1700 to 2500 feet per day), and the location where it reemerges at springs (in the middle of Big Creek, along upstream and downstream tributaries to spreading fields, and springs in Left Fork of Big Creek), and at 7 locations along
the Buffalo National River (figure 8). None of this was mentioned in the Final EA. Especially noteworthy, dye recovery at John Eddings Cave from dye injection at BS-36 during conditions of high groundwater flow clearly indicates an hydraulic connection between CAFO waste-spreading fields and this cave. John Eddings Cave is a recognized hibernaculum for the endangered gray bat, *Myotis grisescens*. By failing to reference this most relevant information, it is my opinion that the Final EA has failed to pursue the potential for negative environmental impact to this.

Dye-tracing results in Big Creek are mirrored by many other researchers throughout the Buffalo National River, especially with reference to the hydrogeology of the Boone Formation and its karst nature (Aley and Aley, 1989; Mott, 2003; Soto, 2014; Aley, 2015; Kosic et al., 2015; Brahana et al., 2017a).

Water-quality trends of dissolved oxygen (DO) as measured continuously in Big Creek during the past few summers indicate disturbing long-term decreases below calculated EPA standards, prompting a request by the National Park Service (NPS) that Big Creek be assigned “impaired” status last summer (Usrey, 2013; Usrey, 2015). DO measurements were ignored in the Final EA, and the “impaired” status request was rejected by the Arkansas Department of Environmental Quality (ADEQ) because the NPS data-collection scheme did not originate from an approved lab. This is the first time that ADEQ rejected NPS water-quality data, an unexpected decision, especially considering the time and careful development and rigorous sampling protocols implemented, clearly written, and carefully followed by NPS and USGS scientists (Green and Usrey, 2014).

The duration and extent of the low nighttime DO concentrations the last few summers (Usrey, 2013; Usrey, 2015) reinforces the observation that the added burden of waste from 6500 pigs, creating more than 2 million gallons of feces and urine per year is producing an impact in Big Creek, and downstream in the Buffalo. Informal observation by local landowners along the creek that the algae and biomass was particularly luxuriant last summer, following about 6 months of waste spreading on nearby CAFO fields. These values alone are not necessarily proof that the hog factory is the cause of the degraded water quality, but they are remarkably consistent that this CAFO has added to the total agricultural loading from this valley, and that data exist to suggest that it is stressed.

As a comparison of water quality in Big Creek with a nearby surface stream, the Little Buffalo River, the DO concentration in the Little Buffalo 7 miles upstream from the confluence of Big Creek and the Buffalo River dropped below 6 parts per million only 1 time (less than 3 hours total for the period of measured) during the sampling interval of summer 2013. The drainage area of the Little Buffalo River has similar land use and karst geology as Big Creek; what is not similar is
that the Little Buffalo River does not have a huge hog factory upstream. Waiting until these water-quality degradations to build up to greater than EPA levels before seeking remediation for Big Creek and the Buffalo National River, Arkansas’ Extraordinary Water Resource, seems short-sighted and potentially risky.

Original Commenter: John Van Brahana

Similar comments were received from: Grant Scarsdale

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The Department considered all relevant scientific data submitted during this permitting process.

An Environmental Assessment is not required for the permitting process and was not provided as part of the permitting process. The Environmental Assessment was prepared by the United States Department of Agriculture Farm Service Agency and the United States Small Business Administration as part of their process in issuing loan guarantees.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management
plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

While no losing/gaining study has been performed to date on Big Creek between BC6 and the confluence with the Buffalo National River, BCRET notes seasonal dryness and rewatering between these two sites. Thomas Aley notes in his expert report of May 24, 2018, that “Big Creek also goes dry during much of the year where it passes over the Boone Formation near C&H Hog Farms.” Dye studies performed by Brahana et al. (2016) and hydrologic studies by Murdoch et al. (2016) in the Big Creek watershed indicate the connectivity of karst hydrology of the Boone Formation. Thomas Aley’s May 24, 2018 expert report thoroughly explains karst geology and provides supporting evidence of the deficiencies of C&H Hog Farms, Inc.’s Regulation 5 application to address land application in karst topography.

The Beautiful Buffalo River Action Committee (BBRAC) has been established for the purpose of addressing potential water-quality concerns throughout the Buffalo River Watershed and to protect the vitality of the Buffalo National River as a national, state, and local landmark. Governor Asa Hutchinson directed five agencies to develop an Arkansas-led approach to identify and address potential issues of common concern in the watershed. A key priority of BBRAC was to initiate the development of a Buffalo River Watershed Management Plan. The nine-element watershed management plan was developed for the Buffalo River Watershed, and the final plan was submitted and accepted by EPA in June 2018.

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Watershed management plans are recognized by EPA as comparable, state-led management approaches expected to result in the attainment of water-quality standards.

Pursuant to the Memorandum of Agreement between the Board of Trustees of the University of Arkansas System for and on behalf of the University of Arkansas System-Division of Agriculture and the Arkansas Department of Environmental Quality, the study performed by BCRET is being carried out for the use and benefit of ADEQ; however, the study shall be funded and conducted independently of ADEQ and shall meet the requirements of an independent study conducted by professionals in the field of water quality.

ADEQ is working to support a collaborative study with the Arkansas Game and Fish Commission, US Geological Survey, and the National Park Service focused on the distribution and causation of the rapid expansion of filamentous algae in the Buffalo River.

Comment 264:  
Major Objection—The original notice of intent (NOI) had fraudulent signatures, inaccurate map locations, errors of scientific fact, omissions of required legal and numerous flaws clearly reported by an independent Civil Engineering M.S. graduate (Hovis, 2014).

This report is an eye-opening account of shortcomings in the NOI by an individual who had no bias. If you would like a copy of this paper, it is available on the Buffalo River Watershed Alliance webpage, or you can request a copy from me. I encourage all politicians, all ADEQ personnel, and all interested stakeholders to read this. She documents misrepresentations of who owned land that was reported to be available for spreading feces and urine, it includes factual misrepresentations in the NOI coupled with secretive awarding of the General Permit without the knowledge of the Director of ADEQ, and allowing only two ADEQ employees from Little Rock to perform inspections at C&H. This demand was initiated after a surprise inspection by the ADEQ employees from the Jasper, Arkansas, office, who were later forbidden to continue with any addition inspections.

Original Commenter: John Van Brahana

Similar comments were received from: Grant Scarsdale

Response:  The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for
public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

Comment 265: *Major Objection—Design of the BCRET sampling plan did not include intensive groundwater data sites, which are essential to describe the hydrology of Big Creek and contiguous basins*

Discontinuous flow along sections of Big Creek during low flow make flow and water-quality comparisons highly questionable, owing to the fact that major aspects of the hydrology are neither monitored nor quantified. This is a common feature of surface water in karst lands. The title of the BCRET sampling, paid for by “Rainy Day Funds” by the Governor, is stated in the title of BCRET reports; it is “DEMONSTRATING AND MONITORING THE SUSTAINABLE MANAGEMENT OF NUTRIENTS ON C&H FARM IN BIG CREEK WATERSHED”. Governor Beebe indicated that he was funding the project to assess if the CAFO were impacting Big Creek and the Buffalo National River, not to help the CAFO find the least-harmful impact on the environment. This overall emphasis of “Demonstrating”…overall “Sustainability” implies a strong bias we has been consistent since the CAFO was permitted.

Historical documents, long-term studies by the U.S. Geological Survey throughout the conterminous U.S., and from numerous locations throughout the world indicate that huge concentrations of animal feces and urine will follow the laws of physics and chemistry, and contaminate downstream waters. In karst regions, this is exacerbated by the high permeability of the conduits to allow rapid flow, with little attenuation of the contaminants. Big Creek and contiguous drainage ways that flow into the Buffalo National River in Newton County, Arkansas, show degraded effects of animal production. Recent study of groundwater by the KHBNR team shows strong evidence that springs and wells closest to the waste sources are seeing the most impact. Delaying action, whether by inactivity or by requesting “needed additional years of data collection” ignores the wisdom we have gained from so many other sites.

Original Commenter: John Van Brahana

Similar comments were received from: Grant Scarsdale

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.
The Department did not review or approve the study design and has no authority over the day-to-day activities of BCRET. While the Department may consider the research conducted by the University of Arkansas, questions regarding the study should be more appropriately directed to the University of Arkansas.

**Response:** The Department amends its previous response. Pursuant to the Memorandum of Agreement between the Board of Trustees of the University of Arkansas System for and on behalf of the University of Arkansas System-Division of Agriculture and the Arkansas Department of Environmental Quality, the study performed by BCRET is being carried out for the use and benefit of ADEQ; however, the study shall be funded and conducted independently of ADEQ and shall meet the requirements of an independent study conducted by professionals in the field of water quality.

**Comment 266:** This permit should be denied because the buffer zones are incorrectly designated. Buffers of spreading fields to Big Creek do not accommodate Extraordinary Resource Waters.

On page 5 of the application *Nutrient Management plan*, the engineer recognizes the needs for buffers on intermittent streams of 100 ft as well as the buffer for extraordinary resource waters of 300 ft as stated in Regulation 5.406(D). The mappings of the various proposed application fields recognize all buffers near water bodies to be 100 feet via blue crosshatching making the assumption that ERW buffers of 300 ft are not applicable.

BRWA contends that for the proposed spreading pastures the buffer should be 300 ft recognizing the integral role of Big Creek as a source for an extraordinary resource water (ERW). The rationale being that Big Creek is a water body that is hydrologically contiguous and is essentially as of one with the Buffalo National River which is a designated ERW. Regulation 2.302 on designated ERW uses says the following:

“**Extraordinary Resource Waters - This beneficial use is a combination of the chemical, physical and biological characteristics of a waterbody and its watershed which is characterized by scenic beauty, aesthetics, scientific values, broad scope recreation potential and intangible social values.**”

The uses as described above are directly impacted by the inflow and intermingling of homogeneous waters and therefore in the interest of maintaining said uses, they cannot reasonably be treated separately. One cannot declare that the water in the glass is superior to that of the pitcher. In addition, the phrase “*waterbody and its watershed*” as used above, implicitly includes Big Creek as a part of the Buffalo’s ERW designation. As a result, all precautions required for an ERW must therefore apply to inflowing homogeneous waters contained within the ERW’s watershed. An argument can be made that separate portions of a waterbody may be
designated differently, and indeed this argument works for downgrading the status of a downstream segment. That argument is not applicable to Big Creek as its waters must be maintained to the standard of the ERW into which it flows and intermingles. These additional suggested precautionary buffers are directly proportional to the unique circumstances of this permit in regard to mitigating risk. The following fields should be buffered at 300 ft from the bank of Big creek. The maps should be corrected and the spreadable acreage recalculated.

- Field 5 9.7ac  - Field 9 25.2ac
- Field 7 64.3ac  - Field 8A 1.4ac
- Field 7A 28.3ac  - Field 10 14.1ac
- Field 23 28.1ac  - Field 10A 16.4ac
- Field 24 8ac  - Field 12 11.4ac
- Field 32 10ac  - Field 16 15.2ac

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. While the definition of ERW is inclusive, all tributaries are not listed as ERWs in Appendix D of APC&EC Regulation 2. The Department relies upon the streams designated as ERW within Appendix D of APC&EC Regulation 2 in making permitting decisions. Big Creek in the Buffalo National River watershed is not listed as an ERW in Appendix D of the APC&EC Regulation 2. Therefore, the setback of 300 feet from an ERW does not apply.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department reviews all buffers to ensure that the applied buffers are in accordance with the buffer distances proscribed in APC&EC Regulation 5.406(D).

Comment 267: This permit should be denied because the application methods proposed for flood prone soils do not conform to AWMFH and are not proportional to risk.

The permit application proposes a large number of application fields in the Big Creek floodplain. The permit includes a “soils map overview” in which each of the fields is labeled with a number indicating a general soil type. The proposed fields in the floodplain adjacent to Big Creek are listed as the following soil types:

- 48 - Razort Loam, occasionally flooded
See Appendix B2 for mapping of soil types and photos of flooded spreading fields. A Water Resources Management Plan published by David Mott and Jessica Laurans of the National Park Service (2004), describes the effect of high precipitation events in the watershed:

“Water levels in the Buffalo and its tributaries are considered ‘flashy’ , with rapid rises and falls in the hydrograph on daily and monthly scales, as indicated in Figure 12. ...during heavy rains, the steeper slopes and shale bedrock result in faster-rising floods on the Buffalo River than in other Ozark streams.”

Reg 5.406 notes that:

“Land application of waste/wastewater shall not be undertaken when soil is saturated, frozen, covered with ice or snow, or when significant precipitation is reasonably anticipated in the next twenty-four hours.”

The Agricultural Waste Management Field Handbook (AWMFH) on 651.0504(f) Soil Characteristics page 5-9 notes the following:

“Flooding events transport surface-applied agricultural wastes off the application site or field and deposit these materials in streams, rivers, lakes, and other surface water bodies”.

Part (f) goes on to define “occasionally flooded” (mentioned as the soil type above) as “5 to 50 times in 100 years”. This is likely low as Big Creek as a wild tributary inundates fields nearly every spring (see photos Appendix B2). “Occasionally flooded” is noted as a “moderate limitation”. The AWMFH then goes on to describe appropriate application methodology for these soil types:

“Agricultural wastes should be applied during periods of the year when the probability of flooding is low. Liquid agricultural waste should be injected, and solid agricultural waste should be incorporated immediately after application. Incorporating agricultural wastes and applying wastes when the probability of flooding is low reduce the hazard to surface water.”

The proposed permit Nutrient Management Plan on page 5 under Operation and Maintenance notes the planned application methodology:
“C & H Hog Farms, Inc. is requesting that manure and wastewater from either storage pond (Pond 1 or Pond 2) be transported via liquid tanker trucks or an irrigation system and applied to all fields included in this plan.”

Surface application via liquid tanker trucks or an irrigation system does not meet the application methodology requirement for soil types 48 and 50. Soil types 48 and 50 fall under the moderate limitation definition where liquids are to be injected and solids incorporated. “Incorporation” in regard to fertilizers means that material broadcast on the surface must then be incorporated via tillage or some other method to place the nutrients below the soil surface. However, injection or incorporation is problematic on these fields due to their shallow, rocky nature (see comment B4). As a result, it is not possible to reasonably comply with AWMFH guidance and these fields should be excluded from the nutrient management plan.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5.406(B) states that “land application of waste/wastewater shall not be undertaken when soil is saturated, frozen, covered with ice or snow, or when significant precipitation is reasonably anticipated in the next 24-hours.” The AWMFH does not prohibit land application in areas where flooding frequency is occasional or frequent.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 268: This permit should be denied because the application methods proposed for slopes from 8 to 15% do not conform to AWMFH and are not proportional to risk.

The permit application on page 4 of the Engineering Plans and Review notes in regard to proposed application fields, the following regarding grades and slopes:
“Field Application Areas: Areas viewed were pasture and hay land that were either not subject to flooding or only subject to occasional flooding. Slopes, after buffering, are within specified limits of 15% or less.”

This 15% buffer corresponds with what is stated in Regulation 5.406:

“Waste/wastewater shall not be applied on slopes with a grade of more than fifteen percent (15%) or in any manner that will allow waste to enter waters of the State or to run onto adjacent property without the written consent of the affected adjacent property owner.”

The AWMFH 651.0504(m) slope page 5-12 concurs with Reg 5.406, but discusses additional limitations when spreading on slopes from 8 to 15%:

“Slope is the inclination of the soil surface from the horizontal expressed as a percentage. The slope influences runoff velocity, erosion, and the ease with which machinery can be used. Steep slopes limit application methods and rates and machinery choices. Runoff velocity, soil carrying capacity of runoff, and potential water erosion increase as slopes become steeper.”

“Limitations for the application of agricultural wastes are slight if the slope is less than 8 percent, moderate if it is 8 to 15 percent, and severe if it is more than 15 percent. Agricultural wastes applied to soils that have moderate limitations should be incorporated. This minimizes erosion and transport of waste materials by runoff, thus reducing the potential for surface water contamination.”

The permit application illustrates all sloped areas in the proposed spreading field maps that exceed 15% by red crosshatching. Slopes from 8% to 15% are not mapped as they are considered by the engineering plan (page 6) to be available for spreading. Reg 5 does not prohibit waste from being applied to slopes of 8 to 15% but it does direct the operator to follow the AWMFH guidelines which call for injection and incorporation for these soils to reduce runoff. The proposed permit Nutrient Management Plan on page 5 under Operation and Maintenance notes the planned application methodology:

“C & H Hog Farms, Inc. is requesting that manure and wastewater from either storage pond (Pond 1 or Pond 2) be transported via liquid tanker trucks or an irrigation system and applied to all fields included in this plan.”

Surface application via liquid tanker trucks or an irrigation system does not meet the application methodology requirement for slopes that meet the moderate limitation of 8 to 15%.
AWMFH 651.0504(m) slope page 5-12 indicates that soils of moderate limitation require incorporation as part of the application methodology. “Incorporation” meaning that material broadcast on the surface must be incorporated via tillage or some other method to place the nutrients below the ground surface. The fields in question will tend to be upland with a lot of stone and chert that would make incorporation difficult and likely worsen erosion. As the AWMFH recommended application method is not a practical alternative to reduce runoff on fields from 8 to 15%, these slopes should be excluded from the nutrient management plan. Fields affected include but are not limited to the following where 15% grades are confirmed in the application mappings:

- Field 1
- Field 2
- Field 4
- Field 6
- Field 6A
- Field 11
- Field 13
- Field 13A
- Field 13B
- Field 14
- Field 15
- Field 15A
- Field 15B
- Field 21A
- Field 21B
- Field 22
- Field 34
- Field 35
- Field 36
- Field 20

The maps of the application fields should be modified to include all slopes from 8 to 15%.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The AWMFH Amendment 61, dated August 2012, does not require incorporation of animal waste on moderate limitation slopes (8–15%). APC&EC Regulation 5.406(C) allows waste or wastewater to be land applied on slopes of up to fifteen percent (15%) and prohibits land application in any manner that will allow waste to enter waters of the State or to run onto adjacent property without the written consent of the affected adjacent property owner.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 269: This permit should be denied because it allows application of waste in excess of agronomic need

Section 651.0201(d) of the AWMFH states:
“If wastes are applied to agricultural fields, the application must be planned so that the available nutrients do not exceed the plant’s need or contain other constituents in amounts that would be toxic to plant growth.”

Arkansas Regulation 5.405(a) states:

“The waste management plan shall be developed in accordance with Reg. 5.402 and shall address the timing of land application of wastes with respect to the nutrient uptake cycle of the vegetation found on the land application site(s)…”

Reg 5.402 referenced above is the requirement for compliance with the AWMFH. The regulation identifies the source of guidance in regard to agronomic “uptake cycle” and that guidance is clear about nutrient exceedance.

Current fields used under the existing permit ARG590001 have “above optimum” levels of phosphorus, based on the most recent soil tests performed in December 2015, and no additional applications of phosphorus are recommended. In addition, the fields proposed to be added under 5264-W have not been soil tested since April, 2014 and at that date many were also “above optimum” for P (phosphorus), with no further applications of P recommended. It is safe to assume that these new fields have likely received fertilizer applications since April, 2014 and at the least, new soil tests should be required for those added fields. Any applications of P will be in excess of the vegetation’s nutrient uptake ability and will exceed agronomic need which will increase the risk of runoff and/or percolation into groundwater. Winter applications of waste, a modification approved by ADEQ, is clearly in excess of agronomic need as little if any plant uptake occurs during winter dormancy periods.

M.D. Smolen, PH.D. who has 35 years of experience in water quality management as affected by agricultural waste management states it this way in a report (Smolen, 2017). For the following, refer to Appendix B8, column: “P-Nutrient Status”:

Nutrient Management and Waste Disposal

“The C &H Hog Farms nutrient management plan (NMP) is based on Nitrogen, resulting in excess Phosphorus application. This amounts to disposal of Phosphorus as most of the fields already have medium to very high soil test P levels. Table 1 shows the P-status of each field in the Permit Application with its most recent Soil Test Phosphorous (STP) and the Phosphorus (P2O5) fertilizer recommendation from the Arkansas Cooperative Extension Service. According to these recommendations these fields need very little or no P2O5. Note virtually all the fields included in the NMP, particularly those that were used previously have “Above Optimum” P-status.”
“In my opinion, application of wastes to fields with P-Status higher than “Above Optimal” should be considered waste disposal, making them subject to storm water rules. Considering the number of fields at Optimal or Above Optimal STP, using a P-basis for nutrient management would severely reduce the amount of land available for waste application without additional BMPs”.

The Arkansas Phosphorus Index (API) is intended to assess risk posed to waters of the state by excessive phosphorus applications, yet it inadequately accounts for soil tests for phosphorus and allows for applications in excess of agronomic need. The API is a waste disposal tool and its use is not appropriate when considering the risk factors as outlined in Part A.

Original Commenter:  Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The AWMFH Part 651.0106(i), as referenced in APC&EC Regulation 5.402, incorporates the NRCS Conservation Practice Standard NMP Code 590 for nutrient management, which is more specific to the State of Arkansas. The NRCS Conservation Practice Standard Nutrient Management Code 590 allows for land application based on the API, which does not limit land application of phosphorus to agronomic need.

The API is used to develop loading rates for land application based on phosphorus. There are many factors taken into account to determine whether land application on a specific field is allowable. While the soil test phosphorus, referred to as “above optimum” by the commenter, is one of those factors, it is not the determining factor. A field with high soil test phosphorus may still be appropriate for land application. The Department only permits land application when the API value is a low or medium class.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA10293, “Arkansas scientists

agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA9516 states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

The NMP submitted by C&H Hog Farms, Inc. does not fully address how manure can be applied to the land to furnish nutrients for crops without degrading the environment as stated in AWMFH 651.1102.

**Comment 270:** This permit should be denied because the nutrient management plan (NMP) proposed application rates are overly optimistic in regard to current forage management

M.D. Smolen, PH.D. who has 35 years of experience in water quality management as affected by agricultural waste management and other aspects of watershed management discusses some assumptions in the nutrient management plan (Smolen, 2017).

“In writing the NMP, the planner used the API to set waste application rates that keep the PI in the Low to Medium range for each field. They analyzed only summer and spring seasons, although some winter application was reported each year under the previous permit, and winter application is the most Risk-prone season for waste application. The planner considered each field separately to set a maximum application rate for that field. This seems an acceptable approach to set upper limits for each field, but is not really a plan for distribution of waste.”

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4 [https://www.uaex.edu/publications/PDF/FSA-9516.pdf](https://www.uaex.edu/publications/PDF/FSA-9516.pdf)
The API analysis presented in the Permit Application is based on the most recent waste analyses and the most recent soil tests (about 2 years ago). The planner assumed in the API that all fields would be managed as rotational grazing at the highest possible forage yield and the best ground cover condition possible for the area. Many of these assumptions are not correct and certainly do not represent a worst-case assessment.”

A definition of “Managed intensive rotational grazing (MIRG)” reads as follows:

“Managed intensive rotational grazing (MIRG), also known as cell grazing, mob grazing and holistic managed planned grazing, describes a variety of closely related systems of forage use in which ruminant and non-ruminant herds and/or flocks are regularly and systematically moved to fresh rested areas with the intent to maximize the quality and quantity of forage growth.”

“One primary goal of MIRG is to have a vegetative cover over all grazed areas at all times, and to prevent the complete removal of all vegetation from the grazed areas (‘bare dirt’)”

Smolen confirms the above characterization of rotational grazing and comments on assumptions made in the NMP. Reference Appendix B11.

Conclusions Regarding Overall Planning of NMP

“The assessment of an upper limits for waste application rates from each source on each field in two seasons of the year is a reasonable approach to setting guidelines for each field, but some of the choices for parameters are not correct. For example, under Regulation 5 soil testing is only required once in five years, but STP it is likely to increase drastically in that time. A glaring error is the designation of “Rotational Grazing” as the use of each pasture. This assumption is based on a very high level of grazing management, where cattle are moved frequently from paddock to paddock to assure the forage is harvested uniformly and has ample opportunity for regrowth before cattle are returned. It gives the lowest PI of all options in the PI spread sheet. Observations by local residents (Figure 5) indicate some fields are overstocked from time to time, and grass cover is not maintained in the most healthy, protective state at all times. An aerial view of Fields 2 and 3 (Figure 6) shows the eroded condition of these fields in mid-March 2016. In this case, Field 2 is among those that should not be included in the Permit.”

Smolen’s reference to “views” can be found as photos in Appendix B11. The photos show examples of poor management of forage production as well as evidence of “erodible conditions” from bare dirt. Smolen goes on to discuss API limitations from livestock use, soil compaction, and erosion:
“The API does not address the risk due to increased runoff due to soil compaction from livestock hoofs or increased drainage efficiency due to subsurface gravel bars, karst geology, or increased drainage efficiency through surface or subsurface features. Another limitation is the API’s treatment of erosion. Erosion is a very important mechanism for transporting Phosphorus. The P-content of eroded soil can be so high it can far exceed that predicted by the API. This is particularly important when assessing risk due to poor grazing management or overstocking.”

The examples in Appendix B11 are limited and not all of the fields have been examined to determine if best management practices regarding forage production have been in effect.

Smolen provides the following summary points regarding fields and forage management (2017):

• Assumptions of forage production are too high for the area.
• Hay is not harvested from all fields so the nutrients are not removed efficiently.
• Assumptions of rotational grazing are not correct. In fact, grazing practices in the area are not as beneficial as planned, estimates of API are systematically low.
• A few fields get most of the waste as indicated by historical record.
• The effects of compaction, due to grazing are not recognized.
• the API does not account for erosion of pasture effectively - erosion is very effective in transferring P to receiving waters.

Evidence of best management practices in regard to sound forage management should have a direct bearing on the evaluation of the permit. The fact that such a review is lacking and that optimal management is assumed speaks to the quality of the NMP in that it is not proportional to the risks described in Part A.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5.407 requires monitoring and reporting by all APC&EC Regulation 5 permitted facilities.

The NMP incorporates the API, which is used to develop loading rates for land application based on phosphorus. There are many factors taken into account to determine whether land application on a specific field is allowable. Land use (i.e., pasture management) is an input used in the API to address soil compaction.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 271: This permit should be denied because the operation’s swine waste is phosphorus-rich and current application rates will result in significant phosphorus build-up resulting in discharge into waters of the state.

M.D. Smolen, PH.D. who has 35 years of experience in water quality management as affected by agricultural waste management and other aspects of watershed management discusses “nutrient imbalances” that can result from hog waste. From his report dated 2017.

The Problem of Nutrient Imbalance from applying Hog Waste to Agricultural Fields “The final stage of treatment of manure wastes is the application of waste to the land as fertilizer to utilize the nutrients in an actively growing crop. Hog manure is rich in Nitrogen, Phosphorus, and Potassium, which are all essential plant nutrients, and organic matter that is beneficial to the soil. There may be as much as 60% loss of soluble Nitrogen during storage in the pond due to volatilization of ammonia and denitrification (Chastain, 1999). Consequently, when the waste is applied to a hay crop, the waste is relatively high in phosphorus and low in nitrogen relative to crop needs.”

Because a hay crop needs fertilizer in a ratio of 8: 1: 1 (N: P: K), but the hog manure has a ratio of about 1: 1: 1, the crop leaves behind most of the P that is applied. With continued application of manure, the soil test P (STP) will increase rapidly. Studies have shown that on average STP increases about 20 lb for every 100 lb of excess fertilizer. Finally, it has been well documented that the concentration of P in runoff increases with STP, although the actual rate of increase depends on the soil (Vadas, 2005).”

“The effect of continued application of P-rich waste from 2012 through 2015 can be seen in the buildup of soil P in the C&H fields shown in Table 4 and in Figure 2 of the Appendix. In a three-year period, STP increased as much as
380%. The Penriched soils will continue to be a source of P to the river for many years.”

“The problem of Soil-P-buildup is virtually assured in these fields because the crop is only harvested by grazing, which removes very little P. Most of this nutrient is consumed by cattle then redeposited in shady lounging areas and riparian areas. This exacerbates the water quality issues, first because much of the manure is deposited in environmentally sensitive areas and second because the P distribution is not optimal for the crop. As can be seen by the STP results in Table 4, these fields have more than enough P for grazing.”

Where Smolen mentions “Table 1”, refer to Appendix B8, column “P-Nutrient Status”. The U.S. Geological Survey says this about phosphorus effects when there is too much of it:

“Phosphorus is an essential element for plant life, but when there is too much of it in water, it can speed up eutrophication (a reduction in dissolved oxygen in water bodies caused by an increase of mineral and organic nutrients) of rivers and lakes.”

As the waters of Big Creek are homogeneous and intermingled with the Buffalo National River, an “Extraordinary Resource Water” (ERW), phosphorus build-up will at some point result in a violation of Reg 2.202 regarding the anti-degradation of high quality waters which reads as follows:

“Where the quality of the waters exceeds levels necessary to support propagation of fish, shellfish and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State of Arkansas’ Continuing Planning Process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located.”

The operation has received no review as per Reg 2.202 in regard to “important economic or social development” in the area in which the waters are located that would allow for an exception to the statute. The phosphorus build-up potential of the permit is clearly out of line and disproportional to the risk factors as described in Part A. For this reason alone, the permit should be denied.

Furthermore, Mott, 2016, states:

“Soil phosphorus can be a potential source of contamination to surface water for both sediment-attached and soluble phosphorus in runoff (NRCS, 2012; Sharpley, 1993). Table 2 (below) was prepared from soil sample results
contained in the NMP prepared for the NOI submitted prior to C and H Hog Farms conducting land application activities. Guidance from University of Arkansas states that fields are considered to be above the optimum level for phosphorus (P) when values exceed 50 pounds per acre (Espinoza et al., 2007). Only fields 12 and 15 were recommended by the University of Arkansas as needing additional phosphorus. All other fields were recommended to receive zero pounds per acre for a “fullcycle system” (DeHann, Grabs, and Associates, 2012). Based on the soil test recommendations, out of the 630 acres permitted to receive land application, only 85 acres actually required additional P, and the total recommended P for these 85 acres equates to 3,391 pounds. Furthermore, when the acres are looked at in total, these 17 fields contain an above optimum surplus of 21,815 pounds of phosphorus already existing on the landscape.”

“Long-term applications of organic P at rates that exceed the uptake rate of plants can result in saturation of the adsorption sites near the soil surface. This results in increased concentrations of both soluble and labile (easily altered) P. The excess soluble P can either leach downward to a zone that has more attachment sites, and then be converted to labile P or fixed P, or in karst environments, it could infiltrate conduits and subsurface drainage networks. Excess phosphorus can also be carried off the land in runoff water. If soils that have high labile P concentrations reach surface water as sediment, sediment particles will continuously desorb (release P in the soluble form) until equilibrium is attained. Therefore, sediment from land receiving animal waste at high rates or over a long period of time will have a high potential to pollute surface water (NRCS, 2012).”

“Sandy soils, such as those common to alluvial deposits in the Big Creek floodplain, may not effectively retain phosphorus (NRCS, 2012). If the ground water table is close to the surface, the application of waste at excessive rates, or at nitrogen-based rates, will likely contaminate the ground water beneath those soils. However, ground water that is below deep, clay soils is not likely to be contaminated by phosphorus because of the adsorptive capacity of the clay minerals. Almost half (291 acres) of the application fields used by C and H Hog Farms have alluvial soils, which commonly have a higher sand content than in-situ developed soils.”

“Because northwest Arkansas has a substantial CAFO industry, high phosphorus readings in pasture soils receiving animal waste is a common occurrence. Vast areas of the landscape could not accept phosphorus if soil test results and plant uptake requirements were the only criteria applied. To assist landowners and regulators with estimating the potential for phosphorus to impact waters of the State, Arkansas has developed the Arkansas Phosphorus Index (API) (Sharpley et al., 2010). This index uses various factors to estimate likelihood of phosphorus mobilization. However, this Index is not referenced in
the NRCS (2012) guidance manual. Rather, the NRCS states “Waste must be applied in a manner that:
• Prevents runoff or excessive deep percolation of the wastewater,
• Applies nutrients in amounts that do not exceed the needs of the crop, and
• Minimizes odors from the waste being applied”

“Estimated total waste water production was approximately 2.6 million gallons per year according to the 2014 and 2015 annual reports filed by C and H Hog Farms. The ongoing test results from the waste storage ponds and soils, and results from recalculations of the Arkansas Nutrient Management Planner with 2009 Phosphorus Index, confirm earlier projections that phosphorus is being applied at rates in excess of annual plant consumption. Several scientific papers are accessible at the BCRET website detailing how long-term application of excessive phosphorus in watersheds results in a slow but steady build-up of legacy phosphorus in soils and ground water. Once phosphorus outmigration from the watershed becomes measurable, it can continue for a long time with lasting environmental consequences (www.bigcreekresearch.org). “

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. The NRCS Conservation Practice Standard Nutrient Management Code 590 allows for land application based on the API. The Department only permits land application when the API value is a low or medium class.

The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2.203. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to dictate regulatory authority over private land within the watershed, other than what exists under local, state, or federal law.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department is actively engaged in developing an antidegradation implementation procedure to address the revision of 40 CFR § 131.12 and identification of Tier II waters. The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2 Chapter 2. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to dictate regulatory authority over private land within the watershed of an ERW, other than what exists under local, state, or federal law.
Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 272: This permit should be denied because the economics of the risk is to be borne by the public, not the business. Financial assurances are lacking and, due to inordinate risk, should be required of the operator.

Looking beyond obvious ecological considerations, what would be the economic costs of a failure at C & H? In the case of a sudden catastrophic release of contamination, tourism would likely be severely curtailed. Affected businesses supported by tourism would request disaster relief. A year’s worth of business losses would amount to $62.2M based on the 2015 estimate of economic output. Let’s assume for the purposes of this example that a conservative relief package of one third that amount is approved. This would not include clean-up costs to restore the watershed, so let’s assign a conservative figure of roughly $30M giving us a rounded amount of about $50M for total mitigation. Who would pay? The corporate integrator would immediately separate themselves from liability due to the fact that the facility itself is a contract operation. The scope of the costs would be well beyond that of the operator’s resources and its owners would have little choice but to declare bankruptcy. At the end of the day, mitigation costs would fall on the backs of the Arkansas taxpayer.

The figures in this example might be debated, but the take-away is that the costs of a failure would be considerable and must be given serious consideration in the context of this permit. The operator feels strongly that he has an inherent right to make a living from his property, yet the businesses who depend on tourism have a similar lawful right, not to mention the public’s right to enjoy a national river. To balance these rights, there is the option of insuring the operation with a policy specifically designed to cover environmental risk. Such policies are available for exactly these sorts of circumstances where the costs of environmental consequences are potentially very high. Rather than the taxpayer being the de facto insurer, the operator would assume the responsibility to insure against environmental damage of up to $50M or whatever the mitigation costs for potential damage would be estimated to be. The true economic cost of the risk to-consequence equation would be determined by a professional actuary. Likewise, an environmental insurer would be motivated to provide constructive guidance for the operator on how risks might be reduced. If the risks are truly low as the operator’s advocates insist that they are, then the cost of the policy will be low as well. Monetizing the risk and having the business (the operator) shoulder the cost
places the responsibility where it belongs and clarifies the discussion to that of a simple business case.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not require facilities to provide financial assurance.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 273: This permit should be denied because the Arkansas Phosphorus Index (API) fails to account for karst

As per the University of Arkansas Division of Agriculture document FSA9531 https://www.uaex.edu/publications/PDF/FSA-9531.pdf:

“The Arkansas Phosphorus Index (API) is used to assess the risk of phosphorus (P) runoff from pastures and hayland as part of farm nutrient management plan (NMP) development” (emphasis added)

The API addresses surface runoff only and does not consider risks to groundwater. A significant weakness of the API is its failure to consider karst or any subsurface geological risk factors when determining the risk of waste applications to waters of the state.

According to geologic maps of the area: http://www.geology.ar.gov/maps_pdf/geologic/24k_maps/Mount%20Judea.pdf

C&H and the spreading fields are located in what is widely and scientifically accepted as a significant karst environment. The presence of karst is not subjective, but obvious to the casual observer from the weathered dissolution features in exposed formations throughout the Mt. Judea area.

For more in depth discussions and references to studies in regard to dye tracing, hydraulic subsurface flows relative to storm events, and evidence of karst see Comments: E2, C2, C11, C12. See also Mott, 2016 which states, "The waste storage ponds and land application sites are predominantly underlain by the Boone Formation; therefore, karst geohydrology." Further, a report titled
“Surface-Water Quality In The Buffalo National River, 1985-2011” by the Watershed Conservation Resource Center, 2017 states:

"The Ordovician through Mississippian rocks [which characterizes the Buffalo River watershed geology] host a complex karst terrain where losing streams, sinkholes, springs, and caves dominate much of the landscape. Most of these rocks are carbonates, either limestone or dolomite. They are particularly susceptible to dissolution. These rocks are highly permeable to the movement of groundwater. Subsurface flow directions and rates of groundwater flow are difficult to predict and may rapidly change based upon the hydrologic events."

Smolen (2017) had this to say in regard to limitations of the API in regard to various aspects including subsurface flows:

Arkansas PI Shortcomings (API)

“The API, as used in planning the NMP, has several severe shortcomings. First, although it purports to address risk of degrading water quality, it does not address some important factors affecting transport to the receiving waters. In reality it only compares the source term of the Index not the risk of polluting the receiving waterbody. The PI was derived from a series of rainfall simulator studies of runoff produced from application of a synthetic rainstorm on a small area of soil. This makes it very sensitive to application rate and characteristics of the waste, but not to many other physical factors such as karst, surface drainage, gravel bars, or management factors that affect delivery to the stream.”

“Because it was developed from very short-term, micro-studies, it cannot address the larger-scale effects of season, groundwater pathways, or weathering, leaching, or eroding of enriched soils.”

“The API does not address the risk due to increased runoff due to soil compaction from livestock hoofs or increased drainage efficiency due to subsurface gravel bars, karst geology, or increased drainage efficiency through surface or subsurface features.”

Karst and fast moving ground water presents a significant risk factor which should be taken into account when assessing risk yet is altogether ignored by the applicable risk assessment tool; the API. If karst was properly factored into the API, it is highly likely that the risk categories for most if not all of the C&H fields would exceed that allowed under the terms of the permit.

Original Commenter: Buffalo River Watershed Alliance
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

APC&EC Regulation 5.402 incorporates both the AWMFH and NRCS Field Office Technical Guides. The AWMFH Part 651.0106(i) lists applicable NRCS Conservation Practice Standards, which includes NRCS Conservation Practice Standard Nutrient Management Code 590 for nutrient management. NRCS Conservation Practice Standard Nutrient Management Code 590 for the State of Arkansas allows for land application based on the API, which is required by APC&EC Regulation 5 for developing nutrient management portion of the waste management plan of a facility.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to
173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA1029, “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA9516 states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 274: This permit should be denied as SPAW modeling for overtopping has not been made available for peer review

“SPAW” stands for Soil-Plant-Air-Water and it is a modeling technique that considers pond sizing, waste generation, waste usage, anticipated precipitation, and other factors to analyze the likelihood of the waste levels overtopping the pond containment system. M.D. Smolen, PH.D. who has 35 years of experience in water quality management as affected by agricultural waste management and other aspects of watershed management, discusses the specific SPAW modeling done for C & H in a report dated Jan 2nd, 2014:

Review of SPAW Model Analysis
“As required in the AR rules, the designers have analyzed the likelihood of this waste system overtopping using the SPAW model. Their analysis uses 47 years of rainfall data from a nearby weather station. The data used are appropriate for this analysis. It is unlikely the result would be different if 100 years of historic data had been available.

5 https://www.uaex.edu/publications/pdf/FSA-1029.pdf
6 https://www.uaex.edu/publications/PDF/FSA-9516.pdf
SPAW analysis by DHG suggests the two-pond system will not overflow if the wastes are pumped out every six months. Their simulation shows annual maximum pond depth to range from 7.0 to 10.8 ft in Pond 2, with average maximum depth 8.99 ft. The maximum allowable depth in Pond 2 is 11.7 ft (Sheet 15 of DGH Plan sheets). Pages 8 – 25 of Certification and QA-QC Section show the SPAW printout. Area of the pond(s) used in the SPAW analysis is shown as 0.70 acres., but the “As-Built” drawings show the top area of Pond 2 as 0.76 acres and Pond 1 is about 0.5 acres for a total of about 1.2 acres. In addition there is also some contributing area from berms surrounding the two ponds that must be considered. Therefore, there should be something more like 1.5 acres considered for rainfall input to the system, or twice the area shown as model input. This is important because all model calculations of water balance are computed in volumes (acre-ft) that are sensitive to the area factor.”

“Maximum volume used in SPAW is shown as 5.66 acre-ft (af), which is approximately the volume of Pond 2 (about 5.32 af depending on the actual depths considered for full and empty). Total volume of both ponds should be about 7.40 af. At the end of the SPAW printout, total values for sections of the water balance are presented on an average monthly basis. The total of all precipitation inputs is shown as 1.33 af. If this is adjusted for area (0.7 acres), the precipitation amount would be about 22.8 inches, or about 1/2 the average annual precipitation for the area (43.7 inches at Marshall, AR). The model also considers water input from Bank Runoff, Seepage from Banks, and the waste input from the barns and the water losses from evaporation, seepage through the liner, and pump down every 6 months. The modeler may have adjusted some of these inputs and outputs to reflect the system accurately, but it is difficult to determine this from the information presented.”

“The SPAW printout shows good water balance (this is an important check the model: on average water inflow must equal water outflow). According to the model, average annual input (precipitation plus wastewater) is about 10.45 a-f. Of this, 73% is pumped out and applied to fields, 11.7% evaporates, and 14.6% leaks.”

Above, Smolen makes suggestions in regard to whether the SPAW model inputs were the best choices. Below is Smolen’s recommendation regarding the model:

“I would recommend that the complete details of the SPAW simulation be requested to check the validity of the modeler's conclusion that the embankment will not be overtopped. The SPAW simulation is particularly important for two reasons; (1) it is used to determine if the waste storage ponds can overflow, and (2) the design assumes there will NEVER be an overflow event. If overflow occurs, catastrophic failure of the embankment is likely, because the design does not include a stabilized emergency spillway.”
Smolen (2017) notes the following in regard to the need to set a “higher bar” for this particular pond design:

“The waste holding ponds should be designed and operated to a higher standard than the NRCS Agricultural Waste Management Field Handbook (AWMFH) because Regulation 5 requires “no discharge.” The C&H waste holding ponds are sized for discharge from a 25-yr 24-hr storm. This would be acceptable under a discharge permit like the Regulation 6 NPDES permit. Regulation 5, however, is a “No Discharge Permit” and should require a higher standard such as NOAA’s Probable Maximum Precipitation. The high recreational value of the Buffalo River should be a basis for designing to a higher standard, such as the PMP, or at least 40 inches of stormwater and freeboard combined.”

A peer review of the engineering details of the SPAW model are appropriate prior to the consideration of this Reg 5 permit. As Smolen mentions, incorrect assumptions in the model or flaws in the calculations have potentially serious consequence as it pertains to the risk level discussed in Part A.

Original Commenter: Buffalo River Watershed Alliance

**Response:** The SPAW model was prepared by a Professional Engineer licensed in the State of Arkansas. The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

**Comment 275:** This permit should be denied because containment ponds are located within 600 ft of an improperly abandoned well

AWMFH 651.0702(n) *Presence of abandoned wells and other relics of past use*

Page 7-15 states:

“The site and its history should be surveyed for evidence of past use that may require special design considerations of the site relocation. If there is an abandoned well on the site, special efforts are required to determine if the well was sealed according to local requirements. An improperly sealed well can be a direct pathway for contaminants to pollute an aquifer.”
The AWMHB 651.1004(b) Liquid and slurry manure storage on page 10-23 states the following regarding agricultural earthen waste storage ponds:

“Earthen storage is frequently the least expensive type of storage; however, certain restrictions, such as limited space availability, high precipitation, water table, permeable soils, or shallow bedrock, can limit the types of storage considered. Table 10-4 provides guidance on siting, investigation, and design considerations.”

See Appendix C10-B shows a downgrade distance of 594 ft to a hand dug well.

AWMHB table 10-4 (Appendix C10) makes recommendations regarding AWMS storage ponds in proximity to improperly abandoned wells which can open an unlined column of water to geologic substrate. The table represents a “Vulnerability to Risk” matrix and clearly states that when planning AWMF waste storage, if it is within 600 feet of an improperly abandoned well, the vulnerability rating is Very High and that the planner should “evaluate other storage alternatives or properly seal well and reevaluate vulnerability”. The improperly abandoned well is not recognized in the SECTION D: SITE SPECIFIC INFORMATION of the original NOI. Likewise, a 2,000 ft radius map is provided in SECTION E: FACILITY PLANS (see Appendix C2-B), does not reference the well. AWMFH 651.0701 Overview of geologic material and groundwater page 7-2 states:

“Many rural domestic wells, particularly in upland areas, derive water from fractures and joints in bedrock. These wells are at risk of contamination from waste impoundment facilities if fractured bedrock occurs within the excavation limits, within feedlots or holding areas, and in waste utilization areas. Fractures in bedrock may convey contaminants directly from the site to the well and significantly affect water quality in a local aquifer.”

The geology is predominantly karst (see Comments C11, E2). This suggests a weakness in the investigation in that the pond locations are too close to this well. The original NOI investigation does not suggest adequate due diligence proportional to the significant risk factors discussed in Part A.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Documentation that the well has been properly plugged and certified has been provided by the applicant.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 276: This permit should be denied because the pond liner leakage rate permitted in Arkansas is lax compared with other state standards making it particularly inappropriate for a location in geological karst.

Smolen (2017) states the following regarding the Arkansas leakage standards compared to those of other states:

Comparison of leakage rate with the rate allowed in other states. “The leakage rate allowed in Arkansas is higher than many other states. I reviewed eight state standards, and the “10-State Standard” for comparison. This analysis (see Appendix C15) showed that most of these states hold animal waste structures to a higher standard than Arkansas. In this comparison I looked at leakage rate based on a 6-foot depth. Ohio’s standard generally allows a leakage rate of 277 gal/ac/day, but restricts leakage further in a karst area. Missouri restricts leakage to 500 gal/ ac/day in a basin where potable groundwater might become contaminated, Oklahoma restricts leakage to 462 gal/ac/day and requires installation of monitoring wells. The 10-state standard restricts leakage to 500 gal/ac/day.”

That the Arkansas standard allows ten times the leakage of the 10-state standard is excessive under any circumstances, but to apply the Arkansas standard in a geologically sensitive karst environment is nothing less that irresponsible, particularly when considering the disproportionate risk factors as discussed in Part A.

Original Commenter: Buffalo River Watershed Alliance
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. In Arkansas, the rate of seepage, as discussed in this comment, comes from the design requirements in APC&EC Regulation 5.402 that incorporates the AWMFH. 10-state standards do not apply to APC&EC Regulation 5 permits.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 277: This permit should be denied because the original permit, ARG590001, was improperly issued.

Failure to issue a construction permit
C & H obtained a discharge permit (NPDES General Permit ARG590001) but failed to obtain a construction permit. Arkansas law requires that a person seeking to construct and/or operate a disposal system that discharges industrial waste or sewage into waters of the State must apply for a state construction permit. § 8-4-201(4), Ark. Code. C & H Hog Farm is a “waste disposal” facility and “sewage” includes animal wastes, and “waters of the state” include underground waters. § 8-4-102, Ark. Code. Arkansas Regulation 6, which contains Arkansas NPDES regulations governing the permitting of C & H, requires a state construction permit for operation of wastewater facilities. Ark. Reg. 6.202(A). ADEQ must approve the application, and a permit be issued and effective before the activity applied for can begin. Ark. Reg. 6.202(A). The state permit is not an NPDES permit. Ark. Reg. 6.202(B). It is intended to ensure a satisfactory design and review of the treatment facility which must meet the basic design criteria set forth in the "Ten States Standards" unless an exception to those standards is justified. Ark. Reg. 6.202(B). Those standards are intended to protect both surface waters and ground waters. In its original application, C&H stated that it was applying for a permit for a new facility and for a construction permit,(NOI Form 1, p.2), and describes its treatment system , (NOI Form 1, p. 5, 13) as required by Ark.. Reg 6.202(A). However, no state construction permit was ever noticed or issued. C&H’s NPDES permit ARG590001 authorizes only discharges, not construction. C & H therefore has been operating without a state construction permit in violation of § 8-4-201(4), Ark. Code. Neither C&H’s application for a Regulation 5 no-discharge permit, nor ADEQ’s draft approval of permit 5264-W includes any reference to a construction permit and makes no effort to correct the aforementioned deficiency. Permit ARG590001 was improperly issued and therefore this permit, 5264-W, should be denied.

Failure to require a review by staff geologists
Comments on draft permit 5264-W have been submitted by Gerald Delavan who, until retirement in February 2014, worked for 30 years as a Geologist and Professional Geologist on staff with ADEQ. His comments are incorporated here by reference and state in part:

“The initial C&H permit application for a Regulation 6 General Permit was never reviewed by any of the Professional Geologists working in the Water Division or by any other ADEQ staff geologists, prior to the permit being issued...The C&H permit application was reviewed and approved exclusively by the ADEQ Engineers working in the Water Division. Consequently, any potential problems concerning the release of liquid waste into the local groundwater supplies from the manure holding ponds at C&H were never discussed or evaluated by ADEQ Geology staff. In addition, the potential for waste contaminated surface water runoff to be discharged into Big Creek and the potential for the infiltration of waste contaminates into ground water from the land application sites through the underlying karst limestone geology was never discussed or reviewed by any ADEQ Geology staff, prior to issuance of the C&H Farm's initial permit...Given the sensitive geologic nature of this proposed hog farm location, the appropriate thing to do would have been for ADEQ Water Division to expand he permit application review process to include the ADEQ Professional Geologist staff in the review process...If ADEQ had given its Geologists an opportunity to review and comment on C&H’s permit application, it is highly unlikely any of the Professional Geologists performing the review would have signed off on or approved the proposed permit for the C&H holding ponds locations without requesting additional geologic data be gathered about the proposed holding pond locations and proposed land application sites.”

The fact that no ADEQ Geology staff were required to review the original C&H application, especially given the sensitive location in karst terrain and in the watershed of the Buffalo National River, reflects a lack of due diligence on the part of ADEQ when reviewing the application. Permit ARG590001 was improperly issued and therefore this permit 5264-W, which relies almost entirely on the previous permit review, should be denied.

Original Commenter: Buffalo River Watershed Alliance

Response: The permit application was reviewed by ADEQ technical staff, including Professional Geologists.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6...
permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012. The Department has made the current permitting decision in accordance with state laws and APC&EC Regulation 5.

**Comment 278:** This permit should be denied because Big Creek Research & Extension Team (BCRET) testing of Big Creek immediately downstream of the facility shows degradation for E.coli

In a report prepared for BRWA titled, ", Assessment of Environmental Data and Draft Regulatory Changes Regarding the C&H CAFO, Including the Present Draft Permit, JoAnn M. Burkholder, Ph.D., 27 March 2017" Dr. Burkholder, an expert in water pollution assessment and water quality monitoring and research in freshwaters and estuaries with more than 30 years of experience in research on nutrient pollution and its effects on aquatic ecosystems, including peer-reviewed publications on the impacts of concentrated (confined) swine and poultry feeding operations (CAFOs) on surrounding natural resources, states:

"...considering BCRET data from January through November of 2016 (BCRET 2016d), the median of excessive E. coli densities at the upstream station was 986.7 (n = 8). During the same year, the median of excessive E. coli densities at the downstream station was much higher, 1,732.9 colonies/100 mL (n = 7). Fecal bacteria such as E. coli tend to adsorb ("stick") to sediment particles and, thus, settle out of the water column to the bottom sediment as the water moves downstream (Burkholder et al. 1997 and references therein). Thus, if the only source of E. coli to the downstream station was contamination upstream from the C&H CAFO, the median of excessive E. coli densities would be much lower at the downstream site than at the upstream site. Instead, the median of excessive E. coli densities at the downstream site is nearly double that of the upstream site. These data indicate that the C&H CAFO is discharging E. coli bacteria which are contributing to the pollution of Big Creek in the CAFO area and downstream waters. “

Elevated E.coli introduces a health risk into a tributary that is intermingled and homogenous with an extraordinary resource water (ERW). In the interest of public health and safety, this permit should be denied.

Original Commenter: Buffalo River Watershed Alliance

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Big Creek is not listed on the EPA-approved 2016 303(d) list as impaired for E. coli, and data from the BCRET quarterly reports show variability in the upstream and downstream E. coli values. Those data do not demonstrate
that downstream \textit{E. coli} values are statistically different than upstream \textit{E. coli} values. Based on the January 2016 to November 2016 BCRET data, the average upstream value was higher than the average downstream value.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC\&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

ADEQ reviewed Jim Petersen’s May 31, 2018 expert report, which presents an analysis of temporal trends among nitrate-N and \textit{E. coli} from January 2014–December 2017 at BC6 and BC7. Mr. Petersen’s analysis presents decreasing trends of ammonia and chlorides and increasing concentrations of \textit{E. coli} at BC6. Yet, increasing concentrations of nitrate-N were observed downstream at BC7. The conflicting temporal analysis prompted Mr. Petersen to further review trends upstream to downstream. By analyzing paired concentration data (collected same day) at BC6 and BC7 from January 2014 through December 2017, Mr. Petersen reports significant increases in total nitrogen, ortho-phosphorus, and chlorides, but non-significant changes in \textit{E. coli} and nitrate-N. The significant increase of nitrate-N in the house well and ephemeral stream does correspond to increases of total nitrogen at BC7. Mr. Petersen’s analysis illustrates the complexities of evaluating water chemistry in karst systems.

**Comment 279:** This permit should be denied because the National Park Service has notified ADEQ of Big Creek Impairment

In a letter dated October 6, 2015, Kevin Cheri, Superintendent for the National Park Service (NPS) to Director Keogh of ADEQ noted the following (excerpt):

"\textit{NPS has also been monitoring the United States Geological Survey (USGS) sites collecting dissolved oxygen data on tributaries to the Buffalo River. Two of these sites have chronically been below the allowable limits in Regulation 2.505. These are Bear Creek near Silver Hill (USGS Site 07056515) (ADEQ site-BUFT12) (Figure 2) and Big Creek at Carver (USGS Site 07055814) (ADEQ site- BUFT06) (Figure 3).}"
These streams have had minimum dissolved oxygen values of 3.9 and 4.5 mg/L, respectively, well below the standards.”

“As dissolved oxygen is very important for aquatic life, particularly for species such as freshwater mussels, and such species are part of the suite of scenic and scientific resources Congress expected to be conserved when the Buffalo National River was established, NPS needs the assistance of ADEQ in determining the sources of low dissolved oxygen and reducing or eliminating these sources. We feel that both of these streams should be placed on the "Impaired Waterbodies" list pursuant to Section 303(d) of the Clean Water Act.”

In a letter dated February 25, 2016, Kevin Cheri, Superintendent for the National Park Service (NPS) to Director Keogh of ADEQ noted the following (excerpt):

“On October 6, 2015 I sent a letter (Attachment 2) to Arkansas Department of Environmental Quality (ADEQ) asking that you consider placing three tributaries of the Buffalo River on the Impaired Waterbodies List pursuant to Section 303(d) of the Clean Water Act. To date, I have not received any formal correspondence relative to my request. My staff has reviewed the draft 303(d) streams list published on your website (ADEQ,2016) and see that these three streams are not in the draft list. I would like to receive documentation explaining why these streams were not listed in the draft 303(d) list.”

The above two letters focus on low dissolved oxygen levels as the justification for an impairment listing. An additional letter was sent on March 16, 2016 to director Keogh where there is a concern expressed in regard to E. coli (excerpt):

“Assuming that Big Creek is not part of an Extraordinary Resource Water, Ecologically Sensitive Waterbody, or Natural and Scenic Waterway (ERW, ESW, or NSW) the upper E. coli limit is 410 colonies per 100 ml (410 col/100ml). Data from BCRET (Big Creek Research & Extension Team), during the primary contact period in 2014, shows E. coli exceeded 410 col/100ml in six of twenty-two samples for a 27% exceedance. According to Regulation 2.507, for assessment of ambient waters as impaired by bacteria, the E. coli standard shall not be exceeded in more than 25% of samples in no less than eight samples taken during the primary contact season.”

The full March letter can be found in Appendix D3. In summary, NPS has pointed out impairment evidence in regard to both low dissolved oxygen as well as elevated E. coli.
Since the submission of the above letters, the National Park Service has commissioned a report, "Permitted Concentrated Animal Feeding Operation Assessment Buffalo National River, Arkansas" by David N. Mott November 2016. This report includes extensive discussion of impairment of Big Creek, and potentially the Buffalo National River, due to elevated nutrients and bacteria in Big Creek.

Considering that Big Creek waters are contiguous and intermingled with waters of a designated ERW, the high level of ecological and economic risk as discussed in Part A justifies a delay of a requested Reg 5 permit until the degradation issues in regard to Big Creek are fully resolved. Full compliance with Reg. 2.202 on anti-degradation of high quality waters should be enforced. If it is determined that C & H contributes in whole or in part to the impaired status of Big Creek, the permit should be denied.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

An impairment determination is made by using the EPA-approved assessment methodology. The EPA did not include Big Creek on the approved 2016 303(d) list.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 280: This permit should be denied because the Arkansas Game and Fish Commission concurs with National Park Service recommendation of Big Creek impairment
Chris Racey, Chief - Fisheries Division, Arkansas Game and Fish Commission wrote to Jim Wise of ADEQ on March 16, 2016 (excerpt):

“AGFC Biologists are also concerned with the Dissolved Oxygen levels of Big Creek, a Buffalo River tributary in Newton County near Gene Rush Wildlife Management Area. Summer algal blooms, likely caused by excess nutrient levels, appear to be impairing this creek. Smallmouth bass require 6.0 mg/L DO for optimal growth, and this water quality standard is not being met for several months of the year, per the USGS gage station at Big Creek. We concur with the recommendations of the National Parks Service that Big Creek should be considered for the list of 303(d) streams.”

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

An impairment determination is made by using the EPA-approved assessment methodology. The EPA did not include Big Creek on the approved 2016 303(d) list.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 281: This permit should be denied because the U.S. Geological Survey study indicates impairment of Big Creek.

On December 15th, an Assessment Methodology session was sponsored by ADEQ at their N Little Rock headquarters to review with selected stakeholders the process for producing the 303(d) list. During this meeting, Billy Justus and Lucas Driver of the U.S. Geological Survey (USGS) Lower Mississippi-Gulf Water Science Center presented a slide presentation entitled: An Evaluation of
Continuous Monitoring Data for Assessing Dissolved-Oxygen in the Boston Mountains. Big Creek was one of five waterbodies reviewed in the presentation. Notable was the slide listed in Appendix D5 showing dissolved oxygen at 20.5% of unit values below 6mg/L. The exceedance level over which impairment is indicated is 10% at 20 degrees centigrade. These USGS statistics show a clear indication of impairment.

Considering that Big Creek waters correspond to waters of a designated ERW, the high level of ecologic and economic risk as discussed in Part A justifies a delay of a requested Reg 5 permit until the impairment issues on Big Creek are fully resolved. Reg. 2.202 on anti-degradation of high quality waters must be given precedence over this permit. If it is determined that C & H contributes in whole or in part to the impaired status of Big Creek, the permit should be denied.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

An impairment determination is made by using the EPA-approved assessment methodology. The EPA did not include Big Creek on the approved 2016 303(d) list.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 282: This Regulation 5 permit should be denied because Regulation 6 Is the applicable regulation for the C&H Permit Application

C&H has applied to ADEQ for a permit under Regulation 5, claiming to be a no-discharge facility. Any discharge from the facility is prohibited under the proposed permit. In fact, C&H is a discharger of hog wastes and is a “point
source” under the Federal Clean Water Act regulations. Consequently, a Regulation 6 NPDES permit is the appropriate regulation for evaluating C&H’s application.

C&H commenced operations in 2012 under NPDES permit No. ARG590001. C&H has applied for and received a draft permit pursuant to APCEC Regulation 5. In the Statement of Basis, ADEQ uses the terms “no-discharge facility” and “no-discharge permit” repeatedly. (See, e.g. Second sentence in Statement of Basis -- “This draft permit decision is for the issuance of a no-discharge facility under draft permit number 5264-W and AFIN 51-00164.” Paragraph 3 of the Statement of Basis -- “The permittee submitted a permit issuance application for a no-discharge permit . . .” “It is proposed that the water no-discharge permit be issued.” Paragraph 12 – “The [ADEQ] has made the determination to issue a draft permit for the no-discharge facility described in the application and NMP.”)

Moreover, the draft permit plainly states, “Waste shall not be discharged from this operation to Waters of the State or onto land in any manner that may result in . . . runoff to Waters of the State.” See Part II, Specific Condition 2. The permit goes on to define Waters of the State:

‘Waters of the State’ means all streams, lake, marshes, ponds, watercourses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, which are contained within, flow through, or border this state or any portion of the state as defined by the Act. See, Part IV, Definitions. C&H’s Nutrient Management Plan (NMP) submitted with its permit application however, makes it clear that it contemplates discharges to Waters of the State:

Purpose of Plan – The goal of nutrient management is to effectively and efficiently use the nutrient resources to adequately supply soils and plants with the proper amount of nutrients to produce food, forage, fiber, and cover while minimizing transport of nutrients to ground and surface water and environmental degradation. (emphasis added).

C&H concedes in its NMP that there will be “transport of nutrients to ground and surface water” and that its “goal” is to “minimize” these discharges. The NMP is incorporated into and made a part of the permit. See, Part II, Specific Conditions, para. 2. ADEQ fails to explain how it can issue a no-discharge permit to a no-discharge facility prohibiting the discharge of waste to Waters of the State when both the permit application and facility design contemplate discharges of wastes to Waters of the State. Moreover, the BCRET work actually documents discharges. BCRET set up a flume to measure flow from waste fields and sample discharges. The results of sampling from this discharge point reflect the presence of nutrients and bacteria.
The waste holding ponds were designed and constructed to permit waste leakage to Waters of the State. The final design documents estimate leakage rates of 1,090 gallons per acre per day for Pond 1 and 1,334 gallons per acre per day for Pond No. 2. Pond 2 is also designed to permit a discharge in the event of a large (25 year 24 hour) precipitation event (“the storm volume is only encroached during a 25 year 24 hour storm event.”). C&H NMP at p. 14. The recent “Drilling Report” concludes that the waste ponds sit atop karst features. Karst features provide a mechanism for rapid transport of wastes that leak from the ponds to ground and surface waters.

Water quality monitoring downstream of the facility indicates an increase in nutrient concentrations as well as e coli bacteria. There is evidence that shows it is more probable than not that a portion of these contaminants are from waste generated at C&H. The contribution of nutrients and harmful bacteria from C&H causes or contributes to degradation of water quality in Big Creek and the Buffalo National River.

Because the facility is causing or contributing to the degradation of water quality in both Big Creek and the Buffalo River, it is violating state and federal antidegradation provisions. See, APCEC Reg. 2, Chapter 2, the Clean Water Act § 303 (33 U.S.C. § 1313) and 40 CFR § 131.12.

The prohibition both in Regulation No. 5 and the draft permit against discharging wastes to Waters of the State will be violated if this permit is granted. That the facility is discharging wastes to Waters of the State is plain both from the permit application and accepted scientific work, including work done by BCRET. Furthermore, it cannot be disputed that waste discharges to Waters of the State will continue to occur unless the permit is denied.

Because the facility will result in discharges of waste to Waters of the State, and because this CAFO meets the definition of a point source under the Clean Water Act § 502(14) (33 U.S.C. § 1362(14)) a no-discharge permit per Regulation 5 is improper. Because the facility is causing or contributing to water quality degradation in the Buffalo National River, a state ERW, federal ONRW and Tier 3 waterbody, any permit that would result in or allow a discharge that causes or contributes to a degradation in water quality is improper.

Notwithstanding that C&H has no known surface discharge of wastes from the waste holding ponds at the present time, there is a general scientific consensus that one or both of the two waste holding ponds are discharging liquids through the pond liners. In fact, it is generally agreed that the ponds are expected to discharge up to 5,000 gallons/day/acre. Furthermore, some of the fields that are used for land application of hog wastes are in the floodplain of Big Creek or its
tributaries, and there are indications that wastes have entered Big Creek from those fields.

Without question, those liquids are “sewage”, “biological materials”, and “agricultural wastes” within the definition of “pollutants under 28 U.S.C.A. §1362(6). In addition, a confined animal feeding operation (CAFO) (including all of its component parts) such as C&H is considered a “point source” under 40 C.F.R. §122.23. There is evidence from sampling conducted in the area of the Big Creek tributary to the Buffalo River that a discharge is occurring from C&H or its land application fields due to the presence of elevated levels of components of hog wastes.

Dr. JoAnn Burkholder, an expert in water pollution assessment and water quality monitoring, states,

"My overall evaluation is that, based on the available data, this CAFO is contaminating the surrounding natural resources with harmful Escherichia coli bacteria. Therefore, it should not be given a “no discharge” permit from ADEQ. These findings were expected; they are similar to findings of impacts from other CAFOs on surrounding natural resources (Burkholder et al. 2007 and references therein). The approach to waste management of industrial swine production operations such as this CAFO, including use of cess pits (waste ponds, often close or at the groundwater table) to allow solids to settle, and fields planted with Bermuda grass or other plants that receive sprayed applications of the liquid wastes, cause unavoidable water, soil, and air pollution (see U.S. EPA 1998, 2013).” (Burkholder, 2017)

Dr Burkholder concludes, referring to her following report,

"Based on the analysis below, this CAFO is contaminating adjacent public trust waters with swine waste pollutants, meaning that it is discharging pollutants. It should not be classified as “no-discharge,” based on U.S. EPA (2004).” (Burkholder, 2017)

The permit application review under Regulation 5 is improper and it should have been reviewed under Regulation 6 of the Commission.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the
state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

It is within the applicant’s discretion to determine which type of permit is appropriate for its liquid animal waste management system. It is then the Department’s charge to evaluate the permit application for compliance with applicable state laws and APC&EC regulations.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 283: This permit should be denied because it does not include An Expiration Date

The proposed Permit does not contain an expiration date. Under Regulation 6, the permit would be required to have a fixed term not to exceed five years. While Regulation 5 does not have a stated time for the effective life of a permit issued under that Regulation, there is nothing in Regulation 5 that would prohibit ADEQ and the Commission from including an expiration date in the permit even if ADEQ persists in using Regulation 5 as its authority.

There are numerous sound policy reasons for requiring a termination date, requiring the permittee to apply for the renewal of the permit. The fact that the permit will be subject to renewal in a stated period of years would be a motivating factor for the permittee to strictly adhere to the terms and conditions of the permit, and to address problems on their own volition. In addition, requiring periodic renewal gives ADEQ and the public an opportunity to review the operations of C&H and for the public to be heard on the quality of those operations and their effect on the environment. Also, periodic renewal allows for the consideration and use of new technology to remedy or prevent problems that may be affecting the
public and the environment. These are among the reasons why NPDES permits are subject to periodic renewal.

Smolen (2017) notes risk of STP buildup:

“…under Regulation 5 soil testing is only required once in five years, but STP it is likely to increase drastically in that time.”

Considering the potential for serious environmental harm from swine CAFO operations, a Reg 5 permit limited to an effective period of three (3) years should be required for such facilities.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. APC&EC Regulation 5 does not require an expiration date.

Comment 284: ADEQ should deny C&H a permit because the conditions put in place by ADEQ in the 1992 moratorium have not been met

ADEQ imposed a moratorium for Regulation No. 5 permits in the Buffalo River watershed in 1992 (see Mott 2016, Appendix A). This moratorium specifically mandated the completion of site specific studies, and the use of those studies to inform regulatory changes to protect the watershed prior to the moratorium being lifted. C&H was designed and is managed in a similar manner to the previous swine CAFOs studied by ADEQ from 1994 – 2002, but the operation functions on a much larger scale. Not only did ADEQ fail to complete the requirements of the previous moratorium, the agency never provided public notice that the 1992 moratorium was to be lifted. ADEQ did not disclose the modifications and corrections it made, if any, based on the results of its own studies and investigations. Because lifting this moratorium would have been a major environmental decision with potential to impact the Buffalo National River, and the outstanding national resource designation by the State of Arkansas, public notice and analysis of this decision was warranted.

By not announcing that it was lifting the moratorium, ADEQ effectively circumvented public participation in protecting and maintaining the water quality of the Buffalo National River. ADEQ should deny this permit because it has yet to fulfill the mandates of the moratorium. ADEQ has not yet gone through the public notice and public comment process, nor has the agency explained to concerned citizens of the state of Arkansas how it addressed the requirements of the moratorium. The goal of this effort as stated in the moratorium was to adjust the regulatory, mitigation, and evaluation requirements of Regulation No. 5
permits issued in the Buffalo River watershed. Until ADEQ addresses the concerns identified in its own studies, ADEQ is in violation of the 1992 moratorium.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

The administrative notice issued on October 12, 1992, was not a moratorium because it was not a final decision by the Department. The administrative notice clearly stated that any person adversely affected by a subsequent action by the Department could challenge that action as provided by applicable law. In the administrative notice, the Department indicated that it would signal the Department’s final decision through a subsequent permitting decision.

Comment 285: The Buffalo River Watershed Alliance also incorporates by reference the comments of the National Parks Conservation Association, the Arkansas Canoe Club, the Arkansas Public Policy Panel, National Parks Service, Friends of the North Fork and White Rivers, Dane Schumacher, Marti Olesen, Carol Bitting, Jessie J. Green, Teresa Turk, John Murdoch, Chuck Bitting, Gerald Delavan, and any other person or entity who opposes the proposed C&H Hog Farm permit that is the subject of these comments.

Original Commenter: Buffalo River Watershed Alliance

Response: Please refer to the responses to those respective comments.
Comment 286: It is our understanding that the NMP is also based on a 24 hr/25 year storm event standard. This approach may be appropriate generically within the U.S., but we question whether this is appropriate for Arkansas where flood conditions may be more frequent than those for which this generic standard was established. If ADEQ has knowledge of the inadequacy of this standard, it should establish an updated standard and apply that standard to this permit so as to not result in violations to water quality standards.

Original Commenter: National Park Service

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The NRCS technical publications listed in APC&EC Regulation 5.402 provide guidance for designing liquid animal waste management systems for 24-hour, 25-year storm events. APC&EC Regulation 5 waste storage ponds are required to have the capacity to receive all waste, as well as the necessary freeboard and capacity for a 24-hour, 25-year storm.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

Comment 287: Part II Specific Condition- Specific Condition #15: "Significant" precipitation (e.g. 1/4 in.) should be specified for the 24-hour period along with the nearest local weather station referenced that provides 24-hour precipitation forecasts. Without such specificity, this permit condition would appear arbitrary and have little enforcement basis. Please also define "saturated" so as to clearly communicate appropriate conditions for land application.
Original Commenter: National Park Service

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5.406(B) prohibits land application when soil is saturated, e.g. during a precipitation event, or when significant precipitation is reasonably anticipated in the next 24 hours.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 288: Statement of Basis, Part 8. Waste Storage/Treatment Components: The current storage provisions for the ponds — a one-foot free board and storage to accommodate a 24-hour, 25-year storm event — seem insufficient to ensure that ponds do not overflow during extreme precipitation events. Such events are predicted to become more common in Arkansas and elsewhere. Perhaps an additional storage buffer could be added during pond liner replacement, to better account for climate change-driven increases in overall precipitation and frequency of intense storm events. Historically, waste pond overflows from such facilities are recognized as one of the more common situations leading to offsite migration of contaminant fluids so they should be better designed (increased freeboards) to minimize and avoid when possible this eventuality.

Original Commenter: National Park Service

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The NRCS technical publications listed in APC&EC Regulation 5.402 provide guidance for designing liquid animal waste management systems for 24-hour, 25-year storm events. APC&EC Regulation 5 waste storage ponds are required to
have the capacity to receive all waste, as well as the necessary freeboard and capacity for a 24-hour, 25-year storm.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.
Comment 289: I’m writing to respectfully ask that you not approve a permanent permit for this large hog operation on the Buffalo River watershed. I don’t understand why they were EVER allowed to operate so close to a national river in the first place, but they certainly must not be allowed to continue without close and continuous monitoring and testing. The most recent soil tests reveal that all C&H fields have already exceeded optimum phosphorus levels and no further phosphorus is recommended. A regulation 5 permit for this facility means cumulatively up to 78,000 hogs and almost 3 million gallons of waste each year into the Buffalo River Watershed. As you know, this high-risk facility operates on karst topography, so there is no way for it to operate without contaminating the watershed, and thus the river. As this country’s very first river to be set aside as a national park, it should be of utmost importance to the state of Arkansas to protect this national treasure, the crown jewel of our state. Therefore, I urge you to deny all permit requests by any operation that would jeopardize the future health of the Buffalo River. Please act now to preserve the beautiful treasures of our “natural state” for our children and grandchildren and all future generations of Americans to enjoy. Thank you in advance for your careful consideration of this urgent matter.

Summarized Commenters: Glenda Allison, Jori Costello, Chea Ball, Sarah Valiquette, Anonymous Postcard

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The API is used to develop loading rates for land application based on phosphorus. There are many factors taken into account to determine whether land application on a specific field is allowable. While the soil test phosphorus, referred to as “exceeded optimum” by the commenters, is one of those factors, it is not the determining factor. A field with high soil test phosphorus may still be appropriate for land application. The Department only permits land application when the API value is a low or medium class.

APC&EC Regulation 5 requires soil analyses every five years and waste analyses annually.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.
The Department emailed public notice of the draft permit to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, the Department of Arkansas Heritage, and the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health or Endangered and Threatened Species from the agencies with the jurisdiction over these matters.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

APC&EC Regulation 5.407 sets forth monitoring frequencies for land application of waste and for soils of each field where liquid animal waste has been applied.

Comment 290: As an Agronomist, I know that the nutrients from the waste applied from the hog farm has been spread on fields at anytime, year 'round. These nutrients
can not be utilized by plants (fescue/bermuda grass) during winter months. I oppose the C:H Hog Farm reg 5 permit due to the environmental hazards. As a Newton Co resident, I oppose the Reg 5 Permit for the C&H Hog Operation. The pasture land where the hog waste is applied consists of either steeply sloping terrain underlain by karst or, are streamside bottomland fields which are subject to flooding, increasing the risk of pollution due to water runoff. And, the hog waste is spread on the pastures year round instead of only when the pasture forages are growing. The land here is not suitable for this type of hog operation. Arkansas cannot risk losing one of its most valuable, beautiful rivers for the sake of a hog production operation.

Summarized Commenters: Margaret Lonadier, Bob Hotchkiss

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Conditions for land application are prescribed by APC&EC Regulation 5.406, Land Application Requirements.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical
investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

Comment 291: Please deny the Regulation 5 permit for the C&H swine factory in the Buffalo River watershed. This industrial operation has no business in the geologically sensitive karst environment of our own national river. Any failures or long term degradation risks a $62M tourism industry in one of the poorest areas of our state. Deny it because it makes economic sense. Deny it out of respect for the Arkansans who came before you who fought to protect it. The potential for pollution from this facility has been proven in karst topography in the midst of tributaries to what many consider to be the most beautiful and pristine area in the central United States. This CAFO is not only a danger to the public health through groundwater pollution and air pollution, but also to federally recognized Endangered and Threatened Species in the caves, air, and in the streams of the watershed. The waste not only will have a negative impact on the environment but can also negatively impact the children that attend the nearby school. People from all over America and all around the world flock to the pristine waters of the Buffalo, our state’s prime national attraction and scenic treasure. However, the smell and waste run-off from this living animal factory will increase repel and horrify tourists. All types of farming and commercial activities in this watershed should be carefully controlled and monitored, rather than there being less monitoring than before.

Summarized Commenters: Joan E. McEwen, Jan Molder, Eleanor Hardesty, Lynn Parker, Nancy Cunningham, Jeffrey Short, Steve Blumreich, Teresa Turk, Marti Olesen

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.
APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes, rock outcrops, and neighboring occupied buildings are required by regulation and are included in all APC&EC Regulation 5 permits.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

The Department emailed public notice of the draft permit to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, the Department of Arkansas Heritage, and the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health or Endangered and Threatened Species from the agencies with the jurisdiction over these matters.

Consideration of odor from agricultural facilities is generally not within the Department’s regulatory authority; however, in order to minimize odor, the APC&EC’s policy is to encourage permittees to adopt a good neighbor policy and consider the use of chemical or biological additives or other best management practices in the operation of liquid animal waste management systems. The NMP contains recommended measures to minimize odors.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land.
application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

Comment 292: It is my lament that we do not allow economic development to infringe upon the health of our country side and consequently our own health. Please, do the right thing and stop this terrible attack on the only naturally, undisturbed river in our country. By definition the operation is a CAFO, with point-source pollution concerns. At least, require that swine waste be burned and trucked out rather than allowed to penetrate the ground and ruin the waters. Economic development is very very possible with a much lower impact on the magical diversity of biology that we are so lucky to have here in Arkansas. Isn't it possible to have more waste management with the swine farm cafo? I know there are technologies that can treat wastewater before it reaches a river. What if a business or service is provided where the farm separates out solids from the waste run off and trucks it away to a remediation plant that creates garden soil through 5 stages?

Summarized Commenters: Brett Michael Scott, Kathy Greenman, Tom Maly, Teresa Seamster, Donald Robinson, Douglas Hay, Sara Casey, Myra Fedyniak, Desda Monaghan, Susan Ulrich, Hayley Kemp

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.
APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

**Comment 293:** I am sick to learn that soon the Buffalo River will be the discharge point for an Industrial Hog Waste Lagoon. Pig waste needs to be deposited on a separate parcel of land away from the pens as ADDED compost not in fresh water rivers as dumped pollution. Do not allow this company to have a license to dump waste in the river. A loophole in clean water regulations allows industrial complexes like hog farms to be classed as area sources, but when concentrated, they are really more like point source. Effluent from hog farms should be strictly controlled to protect important waters like those of Buffalo National River.

**Summarized Commenters:** Larry Bloom, Samuel Booher, Martha Grove, Charlotte Walker, Margaret Weesner

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other
subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 294: I had the opportunity to speak to the owner after I wrote prior cards.
- Why is C&H Farm being the only farm subjected to this process?
- Why are the chicken farms in the area not being regulated?
- Why are both sides of story being told?
- Who is funding the alligence? is Tyson Foods funding this to cover for their waste that is going in the creek?
- Why is only one farm being targeted

Is the C&H Hog Farm Inc still “owned” by a company from Colorado but using a local farmer.
Why no monitoring for biological pathogens in the area?
Why no monitoring? C&H has already proven that they believe that they are going behind the laws and regulations. I feel that monitoring should take place since they are already not following regulations.
What fail safes are being put into place for leakage to get into the water table in the area?
If there is not a discharge, and it is spread on ground will it not flow down into water?
Why is the expert unable to answer the questions presented? He has show again and again he is unfamiliar with area.

I believe after hearing the comments, reading the permit and speaking with the owner, the permit SHOULD be granted.
He is going above and beyond in measures to prevent any waste getting into the Watershed area for Buffalo River.
Plus if you are going to have regulations on one farm then all farms should have them. The chicken farms owned by Tyson Foods should also have to have regulations yet there is none.

Original Commenter: Cynthia Jetton

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public
comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 requires soil analyses every five years and waste analyses annually.

APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

Based on the Disclosure Statement submitted with the permit application by the applicant, the facility is owned by Jason Henson, Richard Campbell, and Philip Campbell.

The Department is not the regulatory authority for the land application of dry poultry litter. The ANRC is responsible for regulating the land application of dry poultry litter.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical
investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

APC&EC Regulation 5.407 sets forth monitoring frequencies for land application of waste and for soils of each field where liquid animal waste has been applied.

**Comment 295:** I frequent the beautiful Buffalo River often and am extremely concerned with hearing the news about permitting a hog farm to dump waste so close to this river. To choose not to monitor and regulate this farm frequently is not only dangerous, but it's incredibly dumb. I apologize for not finding a better term to use, but I cannot imagine how hog waste can be deemed more important than the preservation of such an important piece of Arkansas' history and tourism. Please reconsider choosing hog shit over a river that so many people love and respect.

Original Commenter: Sarah Hatfield

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 requires soil analyses every five years and waste analyses annually.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.
APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

APC&EC Regulation 5.407 sets forth monitoring frequencies for land application of waste and for soils of each field where liquid animal waste has been applied.

Comment 296: Opponents continually raise the "potential" of the "threat" of a catastrophic lagoon failure. They cite the failure of a lagoon on a North Carolina hog farm that released 22 million gallons of treated waste into the Neuse River. What they fail to mention is this lagoon failure came after what was determined to be a 500-year storm event and was largely due to an unauthorized dam alteration and improperly maintained land application equipment. In Arkansas' long history of hog production there has never been a catastrophic lagoon failure. Furthermore, in December 2015 Arkansas and the Mt. Judea area experienced a 500-year storm event. The area received over 15 inches of rain over a two-day period. Because of the extra lagoon capacity and the diligence of the farm family, they were more than prepared to weather these storms and the farm's performance exceeded expectations.

In addition, a study was conducted by the U.S. Geological Survey in cooperation with the Natural Resources Conservation Service, the University of Arkansas, and the Arkansas Department of Environmental Quality to examine swine waste storage lagoons in a mantled karst terrane (Appendix F). The study evaluated potential leakage from existing holding ponds and a settling basin as well as a newly constructed Anaerobic lagoon at the University of Arkansas' Savoy Experimental Watershed. The Savoy Swine Facility is a demonstration farm that provides a long term model for environmental management. The study points out that the "Savoy Swine Facility is located within the Springfield Plateau, which is underlined by nearly flat lying Mississippian-age cherry limestones and limestones" and has "[k]arst features such as springs, sinkholes, losing streams, caves, and conduits...in the study area."
Water quality samples were collected from several sampling locations which included wells, springs, seeps, and an interceptor trench. The study concluded that "very little leakage from the waste holding ponds and settling basin occurs" and goes on to say the reason for minimal leakage is due to the high solids content in the animal waste which provided a seal significantly reducing seepage. The study concludes with "[biased on these results, the swine waste lagoon...is minimally affecting the ground-water quality of the area.

If past operations and a study performed by the university of Arkansas are not enough, the ADEQ conducted a single boring and sample collection at the C&H Hog Farms facility. The drill study was conducted due to interpreted results of an electrical resistivity imaging (ERI) which was perceived to show vertical leakage from the waste storage ponds and a possible fracture. Concerns from citizen groups opposed to the hog farm recommended a subsurface investigation, despite the fact that BCRET direct measurements showed otherwise, to verify if the ponds were leaking at the "fracture". A third party was hired by ADEQ to prepare and execute a site investigation work plan as well as prepare a final study report. Key ADEQ staff which included a Professional Engineer and Professional Geologist reviewed the final study report and ADEQ unanimously concluded "[t]here was no evidence of a release from the storage ponds.

Original Commenter: Evan Teague for Arkansas Farm Bureau

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section
651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

**Comment 297:** The review and approval of the initial C&H Hog Farms permit application (Permit 5264-W) by Water Division Engineers to allow the land application and disposal of a large volume of untreated hog waste in the Big Creek watershed under a General Permit using Confined Animal Operation (CAFO) regulatory guidelines was at best poorly conceived and poorly executed, by Water Division staff. The initial C&H permit application for a General Permit to land apply hog waste at this location was never reviewed by any of the Professional Geologists working in the Water Division or by any other ADEQ staff geologists, prior to the permit being issued. To my knowledge, NONE of the ADEQ staff Geologists were ever offered the opportunity to participate in the C&H permit application review process.

The C&H permit application was reviewed and approved exclusively by the ADEQ Engineers working in the Water Division. Consequently, any potential problems concerning the release of liquid waste into the local groundwater supplies from the manure holding ponds at C&H were never discussed or evaluated by ADEQ Geology staff. In addition, the potential for waste contaminated surface water runoff to be discharged into Big Creek the potential for the infiltration of waste contaminates into ground water from the land application sites through the underlying karst limestone geology was never discussed or reviewed by any ADEQ Geology staff, prior to issuance of the C&H Farm's initial permit.

ADEQ staff Engineers never requested any geologic borings be installed or performed any additional geologic evaluation of the proposed holding pond locations prior to issuing the C&H Hog Farm permit. The known presence of karst geology beneath the proposed locations for the manure holding ponds and
the proposed land application sites should have raised a major "Red Flag" for any ADEQ Engineer reviewing this permit application.

The limestone geology beneath the hog farm site and beneath the land application sites and the region is known to be highly fractured, with numerous voids and conduits which move surface water and ground water rapidly through a vast system of inter-connected fractures, solution channel and springs just inches below the soil profile.

Given the sensitive geologic nature of this proposed hog farm location, the appropriate thing to do would have been for ADEQ Water Division to expand the permit application review process to include the ADEQ Professional Geologist staff in the review process. There was little or no geologic information about the hog farm or the land application sites provided in the C&H permit application. Therefore, in order to evaluate the geology of a site you need site specific information. Therefore, the reviewing Geologist would have most likely requested an additional geologic evaluation be performed in and around the proposed holding pond locations prior to approving construction of these manure holding ponds.

Additional borings placed in and around the proposed holding pond locations would have provided the additional data needed to determine if there are any karst features present beneath the holding ponds such as solution channels, caves, or void spaces which could impact the integrity of the constructed pond liners and/or provide an avenue for rapid transport if and when any liquid wastes are released from these liquid waste holding ponds. If this data had been requested and provided by the applicant, the reviewing Geologist could have in turn, had input in the permit review process and assisted the reviewing Engineers in making informed decisions regarding the site itself and the larger issue of whether it was appropriate to approve a permit a hog farm at this location at all.

If ADEQ had given its Geologists an opportunity to review and comment on C&H's permit application, it is highly unlikely any of the Professional Geologists performing the review would have signed off on or approved the proposed permit for the C&H holding ponds locations without requesting additional geologic data be gathered about the proposed holding pond locations and proposed land application sites.

I believe the permit application review process conducted by the Water Division Engineers for the C&H Hog farm permit application was severely flawed, as it failed to adequately consider several issues the first being the potential impact of locating this hog farm and its associated land application sites on the shallow karstic limestone geology found beneath the site, prior to issuing the final approved permit to C&H. In addition, Water Division Engineers were clearly malfeasant in their review of the C&H permit application as they failed to
consider missing key data needed to properly and adequately evaluate the potential environmental impact of this hog farming operation on the local environment. As an example, the Applicant was required to submit an Environmental Assessment (EA) as part of the hog farm permitting process.

The EA prepared for and submitted by C&H in its permit application barely mentions and/or discusses the subsurface geology found beneath the sites and failed to even mention the shallow karst limestone found beneath the site and/or discuss any possible impacts hog farm operations may or may not have on shallow local ground water supplies present beneath the farm and land application sites. The EA also failed to discuss any potential impacts to surface water quality or ground water quality from waste infiltration or waste water runoff at the land application sites associated with this hog farming operation.

It is clear, Water Division Engineers and ADEQ Senior Staff by overlooking these omissions in the C&H permit application and by not requesting additional information be provided by the Applicant in regards to these omissions, ADEQ failed to adequately review the C&H permit application as submitted, and therefore should not have issued the final permit to C&H until such time as these deficiencies in the permit application were addressed. It is also my opinion, ADEQ was also malfeasant by not having an ADEQ Registered Professional Geologist or any other Geologist from any Agency Independent or otherwise review and comment on this proposed hog farm permit prior to its approval and issuance.

Original Commenter: Gerald Delavan

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

This permit application was reviewed by technical staff, including Professional Geologists.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6
permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

The Environmental Assessment was prepared by the United States Department of Agriculture Farm Service Agency and the United States Small Business Administration as part of their process in issuing loan guarantees, which is not part of the permitting process for permits issued by the Office of Water Quality.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504(a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

**Comment 298:** If there is evidence this farm is impacting local water quality how can ADEQ allow the existing hog farm operation to expand and increase the volume of waste manure disposed?

Original Commenter: Gerald Delavan

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

Comment 299: Will any additional geologic site investigations and/or environmental assessments going be performed as part of the permit review process?

Original Commenter: Gerald Delavan

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 300: Will any additional boring be placed down gradient from the existing holding ponds to monitor for possible pond leakage?

Original Commenter: Gerald Delavan

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
Comment 301: Please explain why the holding ponds have a permitted, allowable leakage rate under this permit.

Original Commenter: Gerald Delavan

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Pond liner design in Appendix 10D of the AWMFH includes an allowable seepage rate.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 302: The Applicant is applying for a "No Discharge Permit". Please explain how a no discharge permit can have a permitted leakage rate.

Original Commenter: Gerald Delavan

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Pond liner design in Appendix 10D of the AWMFH includes an allowable seepage rate.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 303: How do you determine if the nutrient loading capacity for site soils has been exceeded at the land application sites? What happens when the nutrient loading capacity of a specific field is reached?

Original Commenter: Gerald Delavan
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The API is used to develop loading rates for land application of liquid animal waste and is used to determine the phosphorus runoff classification. There are many factors taken into account to determine whether land application on a specific field is allowable. Nutrients in the land application sites soil are some of the factors used to calculate the API; however, they are not the determining factor. A field with high soil test phosphorus may still be appropriate for land application. If the API classifies a land application site as high, land application of liquid animal waste cannot occur.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA1029¹, “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA9516² states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504

(a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 304: Will ADEQ allow a set of synthetic liners be placed over these flawed Clay Liners that have cobble-size coarse material clearly still in them?

Please review Appendix C. This is a public comment I made in opposition of the Major Modification (synthetic liners and cover) for the same reason I mentioned above. I added it to show it was relevant then and is still relevant.

Original Commenter: John Murdoch

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 305: There is nothing like flies covering the eves of houses and puking in the mornings as you try to tend to your chores. How about the asthma illness’ and the kids who have to go outside on the playground while hog waste is being spread around their school? Have you heard one classmate to another say, “hogs are stinking up the air?” What about a comment made by a teacher to her students when they remarked the hogs stink and they can’t stand to play outside, ”that’s the smell of money”? Whose going to tell those children that C&H and ADEQ have now permitted fields in all directions of the school, not just south and west? Whose going to tell those children the headaches, runny noses, asthma and illness’ they experience are creating immune issues that will slowly break down their health?

Whose going to tell the children the Buffalo River is no longer a place to swim or fish and that recreation is limited to staying out of the water and throwing back your catch? This year I was on a canoe trip, two days into the trip my husband and I both became extremely ill. In our 25 years together we have never been so ill nor have we ever had the same issue at the same time. We both believe we contracted something from a swim at a favorite spring below Big Creek, possibly we licked the water from our lips and exposed our systems to “rage”. I also received a phone call from a high school friend telling me of 2 of their youth whom on a June, 7 day Buffalo River canoe trip became so ill they still don’t
know if both will survive. How many others are out there we don’t know of? No agency wants to tell the public the Buffalo River is a hazard and that 6500 hogs (equivalent to a 15,000 town of people) waste is being applied to thin soils with rapid transport to the streams, creeks, wells and aquifer of this state. No one wants to take responsibility, do you?

The April 4, 2001 report by Dr. William Weida, Department of Economics, the Colorado College, Colorado Springs, CO Nutrient Management Problems defines many of the issues with stream and groundwater near cafo’s.

“The pathogens present in hog manure are not found in inorganic chemicals. These pathogens could be transported to ground water supplies through improperly sealed wells or other naturally occurring pathways. Studies released since 1999 have found that:

(a) Swine herds are a potential animal reservoir for Swine Hepatitis E Virus and this virus is present in fields to which manure has been applied and in water waste from these fields. Swine Hepatitis E Virus may persist in the environment for at least 2 weeks and possibly longer.15

(b) A broad profile of chemical and microbial constituents are present in both ground and surface water proximal to large-scale swine operations—chemical (pesticides, antibiotics, heavy metals, minerals, and nutrients) and microbial (Escherichia coli, Salmonella sp., Enterococcus sp., Yersinia sp., Campylobacter sp., Cryptosporidium parvum) contaminants were present.

(c) Antibiotics are present in waste generated at confined animal feeding operations and may be available for transport into surface and ground water.17

These data directly contradict the contention the risk of groundwater contamination from hog manure is no different than that from inorganic fertilizer. In fact, the use of animal manure for fertilizer carries with it not only all the contamination issues associated with inorganic fertilizers but also a large number of additional pollution and health concerns.

Hog waste from a large confined feeding operation is a waste application permit. Hog and humans can transfer bacteria and pathogens back and forth. Applying more than the agronomic amounts results in scours in calves and even death of the animals, kidney and liver failures, weedy fields, excessive nutrient runoff (Reg 5.303), and algae growth in streams, loss of aquatic life such as the small mouth bass, muscles, and insects that bats and fish feed upon.

Here (Photo on right) below Gilbert the waters are choked with algae on the impaired stretch of the Buffalo River. The algae was reported for over 30 miles of river. I witnessed at 11.

Original Commenter: Carol Bitting
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Consideration of odor from agricultural facilities is generally not within the Department’s regulatory authority; however, in order to minimize odor, the APC&EC’s policy is to encourage permittees to adopt a good neighbor policy and consider the use of chemical or biological additives or other best management practices in the operation of liquid animal waste management systems. The NMP contains recommended measures to minimize odors.

The Department provided public notice of the draft permit via email to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, the Department of Arkansas Heritage, and the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regard to public health or Endangered and Threatened Species from the agencies with the jurisdiction over these matters.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

ADEQ is working to support a collaborative study with the Arkansas Game and Fish Commission, US Geological Survey, and the National Park Service focused on the distribution and causation of the rapid expansion of filamentous algae in the Buffalo River.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”
Comment 306:  Page 6 of the Statement of Basis; ADEQ left out the following sources for proper permitting procedures. Why weren’t the following used for this permit in a most sensitive karst environment and the First National River, an Outstanding Resource Water with the highest protection, when they are included in proper permitting procedures?

https://www.adeq.state.ar.us/water/permits/nodischarge/individual.aspx

Here are 4 of the sources that are omitted from proper permitting procedures;

• APC&EC Regulation 2,
• The USDA Natural Resources Conservation Service Technical Publications
• (a) Field Office Technical Guide and
• (b) Agricultural Waste Management Field Handbook

Original Commenter: Carol Bitting

Response:  The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response:  The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 307:  Page 6, 2nd paragraph increases the number of boars and sows and violates Regulation 5.901 (d) A permit renewal, permit modification, or new permit issued pursuant to Reg. 5.901(C) shall not increase the number of swine permitted at a facility.

2012, ARG590001 design calculations section C2 (b) to determine minimum storage requirement it is the sum of the animal waste produced, plus the spillage and wash water, plus the pit recharge produced in 180 days.

These following figures are estimates not exact numbers, but if these were accurate you would see this permit increases the sows, boars, pigs and the number of pounds of hogs raised at C&H over the year increasing waste production.

ARG 590001 NMP Section C2: Design Calculations Waste Production A. (3) 3 boars @ 450 lbs, 2,100 Gestating sows @ 375; 400 lactating sows @ 425 lbs, 4,000 pig @ 10 lbs
ARG 5900001 weekly average of hog weight by annual report 2012-2016 = total hog # \div 4 \text{ years} \times \text{average #} \times \text{pounds} = \text{total hog weight}

boars 3 @ 450 = 1,350.00 pounds of hog weight
Gestating Sows 2011.75 @ 375 = 754,406.24 pounds of hog weight
Lactating Sows. 400 @ 425 = 170,000.00 pounds of hog weight
pigs 856 @ 10 = 8,560.00 pounds of hog weight
total 934,316.25 total hog pounds a week

5264-W (Regulation 5 revised, modified numbers)
boars 6 @ 450 = 2,700
Gestating Sows 2252 @ 425 = 957,100
Lactating Sows 420 @ 400 = 168,000 weight has decreased by 25 lbs per hog in 2016 NMP pigs 750 @ 14 = 10,500 pounds (permit states average 1,500 shipped weekly) this figure was Section 2 P. 6.
total 1,138,300 weekly hog pounds for 5264-W

This is a difference of 203,983.75 pounds of hog weight per week increase. With lagoon and nutrient management plans relying on hog weight for calculations this will increase the waste output and the storage limits and increase the need for more application fields. This will also increase the impact to the water quality by increasing the output on the already phosphorus saturated fields.

I also would suggest refiguring the pig output. If 2,412 sows produce an average of 856 pigs weekly over 4 years then 2672 sows (an increase of 260 sows a year at the facility) will increase pigs, not reduce them as written in this permit. Will you please explain how you came about reduced figures by increasing sows and boars?

ARG 590001 Section C2: Design calculations "Liquid manure storage is measured by unit waste production (UWP) in cubic feet per day per 1,000 pounds of animal"

Do you see anything in my calculations or reasoning that appears wrong or that there will be less waste due to increase in sow numbers? When sows and boars are increased pigs are increased. The average number of pigs in the last 4 annual reports average 856 yet 5264-W states only 750. Can you clarify this for me?

Original Commenter: Carol Bitting

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.
The number of swine previously permitted under the APC&EC Regulation 6 Permit (Permit Tracking No. ARG590001) was 6,503 while the maximum number of swine proposed under the individual APC&EC Regulation 5 Draft Permit (5264-W) is 4,178. The permit application reduces the maximum number of swine allowed at the facility by 2,325. Because 5264-W reduces maximum number of swine allowed, the potential for the total amount of waste produced is less than previously permitted under ARG590001.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 308:** Condition # 28. If ADEQ is already expecting this permit appealed does it seem that the agency should rethink the permitting of a large swine cafo in the Buffalo River watershed? Is the agency taking the public comments and expert reports and the water quality criteria into consideration? Has the department predetermined it is going to approve this permit regardless of any and all scientific data, public resistance, or recommended council? Please supply answers.

Original Commenter: Carol Bitting

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 309:** Page 2 Part III, 5. Be sure Oil and Hazardous Substance Liability pertains to this permit. I’m not sure about oil but if you consider hog waste hazardous then we need to include that in the transportation of hazardous substance. If a disclosure statement is included a better determination is whether C&H is financially or mechanically responsible to handle a crisis of a hazardous substance. I think it important to note CDL’s, spill training, qualifications, etc. Will you please explain?

Original Commenter: Carol Bitting
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 310: #12 Discarded or land applied? I’m not sure this is what you mean. Could you please define “removed substances” as relating to a waste management plan? This condition starts off with “solids removed” and Regulation 22, page 1-8 under solid waste definition includes “agricultural operations”. According to definition of Liquid Waste Management System in Regulation 5 chapter 2; Definitions it means a system used for the collection, storage, distribution or disposal of animal waste in liquid form generated by a confined animal operation. ARG590001 states Condition 7.6 of the permit does talk about removed substances but I can only assume somewhere there are management practices to follow, here are from previous ARG590001 permit. Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of waste waters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering the waters of the State. Written approval for such disposal must be obtained from the ADEQ Director, unless management of the material is contemplated by the Nutrient Management Plan.

Original Commenter: Carol Bitting

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 311: #13. In a karst terrain 24 hours could be too late to capture the pollutant from making it to the streams. Spills, leaks, or any discharge must be handled immediately. See Terry Paul, ADH comment “The only thing really evident at this point is the system flushes well after a rainfall event.” See Arkansas State
Geology road guide for description of the area of Big Creek and surrounding spreading fields.

The Confederate Fault may help understand why the section of the Buffalo River is impaired at Tyler Bend. See
http://buffaloriveralliance.org/resources/Pictures/scanned%20reprints%20GWSW%20Big%20Creek%20karst.pdf also;
http://buffaloriveralliance.org/resources/Pictures/Brahana%20JAAS%20Article.pdf
See Regulation 5.402, Chapter 7, Part 651-Geologic and Groundwater Considerations

Original Commenter: Carol Bitting

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

Comment 312: There is no plan for spills yet the terrains are steep, roads are windy and narrow crossing many tributaries, sink holes with heavy laden fast moving trucks in a hurry to get the next load of waste dumped. Very important is the financial ability of C&H to support a disaster in the event of “at fault accidents”.

Original Commenter: Carol Bitting

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public
comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Transportation of liquid animal waste via tanker truck is an acceptable method of waste transport. The Department does not regulate liability insurance for motor vehicles.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

**Comment 313:** Page 3 of Part II; Condition #22, whose going to ship waste and are there specific requirements for shipping waste? Is C&H qualified to ship waste? Would specific skills be needed for shipping waste? Can this waste be shipped out of the County? State? Country? What type container should hog waste be shipped in? Is there a specific placard for the shipping container? Would you please expand an explanation of what this means. Regulation 22 might need to apply here.

Original Commenter: Carol Bitting

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Waste from a permitted facility may be transferred to another county as long as it is being transferred to a permitted land application site. APC&EC Regulation 5 does not set forth any additional specific qualifications or skills for transferring waste. Transportation of liquid animal waste via tanker truck is an acceptable method of waste transport.

APC&EC Regulation 22.202(a) states, “Applicability - A person who engages in the business of hauling solid waste must obtain a license from the Regional Solid Waste Management Board.”
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 314: Condition # 26. It doesn’t appear that the past has made facilities more responsible with time. In fact facilities such as these become outdated quickly. To allow less observation and frequency of monitoring with time seems backwards. Can you explain how with years there will be less likely hood of pollution and levee breaching? See the ADEQ study done in the 1990’s that explains the problems with older facilities and lagoons that were full of solids that no longer held the liquid waste but it flowed over the levees into the streams.

Original Commenter: Carol Bitting

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 315: It appears to me that ADEQ engineers did not notice that the soil samples used for the application are over a year old, and some are nearly two years old. It is unreasonable to assume the soil conditions would be the same, particularly on fields which have been receiving swine manure and/or poultry litter. It also appears that ADEQ engineers did not see that the Nutrient Management Plan (NMP) is based upon the lowest Phosphorus (P) concentration ever recorded from Pond 1. I also see no evidence that ADEQ engineers required a NMP spreadsheet specific to pond sludge, even though the draft permit would allow C&H to clean their ponds in order to install synthetic liners.

Original Commenter: Charles Bitting

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 316: In regard to Permit Number 5264-W; AFIN 51-00-0016, I ask you to deny the C&H permit. The permit as written contains provisions that are inadequate to protect the environment and most importantly, the Buffalo National River just a few miles downstream from the factory. My reasons for being against the permit are that the nutrient management plan is unrealistic; this permit allows even more hogs into the facility; and the consequences of having this factory sitting on karst don’t seem to have been taken seriously by ADEQ. If this permit is allowed, the C&H operation will continue to degrade the water and air of the Buffalo River watershed as it has for the four years since the startup of this factory farm. It seems to me that ADEQ is actually trying to pave the way for this factory which never should have been approved-to not only continue to operate but expand its operations. ADEQ is supposed to be the state’s “primary environmental protection agency”, according to its public outreach brochure. I would like to see the agency act in accordance with its mission statement and actually put protection of our natural environment first. Err on the side of caution and common sense. Protect the BNR first.

Original commenter: Carmen Quinn

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

The ADEQ Office of Water Quality Planning Branch routinely collects and evaluates water quality data from approximately 300 stations across the state. The Department is required every two years by 40 CFR 130.7(b)(5) to assess all readily available data for attainment of water quality standards. The EPA did not include Big Creek on the approved 2016 303(d) list.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 317: Thank you for opportunity to submit my comments and concerns. I am writing to ask you to deny the C&H Hog Farms, Inc., application for permit 5264-W until a system is in place to monitor for contamination entering the river from the hog waste, and a plan to remediate contamination if it occurs.

Original commenter: Daniel Safer

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The ADEQ Office of Water Quality Planning Branch routinely collects and evaluates water quality data from approximately 300 stations across the state. The
Department is required every two years by 40 CFR 130.7(b)(5) to assess all readily available data for attainment of water quality standards.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 318:** I am writing to ask you to deny the C&H Hog Farms, Inc., application for permit 5264-W based on the threat the operation poses to our first national river. The hogs generate more than 2.5 million gallons of urine and feces annually that has the potential to seep through the porous ground and eventually into the river. While the results of your drilling study seem to suggest that there is no evidence of seepage from the storage ponds, it is important to note that groundwater flow is a slow process. Who is to say that there couldn't be seepage in the long term? Considering that much of the subsurface is limestone (which is prone to fracturing and rapid water seepage), it seems likely that the threat of wastewater seepage is quite high. Did the drilling study not take this into account? As the nation's first national river and a unit of the National Park System, the Buffalo National River belongs to all Americans and its protection now, and for future generations, is important to me. I encourage you to reconsider.

Original Commenter: Joshua Vandehey

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The
necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Although the analytical data from the Harbor Drilling Study did not indicate a leak at the borehole drilling location at the time of the sampling, the Study does not support the conclusion that there is not any leakage from the ponds.

Comment 319: My concerns about the permitting of the C&H facility for large-scale sow farrowing include sampling protocols of the millions of gallons of waste. I have seen some discussion of “Monitoring and Reporting Requirements” in part 6 of the fact sheet.


While the parameters are listed in the ARG590001 permit, I cannot find details about annual, thirty-day, or single day limits that are more in line with the EPA NPDES guidelines. Is there an NPDES Form 2C available for this Newton County facility? Apparently this comes into effect when there is a discharge to the receiving waters in the stream segment whether unplanned or not. While I realize that a CAFO is not the same as municipal wastewater treatment plant, I would like the monitoring requirements to be changed to report once a month, so that in the event of a massive discharge into state waters, a biological profile would help with the development and execution of an emergency environmental remediation plan.

I am also concerned about the transportation of wastes to be applied to one of a dozen or more sites listed in the permit at hand. Arkansas has obviously experienced the negative consequences of spills of petrochemicals through leaks in the pipelines – Mayflower spill springs to mind. What about the accidental discharge of wastes by trucks, pipelines, or other infrastructure or equipment to direct the CAFO waste to land? Over what routes will the waste be transported? Will it be conveyed directly or indirectly over environmentally sensitive waters (ESW) or naturally scenic waters (NSW) to get to the receiving lands comprising 630 acres?

What are the reporting, monitoring, and compliance controls for the disposal sites? Are the results from sampling and monitoring going to reported separately or composited?

I think there needs to be more input on the geological characteristics of the area: karst. “Common geological characteristics of karst regions that influence human
use of its land and water resources include ground subsidence, sinkhole collapse, groundwater contamination, and unpredictable water supply.” as noted in http://karstwaters.org/educational-resources/what-is-karst-and-why-is-it-important/ retrieved 1-Apr-2017 12:15 pm EST.

While I understand that clay liners will be replaced with synthetic ones at the site for shielding groundwater from the lagoons, what protection on the land sites will be required to prevent the contamination of underground aquifers in this region given its location in the karst region? If the environmental engineering is correct, then millions of gallons of waste can be spread over the lands, but what is the environmental impact upon the fields if we discount agricultural run off from the fields?

Given that the geographically dispersed lands are covered as if it were one site for the permit, what is the effect if one of the disposal sites goes out of compliance?

How many have to go out of compliance before a permit is stopped or withdrawn?

ARG590001 permit comment on recycling Would like to see another condition added to the permit, one where Cargill (the parent company of C&H CAFO operation in Newton County) commits to participating either directly or indirectly in alternative nutrient recycling and recovery programs of the type already recognized at Challenge.gov and allocates resources to come up with better nutrient management practices at its CAFOs.

(see https://www.challenge.gov/challenge/nutrient-recycling-challenge/)

Original Commenter: Steve Hodge

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5.407 requires monitoring and reporting by all APC&EC Regulation 5 permitted facilities.

Transportation of liquid animal waste via tanker truck is an acceptable method of waste transport. Transportation routes are outside the scope of this permitting decision.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. The AWMFH Part 651.0504 states that karst geology “does not necessarily imply that agricultural wastes cannot be used. It does, however, indicate a need for careful planning and design.”
Based on the Disclosure Statement submitted with the permit application by the applicant, the facility is owned by Jason Henson, Richard Campbell, and Philip Campbell.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504(a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

**Comment 320:** Has a real extent of subsurface hydrology been mapped or estimated for regions which might be affected by a breach in these ponds/tanks?

Original Commenter: Keith Dopson

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit. The permit application does not contain a groundwater flow direction study as recommended by AWMFH Chapter 7. The Department has determined that a groundwater flow direction study is necessary due to the specific siting of this facility.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other
subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504(a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 321: My question & comment concerns the baseline data for any land application not in the original C&H permit. At least some of these land application sites are not in the Big Creek watershed. Who will be gathering the baseline data? When will these data be gathered? Will the data be gathered before the permit is finally approved? If not, why not? Where will the sampling sites be located? It will not be possible to measure any increase in pollution from hog waste without baseline data. I oppose approval without these data. Will the C&H Farm continue to use the fields in their original permit, under the new permit? Have all of the fields being proposed for this permit been permitted previously for land application of hog waste?

Original Commenter: Dennis Larson

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not require stream monitoring for liquid animal waste management systems.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 322: The original C&H Hog Farm permit was wrongly allowed. This new permit must be denied. The factory is located on karst terrain which has been documented time and again. It will only be a matter of time until irreparable harm to the Buffalo National River. Already USGS and NPS data is showing lowered dissolved oxygen levels. Annual Farm reports indicated fields that are already high in phosphorous and nitrogen. A storm event would be devastating to the BNR. The new permit application shows an increase in the number of sows, but a decrease in the number of piglets from 4,000 to 750. Please answer these questions:

- Is C&H Hog Farm located on karst?
- Does the data show lowered dissolved oxygen levels in Big Creek and the BNR?
- Are the application fields reaching maximum absorption of nutrients?
- Is the nutrient management plan sustainable for year after year application of the hog waste?
- Who will be responsible for clean-up during a major storm event?
- Why does the number of swine/piglets on the new permit vary so much from the original permit?
- Has C&H violated the Moratorium of no increase in swine numbers in the watershed?

Thank you for considering these comments and responding to my questions. This permit must be denied.

Original Commenter: Rebecca Corley

Similar comments were received from: Fay Knox

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.
APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

The EPA did not include Big Creek or the Buffalo National River on the approved 2016 303(d) list.

The API is used to develop loading rates for land application of liquid animal waste and is used to determine the phosphorus runoff classification. There are many factors taken into account to determine whether land application on a specific field is allowable. Nutrients in the land application sites’ soil are some of the factors used to calculate the API; however, they are not the determining factor. A field with high soil test phosphorus may still be appropriate for land application.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

The number of swine previously permitted under the APC&EC Regulation 6 Permit (Permit Tracking No. ARG590001) was 6,503 while the maximum number of swine proposed under the individual APC&EC Regulation 5 Draft Permit (5264-W) is 4,178. The permit application reduces the maximum number of swine allowed at the facility by 2,325. Because 5264-W reduces maximum number of swine allowed, the potential for the total amount of waste produced is less than previously permitted under ARG590001.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.
The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA1029, “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA9516 states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504

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4 https://www.uaex.edu/publications/PDF/FSA-9516.pdf
(a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 323: Friends of the North Fork and White Rivers (FOR), a nonprofit watershed organization dedicated to clean, healthy waters in the middle section of the White River watershed, opposes the issuance of the Draft Permit under Regulation 5, for the storage and land application of waste from C&H Hog Farms. Big Creek is the fifth largest tributary of the Buffalo National River (BNR) and comprises 8% of the total drainage area. Karst hydrogeology is present throughout the Big Creek Valley. The base flow of the BNR in low flow seasons primarily comes from groundwater in its watershed.

The original Regulation 6 General Permit that was issued to the hog farm did not require karst-specific scientific methods of investigating the hydrogeology of the permit site as is required by section 5.402 of Regulation 5. Because this no-discharge (into Waters of the State, which includes groundwater) permit application fails to adequately consider the karst topography of the region in order to avoid degradation of the Big Creek and BNR, the permit should be denied. According to Federal Code, concentrated animal feeding operations (CAFOs) of this size are considered to be point sources of waste discharge. Accordingly, an Individual Permit under Regulation 5 or an Individual NPDES Permit should have been required. Ample scientific evidence exists through studies of the Arkansas Game and Fish Commission, the National Park Service, the United States Geological Survey, the Big Creek Research Extension Team, and a team of scientists led by Dr. Van Brahana that significant degradation of the water quality of Big Creek and BNR has occurred since the beginning of the C & H Hog Farm. Issuance of this permit violates the Clean Water Act’s anti-degradation policy. The draft Permit does not insure the water quality of the BNR, an Outstanding National Resource Water, will be maintained.

The requirement of the ADEQ to have only one test drill site to prove no contamination of groundwater or karst risk at the two storage ponds was not a scientifically valid investigation. It is unethical for the ADEQ to portray to the public that this was the case. Much of ADEQ’s action regarding the permitting of the hog farm, from the beginning steps, have only served to erode the public’s confidence in the agency that is charged with protecting the state’s waters.

Thank you for your consideration of these comments on the Draft Permit 5264-W.

Original Commenter: Sam D. Cooke

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.
APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2 Chapter 2. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to dictate regulatory authority over private land within the watershed, other than what exists under local, state, or federal law.

The Department acknowledges the comment about the drilling study. This issue was previously covered during final report comment period for the Harbor Environmental Drilling Study.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.
The Department is actively engaged in developing an antidegradation implementation procedure to address the revision of 40 CFR § 131.12. The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2 Chapter 2. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to dictate regulatory authority over private land within the watershed of an ERW, other than what exists under local, state, or federal law.

**Comment 324:** Does ADEQ believe more borings are needed to define the geology per AWMFH before a Regulation 5 permit can be mistakenly issued for the CAFO?

Original Commenter: Ray Quick

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit. The geologic investigation of the waste storage ponds does not comply with AWMFH Chapter 7.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.
Comment 325: Please explain why ADEQ has approved synthetic liners to be placed in Waste Lagoons 1 & 2 when there are numerous large serrated rocks exposed in the clay liner that are in violation of C&H’s QA/QC plan and should not be there?

Original Commenter: Ray Quick

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 326: C&H manure application fields are located on highly fractured mantled karst in the Boone Formation of the Springfield Plateau. Numerous studies and USGS maps indicate C&H and its 17 spreading fields contain thin soils “feather-edge up to 8 meters” and are “underlain by thin chert and limestone layers that have been fractured by slight uplift”. In addition, soils are underlain by a system of well-developed fast-flow pathways and voids which pass water and entrained contaminants downgradient to resurgent springs and streams quickly and with little attenuation of the pollutants” in the Boone Formation. Since 2013, C&H has distributed an average of 2.5 million gallons of hog waste yearly onto the permitted fields.

All 17 fields are now above optimum soil test phosphorus (STP) agronomic levels. The latest soil tests available were collected in December, 2015 and since that time over 3 million gallons of additional untreated hog manure have been spread on these fields. The above optimum level for phosphorus for all fields was achieved in less than 3 years requiring C&H to find new fields to deposit waste. Currently C&H is working in conjunction with EC Farms to obtain a permit to spread up to 6.5 million gallons of waste generated by the C&H hog factory to over 30 different locations in the BNR without independent monitoring. If this permit is approved, C&H waste will expand the spread of untreated hog sewage more broadly and extensively throughout the Buffalo National River watershed. The Little Buffalo River may see its water quality precipitously decline once manure application in the watershed begins.
Under Regulation 5, ADEQ is not required to use the Arkansas Phosphorous Index (API), but C&H has requested its use as a method to evaluate phosphorous levels to determine if they can continue to apply manure. The API does not take into consideration the underlying geology of a region and thus does not consider the probability of water quality degradation and contamination through sink holes, voids, fractures in pastures. The API functions as an excessively complex algorithm that allows over-application of nutrients that consistently exceed the agronomic rate of absorption. More importantly, the public does not have access to the model or algorithms used to calculate an API by field. These algorithms are not publicly available making independent analysis of the model difficult, if not impossible. Using the API that allows exceedance of crop adsorption leads to long term build of phosphorous. Up to 80% of applied Phosphorous can “enter stores in soil, river sediments, groundwater, wetlands, riparian flood plains, lakes and estuaries. These stores can release legacy Phosphorous as storage capacity becomes saturated…” The buildup of Phosphorous from manure application in the BNR can result in continued release of Phosphorous into the watershed for many decades and in some cases centuries and can mask “downstream improvements in water quality”.

One of the key authors of the API is Dr. Andrew Sharpley at the University of Arkansas and the leader of the tax payer funded Big Creek Research and Extension Team (BCRET). He has an apparent conflict of interest in researching the hog operation that uses the API and is a research professor who must search and receive outside funding to continue at the UA. Much of his funding comes from large corporate agriculture, the very industry C&H works within. As evidenced by the title, BCRET does not even hide its bias and advocacy of the C&H operation. By its very title “Monitoring the Sustainable Management of Nutrients on C&H Farm in Big Creek Watershed” BCRET has demonstrated that the team and its study have lost the pretext of impartiality and objective research. BCRET’s poor sampling design, lack of fundamental testing such as DNA tracking, isotope analysis or dye tracing that would determine if C&H was impacting water quality has by design, tried not to find any water contamination or degradation.

The Arkansas taxpayer has spent in excess of $700,000 on the BCRET since its inception, yet no analysis or final report has been presented to ADEQ or the taxpayers who are funding the investigation. Until such an expensive project produces a peer reviewed final report complete with extensive data analysis and interpretation, C&H should be denied any new permits.

Original Commenter: Teresa Turk

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management
Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The API is used to develop loading rates for land application based on phosphorus. The API has been adopted by the NRCS Conservation Practice Standard, Nutrient Management, Code 590 to manage the application of phosphorus in the State of Arkansas. There are many factors taken into account to determine whether land application on a specific field is allowable. While the soil test phosphorus, referred to as “above optimum” by the commenter, is one of those factors, it is not the determining factor. A field with high soil test phosphorus may still be appropriate for land application. The Department only permits land application when the API value is a low or medium class. The University of Arkansas Division of Agriculture Cooperative Extension Service has published guidance documents regarding the API, including the calculations used to determine the risk value, and understanding soil test phosphorus.

The AWMFH recommends reduced application rates and using split application based on soils with severe limitations based on soil depth. For soils with moderate limitations based on soil depth, the AWMFH recommends reduced application rates.

The APC&EC Regulation 5 Permit for EC Farms is outside the scope of this permitting decision.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

The Department did not review or approve the study design and has no authority over the day-to-day activities of BCRET. While the Department may consider the research conducted by the University of Arkansas, questions regarding the study should be more appropriately directed to the University of Arkansas.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is
not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA1029\(^5\), “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA9516\(^6\) states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 327: Please provide documentation and analysis to account for sludge being applied to manure fields. I did not see a different calculation in the NMP that accounts for higher phosphorous and nitrogen contained in the sludge from the manure lagoons.

Original Commenter: Teresa Turk

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

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\(^6\) https://www.uaex.edu/publications/PDF/FSA-9516.pdf
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 328: Please provide a copy of ADEQ’s long term plan to draw down legacy phosphorous stores created by C&H.

Original Commenter: Teresa Turk

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 329: Again, large cobble is still present in the existing clay liners of the holding ponds. Which is a violation of the existing permit as it stands. Due to the poorly constructed clay liner and the apparent long term issues addressing erosion control on the inner sidewalls of the ponds, increased leakage is certain to be expected. While it is the expectation that manure solids will clog subsurface pores beneath holding ponds, that’s an assumption that is taken for granted and has proven to be false even under ideal construction circumstances.

Also, as I already explained how there would not actually be any way to detect a significant change in any kind of steady leak from the holding ponds. If the interceptor trenches are in fact properly placed, which it’s karst, so I would agree that there should be a potential to catch some subsurface movement, but there is no reason to assume that this would be the case in the given setting, then they only have the potential to detect a catastrophic failure in the liner. But this is only a chance. Increased monitoring would have to be required if the Department expects to actually detect an impact, let alone a statistically significant one.

Sinkhole occurrence below the holding ponds should be expected. It’s apparent that other states that understand the importance of taking karst into consideration in their permitting decisions acknowledge this. Missouri bans earthen liners in karst terranes with severe collapse potential. Iowa also bans earthen liners in karst terrain for holding ponds other than for small CAFOs. Minnesota has specific manure holding pond requirements for areas “susceptible to soil collapse or...
sinkhole formation” for karst areas where depth to bedrock is less than 50 feet, and does not allow earthen liners for CAFOs with more than 1000 animals if bedrock is less than 40 feet below liner. That is because it is well understood and acknowledged that CAFOs can easily contaminate groundwater through runoff from land application of manure, leaching from manure that has been improperly spread on land, or through leaks from holding ponds. Even if sinkhole formation doesn’t occur, the holding ponds are undoubtedly currently leaking due to the insufficient integrity of the liner.

PVC liners are incapable of supporting liquid waste over a sinkhole and even plastic liners are susceptible to degradation due to environmental weathering. The only way to provide a moderate safeguard for the very likely potential for contamination from the holding ponds would be to require that these are built to specification for hazardous waste lagoons (steel reinforced concrete) as required by USEPA Resource Conservation and Recovery Act. These requirements are similar to those that are required by Florida, New York, and Ohio for manure lagoons sited in karst terranes. This is because urine and manure can be rather acidic, which can result in the increased dissolution of underlying carbonate rocks. Even more unfortunate is this can lead to weakening of even concrete lined ponds. Since it is standard practice that RCRA programs assume holding ponds and landfills assume leakage, regardless of double liners and leak detection and collection systems, it doesn’t make any sense that this would not be the assumption in this case as well.

Abnormal rainfall events and water table declines are becoming more and more frequent in Arkansas. These issues are known to be the direct result of sinkhole development and are likely to exacerbate the increased potential that is likely to occur below these holding ponds given the karst terrain. Because, again, this is literally our nation’s first national river and if we don’t require proactive and sustainable practices in this watershed then I don’t really know where else they would be more applicable. This is not an assault on landowner rights, and certainly not on farmers. This is just thinking about the big picture and long term consequences.

Original Commenter: Jessie J. Green

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from
sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

The response by the applicant to the referenced inspection report for the compliance assistance inspection conducted on July 23, 2013, was deemed sufficient to the items referenced in the inspection report. A subsequent inspection by EPA documented the corrective actions taken by the applicant to prevent future erosion rills and desiccation cracks.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Seepage from waste storage ponds has the potential to pollute surface and ground water. The record included one recompacted permeability test that is insufficient to determine liner integrity. The necessary soil investigations including, but not limited to, percentage of fines and soil permeability evaluations, have not been performed at this facility in accordance with the AWMFH 651 Table 10-4 and Appendix 10D. Plasticity index analysis was performed on one sample of the in situ clay material in boring 2. The variability in the regolith expected in this geologic setting coupled with the insufficient data creates additional concerns about the siting and soil sources for the clay liner. The required number of borings were not advanced within the pool areas in accordance with AWMFH 651.0704(b)(4); these additional borings would have provided more data for assessment of clay source material. Proper soil investigations for the liner material
are necessary to determine the suitability and location of the clay source material and to consider any additional geotechnical testing to confirm material properties, which will reduce the potential for downward and/or lateral seepage of the stored wastes.

Pursuant to Appendix 10D of the AWMFH, it is the position of NRCS that special design measures are necessary where agricultural waste storage ponds are constructed in soils with high calcium content or highly unfavorable geologic conditions, such as karst formations.

Pursuant to the Memorandum of Agreement between the Board of Trustees of the University of Arkansas System for and on behalf of the University of Arkansas System-Division of Agriculture and the Arkansas Department of Environmental Quality, the study performed by BCRET is being carried out for the use and benefit of ADEQ; however, the study shall be funded and conducted independently of ADEQ and shall meet the requirements of an independent study conducted by professionals in the field of water quality.

Comment 330: As part of a larger effort to map the threats to Arkansas’ species of greatest conservation need, The Nature Conservancy of Arkansas modified the EPA DRASTIC index to more accurately reflect the vulnerability of (relative attenuation capacity of geologic material between the land surface and saturated zone) groundwater in karst terrain, termed DRASTIK.

I spatially referenced overlays of land application maps provided in the permit application in order to create geographic shapefiles of the existing and proposed land application sites in ArcGIS 9.3 (Figure 3). Overlaying the land application sites on the DRASTIK map, the most comprehensive and groundwater vulnerability index specifically calibrated to the karst regions in Arkansas, it is apparent that these locations offer little soil attenuation and land application of waste poses a high risk to groundwater resources (Figure 4 and Figure 5). Using these data to assess risk in sensitive karst terrains, such as the Big Creek watershed, provides a more comprehensive and accurate method of ascertaining potential for negative water quality impacts than simply relying on Web Soil Survey data to assess risk.

Rapid response of the groundwater level is an indicator that karst conditions facilitate rapid flow of precipitation into the ground. This also indicates the importance of relying on dye trace studies to identify sampling locations of where nutrients transported through subsurface channels will eventually emerge, as was suggested by the BCRET expert review team and also ignored. This information also helps emphasize the importance of calculating realistic nutrient loss to

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surface and groundwater sources through land application and manure storage rather than relying on edge of field and nearby surface water monitoring alone.

Original Commenter: Jessie J. Green

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

The AWMFH recommends lower application rates and using split application for soils with severe limitations based on soil depth. For soils with moderate limitations based on soil depth, the AWMFH recommends lower application rates.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.
Comment 331: Since ADEQ has no formal antidegradation implementation plan in place, please describe the process the Department is using to insure protections of Tier III waters and determine when degrading high quality waters is necessary.

Original Commenter: Jessie J. Green

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2 Chapter 2.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department is actively engaged in developing an antidegradation implementation procedure to address the revision of 40 CFR § 131.12. The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2 Chapter 2. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to dictate regulatory authority over private land within the watershed of an ERW, other than what exists under local, state, or federal law.

Comment 332: The allowed design for the holding ponds to meet up to a 25-year rain event is insufficient to protect against the likelihood of a spillage, ensuring future spillage and likely catastrophic failure of the clay embankment with an adjacent land slope of greater than 10%.

Original Commenter: Bob Allen for the Sierra Club

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

**Comment 333:** Standard clay liners for the holding ponds, with an allowable leakage rate of 5000 gallons/surface acre/day, are insufficient considering the porosity of the Karst under the ponds.

*Original Commenter: Bob Allen for the Sierra Club*

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems from being located in karst.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and
the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

**Comment 334:** It is clear that ADEQ made a mistake in issuing a Regulation 6 NPDES General Permit to C & H Hog Farm, Inc. to operate and discharge waste in the Buffalo River watershed. However, the Regulation 5 No Discharge permit is not the remedy for a point source large concentrated animal feeding operation that stores and land applies untreated waste in amounts comparable to a city the size of Harrison, AR. The distinction between CAFO permits and Regulation 5 permits related to karst investigation is noted in a 2013 communication between ADEQ personnel and the Natural Resource Conservation Service. Nonetheless, ADEQ failed to conduct the requisite geotechnical protocol/investigation in accordance with the Field Office Technical Guide and the Animal Waste Management Field Handbook with regard to C & H Hog Farm, Inc. Further, ADEQ makes no mention of karst in its Reg 5 draft permit for C & H Hog Farm, Inc. A Freedom of Information Act request to ADEQ for communications (including memos, notes and/or reports) related to karst and/or karst features with regard to C & H Hog Farm, Inc. for the time period August 2016 to February 22, 2017 has produced no results to date.

Original Commenter: Dane Schumacher

Similar comments were received from: Fay Knox

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 335: I object to the original CAFO general permit issued and the current CAFO Reg 5 permit application for C&H farms due to apparent failure by ADEQ during permit process pertaining to site construction to examine, acknowledge the karst geology aspects that render this type of animal factory unsuitable in the Buffalo National River watershed.

Original Commenter: Debbie Alexy

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other
subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 336: I object to the original CAFO general permit issued and the current CAFO Reg 5 permit application for C&H farms due to ADEQ’s inadequate water quality monitoring plan and methods restricted to surface water testing, selected fields for nutrient samples, and one drill hole near a waste holding pond. Methods which fail to address subsurface streams and underground water flow, as demonstrated by Dr. John Van Brahana, a renowned hydrogeologist, who recently published a peer-reviewed paper detailing results of dye tests confirming that subsurface and underground waters, in the acreages owned or leased by C & H Farm CAFO, used to spread manure discharge from the CAFO, flow directly into the Buffalo National River watersheds from MULTIPLE locations due to the karst geology.

Original Commenter: Debbie Alexy

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize
nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system. APC&EC Regulation 5.407 requires monitoring and reporting by all APC&EC Regulation 5 permitted facilities.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

The ADEQ Office of Water Quality Planning Branch routinely collects and evaluates water quality data from approximately 300 stations across the state. The Department is required every two years by 40 CFR 130.7(b)(5) to assess all readily available data for attainment of water quality standards.

The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504(a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.
Comment 337: I object to the original CAFO general permit issued and the current CAFO Reg 5 permit application for C&H farms due to lack of ADEQ “emergency response plan” information for manure spills in the Reg 5 permit. Is there a written plan on ADEQ website? Who is liable legally and financially for a spill in the Buffalo National River watershed? C & H Farm CAFO or Arkansas taxpayers? Who has authority to call for environmental disaster cleanup? The Arkansas Governor or U.S. EPA or C & H Farm CAFO? Who has responsibility for the cleanup of manure spills for the Buffalo National River watershed? C & H Farms CAFO or Arkansas taxpayers? Who are responders to this type of environmental disaster? Who is responsible for notifying the State Health Department when manure spills or leaks occur for health risk evaluations?

Original Commenter: Debbie Alexy

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

All violations of APC&EC regulations and applicable state laws are subject to enforcement actions by the Department.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.
Comment 338: Once there are spills, which are inevitable, I predict the government won't pay for a clean up as this region is remote. But really, let’s think ahead, where are the rules in place that would require C & H to pay a surety bond to pay for any spills incurred? This should be factored in to their operating costs. This CAFO is like a city of 30,000 people, which by law would need a sewage treatment plant. A city can't just put it in lagoons and spray it on fields. Please, just shut down or move this farm, and if you do please don’t allow field spraying of pig sludge in the Buffalo River Watershed region.

Original Commenter: Virginia Booth

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 and state statutes do not require applicants to supply a financial assurance mechanism as a permit condition.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 339: First, this hog farm was established atop a known karst geographical region and it is scientifically established that this honeycomb type structure allows water, ground and surface to freely move through the structure eventually ending up in springs, streams, creeks and rivers. So, should the hog waste containment ponds leak, and even the previous permit allows substantial leakage, then this effluent will eventually contaminate the ground water and springs which carry the contaminants into Big Creek and thence into the Buffalo.

Original Commenter: Gerald Weber

The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon
consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504(a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 340: It is irrefutable that the C&H waste lagoons are discharging up to 4,000 gallons/acre/day (as certified by their own engineers). As noted above there is overwhelming scientific evidence of increased pollutants in Big Creek which coincides with commencement of C&H operations. An objective assessment leads to the conclusion not only that discharge will occur but is, in fact, occurring. It is clear that this CAO does not meet the permitting requirements set forth in section 5.303 of Regulation 5. This permit should be denied.

Original Commenter: Mark Richards

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management
Permit No: 5264-W
AFIN: 51-00164

Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

Data collected by the Department shows no statistical difference in dissolved oxygen, E. Coli, or nitrates on Big Creek before and after prior permit issuance.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

In the April 1 to June 30, 2018 Quarterly Report, BCRET presents data that documents a statistically significant increase of nitrate-N in the ephemeral stream (BC4) since 2014. However, BCRET notes that chloride, a conservative tracer, did not show a statistically significant increase. Four years of data also indicate a steady increase of geometric mean nitrate-N within the house well (W1) (BCRET April–June 2018, Figure 24). Increased nitrate-N in both the ephemeral stream and the house well does suggest that these systems may be hydrologically connected to areas where farm activities take place. APC&EC Regulation 5 requires the design and waste management plans for liquid animal waste management systems be in accordance with the AWMFH. The AWMFH requires a detailed, geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. Detailed geologic investigations are necessary to determine that the ephemeral stream and house well are not influenced by the waste storage holding ponds, on-farm activities, or waste management practices.
Comment 341: The undeniable presence of karst triggers the requirement for a detailed geologic investigation per the Natural Resources Conservation Service’s Agricultural Waste Management Field Handbook (AWMFH). Because of the inarguable presence of karst and the inordinate risks it poses in the watershed of the Buffalo National River, this permit should be denied.

Original Commenter: Ginny Masullo

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 342: While you are considering the perpetual permit for C&H, please explain to the public how the Arkansas Phosphorous Index promoted by Dr. Sharply can be applied to the karst terrain of Newton County when the soil itself allows unfiltered surface water directly into the water table? The API relies on applying mitigation to prevent surface runoff from directly into streams, limits the amount of phosphorous that can be found in the top couple of inches of soil and so forth.
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

Conditions for land application are prescribed by APC&EC Regulation 5.406, Land Application Requirements.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 343: Please review and document the applicability of the API to karst. Explain in detail how you will prevent untreated sewage from entering surface streams and the groundwater as required by the API if you spread sewage on karst. Clearly state your review in your documentation of this permit.

Original Commenter: Duane Woltjen

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all
APC&EC Regulation 5 permits. APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

Conditions for land application are prescribed by APC&EC Regulation 5.406, Land Application Requirements.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA1029, “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA9516 states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not

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9 https://www.uaex.edu/publications/PDF/FSA-9516.pdf
contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 344: The allowed design for the holding ponds to meet up to a 25 year rain event is insufficient to protect against the likelihood of a spillage, insuring future spillage and likely catastrophic failure of the clay embankment with an adjacent land slope of greater than 10%.

Original Commenter: Bob Allen

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

Comment 345: Standard clay liners for the holding ponds, with an allowable leakage rate of 5000 gallons/surface acre/day is insufficient considering the porosity of the Karst under the ponds. Pollutants could already be leaking into the subsurface strata and hence to the BNR but no testing of the river itself is being conducted by this agency to ensure the public's safety.

Original Commenter: Bob Allen

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.
APC&EC Regulation 5 does not prohibit liquid animal waste management systems from being located in karst.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Seepage from waste storage ponds has the potential to pollute surface and ground water. The record included one recompacted permeability test that is insufficient to determine liner integrity. The necessary soil investigations including, but not limited to, percentage of fines and soil permeability evaluations, have not been performed at this facility in accordance with the AWMFH 651 Table 10-4 and Appendix 10D. Plasticity index analysis was performed on one sample of the in situ clay material in boring 2. The variability in the regolith expected in this geologic setting coupled with the insufficient data creates additional concerns about the siting and soil sources for the clay liner. The required number of borings were not advanced within the pool areas in accordance with AWMFH 651.0704(b)(4); these additional borings would have provided more data for assessment of clay source material. Proper soil investigations for the liner material are necessary to determine the suitability and location of the clay source material and to consider any additional geotechnical testing to confirm material properties, which will reduce the potential for downward and/or lateral seepage of the stored wastes.

Pursuant to Appendix 10D of the AWMFH, it is the position of NRCS that special design measures are necessary where agricultural waste storage ponds are constructed in soils with high calcium content or highly unfavorable geologic conditions, such as karst formations.

Comment 346: Another key difference between the two permits is that a subsurface investigation is required for a Reg. 5 permit but not for a Reg. 6 permit. Had C&H been required to undergo a thorough subsurface investigation, it might have been difficult for two different out-of-state firms to conduct the required Environmental Assessment without concluding that introducing millions of gallons of waste into a fragile watershed would have a sizable environmental impact. The karst geology and siting of the facility along a major tributary to an Extraordinary Resource Water should have been enough.

Original Commenter: Lin Wellford

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management

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10 BCRET Quarterly Report for October 2016 to December 2016, Table 10, page 71.
Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit. The geologic investigation of the waste storage ponds does not comply with AWMFH Chapter 7.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

An Environmental Assessment is not required for the permitting process and was not provided as part of the permitting process. The Environmental Assessment was prepared by the United States Department of Agriculture Farm Service Agency and the United States Small Business Administration as part of their process in issuing loan guarantees.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504(a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

**Comment 347:** ADEQ does not require C&H to permanently mark the waste disposal boundaries in the waste application fields. As a result, I fully expect that waste will be applied where it is not supposed to be. This is neither protective of water quality, nor is it protective of the health and welfare of the citizens of Big Creek valley.
Original Commenter: Charles Bitting

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 348:** The Natural Resource Conservation Service (NRCS) Agricultural Waste Management Field Handbook (AWMFH) 651.0702(c) and 651.1004(b) [Table 10-4] strongly discourage the construction of waste storage ponds with compacted clay liners or synthetic liners above karst features. The ERI study Dr. Halihan completed around the waste storage ponds, and the drilling study completed for ADEQ proved that the ponds are indeed situated on top of karst features. Based on the large body of sound scientific evidence regarding the waste ponds at C&H, and the even larger body of sound scientific evidence discouraging the construction of such facilities on top of karst features, it would be unreasonable and arbitrary for ADEQ to grant this permit. Therefore, the permit for C&H as currently developed, cannot and should not be granted.

Original Commenter: Charles Bitting

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit. The geologic investigation of the waste storage ponds does not comply with AWMFH Chapter 7. The compaction test and permeability analysis does not comply with the AWMFH Chapter 10.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Pursuant to Appendix 10D of the AWMFH, it is the position of NRCS that special design measures are necessary where agricultural waste storage ponds are
constructed in soils with high calcium content or highly unfavorable geologic conditions, such as karst formations.

Comment 349: The permit violates the moratorium. Regulation 5.901d states “a permit renewal, permit modification, or new permit issued pursuant to Regulation 5.901c shall not increase the number of swine permitted at a facility.” The current C&H NPDES permit allows for 2,500 sows and 4,000 piglets. The new draft permit includes 2,672 sows an approximately 7% increase in the gestating and lactating sows, but the number of piglets in the new permit has been reduced from 4,000 to only 750 piglets. This is based on an estimated average number of the piglets present at any one time. However, annual production is more meaningful and common sense indicates that an increase in the number of sows will result in an increase in the number of piglets. In this case 78,000 permit year. And consequently the amount of waste produced annually will be increased by 7%. This violates both the spirit and the letter of the moratorium as described in Regulation 5.901d and this permit should be denied.

Original Commenter: Ellen Corley

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The number of swine previously permitted under the APC&EC Regulation 6 Permit (Permit Tracking No. ARG590001) was 6,503 while the maximum number of swine proposed under the individual APC&EC Regulation 5 Draft Permit (5264-W) is 4,178. The permit application reduces the maximum number of swine allowed at the facility by 2,325. Because 5264-W reduces maximum number of swine allowed, the potential for the total amount of waste produced is less than previously permitted under ARG590001.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 350: What I’m asking is, you have these open cesspools which are basically opened vectors for contamination to be spread to any other farm around here, or to people, or if this water happens to be breached somehow and become a paint point source form of contamination in the river. If people start getting sick from this you’re not monitoring this, who’s going to be liable for it? And there are

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11 BCRET Quarterly Report for October 2016 to December 2016, Table 10, page 71.
basically results that show that there are nutrients going up in the wells in this area. So it’s happening. What are you going to do about it? Who’s going to be liable? How many people are going to get sick before, you know, something gets done about it?

Original Commenter: Dorothy Walters

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

Comment 351: Airborne Pathogens, I see that no agency is monitoring air quality. Have we so soon forgotten the Ebola Virus? Let me make this simple. If you smell poop or pee you are actually inhaling colloidal bits of poop & pee. That's just a fancy way of saying ii tiny pieces of poop & pee. Viruses & bacteria are excreted in feces & urine and ride piggy back on those ii colloidal bits of poop you are inhaling. You have just potentially infected yourself with a number of pathogens. Yet I don't understand why with years of good sound research by the CDC & WHO that these potential problems are being completely ignored. 1.7 to 2.0 million people are being put at risk yearly, so C & H hog factory farm can operate essentially with NO credible, competent monitoring being done? Just how are you going to restore good clean ground water if they do have a major spill? They already have seepage which shows high levels of chemical & biologic contamination. I noticed that the ventilation fans can blow contaminates to the nearby school. Would you want your children to go to that school with that poor air quality? How about all the potentially contaminated dust size particles, from C & H Factory Hog Farm, on the play ground ?? The fields they spread the hog
waste effluent on both sides of the school, and you can literally wack the guy runny the spreader with a rock, if you got a good throwing arm.

Original Commenter: Dorothy Walters

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Potential issues involving air quality are outside the scope of this permitting decision.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

Buffers from neighboring occupied buildings are required by regulation and are included in all APC&EC Regulation 5 permits.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

APC&EC Regulation 5.407 sets forth monitoring frequencies for land application of waste and for soils of each field where liquid animal waste has been applied.

**Comment 352:** Lack of compliance with the Agricultural Waste Management Field Handbook, the AWMFH. Reg. 5.402 states “Designs and waste management plans shall be in accordance with the following United States Department of Agriculture Natural Resource Conservation Service technical publications. One, the Field Office Technical Guide as amended, two, the Agricultural Waste Management Field Handbook AWMFH, as amended.” C&H did not comply with the AWMFH, particularly in regards to: One, the failure to acknowledge the presence of karst and follow the subsequent requirements for a detailed geologic investigation, chapter seven; two, application of waste in excess of agronomic need, chapters two three; three, failure to perform a substantive evaluation of the
impact that sudden breach or accidental release for waste impoundments, chapters
two fourteen; failure to develop an emergency action plan, which should be
considered for waste impoundments where there is potential for significant impact
from breach or accidental release. Number five, inability to comply with guidance
regarding waste application on flood prone and sloping 8-15% fields. Guidance
recommends injection or incorporation, which is impractical in this karst terrain,
requiring that those fields be removed from the nutrient management plan. Six,
failure to account for proximity of a waste impoundment to sensitive ground
water areas or to investigate groundwater flow direction.

Original Commenter: Marti Olesen

Response: The Department made this permitting decision in accordance with
state laws and APC&EC Regulation 5, Liquid Animal Waste Management
Systems. Upon consideration of the completed permit application, the public
comments on the record, and additional data and information submitted during the
permitting process, the Department denies issuance of the permit. The geologic
investigation of the waste storage ponds does not comply with AWMFH Chapter 7.
The permit application does not contain an emergency action plan as
recommended by AWMFH Chapter 2. The Department has determined that an
emergency action plan is necessary due to the specific siting of this facility. The
permit application does not contain a groundwater flow direction study as
recommended by AWMFH Chapter 7. The Department has determined that a
groundwater flow direction study is necessary due to the specific siting of this
facility.

APC&EC Regulation 5 does not prohibit liquid animal waste management
systems or associated land application from being located in karst. Buffers from
sinkholes and rock outcrops are required by regulation and are included in all
APC&EC Regulation 5 permits.

The AWMFH Part 651.0106(i), as referenced in APC&EC Regulation 5.402,
incorporates the NRCS Conservation Practice Standard Nutrient Management
Code 590 for nutrient management, which is more specific to the State of
Arkansas. The NRCS Conservation Practice Standard Nutrient Management Code
590 allows for land application based on the API, which does not limit land
application of phosphorus to agronomic need.

The AWMFH Amendment 61, dated August 2012, does not require incorporation
of animal waste on moderate limitation slopes (8–15%). APC&EC Regulation
5.406(C) allows waste or wastewater to be land applied on to slopes of up to
fifteen percent (15%) and prohibits land application in any manner that will allow
waste to enter Waters of the State or to run onto adjacent property without the
written consent of the affected adjacent property owner.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504(a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

Comment 353: Now we come to the Great State of Arkansas, “The Natural State”, ADEQ and the CAFO. There is significant reliable scientific data to show pollution is occurring currently from runoff and seepage into groundwater caused by spraying approximately 2.6 million gallons, according to the CAFO’s annual report to ADEQ, of untreated liquid hog waste on 500 to 600 acres of local pasture land. Much of this untreated liquid hog waste will flow through the thin layer of top soil into the karst topography below and then rapidly into the groundwater contaminating wells, Big Creek and the Buffalo River. The CAFO’s lagoons with millions of gallons of liquid and solid hog waste may also be leaking into the ground water because the lagoons have only a clay liner and no impermeable liner. I realize a bore hole was drilled under one lagoon to test for leaks but am concerned one test hole was insufficient to test for leakage. It doesn’t take a
scientist to understand if you spray millions of gallons of liquid hog waste on fields year after year or have lagoons with millions of gallons of hog waste leaching into the ground that groundwater contamination will occur.

Original Commenter: Steve Blumreich

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

The AWMFH recommends reduced application rates and using split application based on soils with severe limitations based on soil depth. For soils with moderate limitations based on soil depth, the AWMFH recommends reduced application rates.

The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst.

Seepage from waste storage ponds has the potential to pollute surface and ground water. The record included one recompacted permeability test that is insufficient to determine liner integrity. The necessary soil investigations including, but not limited to, percentage of fines and soil permeability evaluations, have not been performed at this facility in accordance with the AWMFH 651 Table 10-4 and Appendix 10D. Plasticity index analysis was performed on one sample of the in situ clay material in boring 2. The variability in the regolith expected in this geologic setting coupled with the insufficient data creates additional concerns about the siting and soil sources for the clay liner. The required number of borings were not advanced within the pool areas in accordance with AWMFH 651.0704(b)(4); these additional borings would have provided more data for
assessment of clay source material. Proper soil investigations for the liner material are necessary to determine the suitability and location of the clay source material and to consider any additional geotechnical testing to confirm material properties, which will reduce the potential for downward and/or lateral seepage of the stored wastes.

Pursuant to Appendix 10D of the AWMFH, it is the position of NRCS that special design measures are necessary where agricultural waste storage ponds are constructed in soils with high calcium content or highly unfavorable geologic conditions, such as karst formations.

In the April 1 to June 30, 2018 Quarterly Report, BCRET presents data that documents a statistically significant increase of nitrate-N in the ephemeral stream (BC4) since 2014. However, BCRET notes that chloride, a conservative tracer, did not show a statistically significant increase. Four years of data also indicate a steady increase of geometric mean nitrate-N within the house well (W1) (BCRET April–June 2018, Figure 24). Increased nitrate-N in both the ephemeral stream and the house well does suggest that these systems may be hydrologically connected to areas where farm activities take place. APC&EC Regulation 5 requires the design and waste management plans for liquid animal waste management systems be in accordance with the AWMFH. The AWMFH requires a detailed, geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. Detailed geologic investigations are necessary to determine that the ephemeral stream and house well are not influenced by the waste storage holding ponds, on-farm activities, or waste management practices.

Comment 354: Another recommendation of Dr. Sharpley is to utilize nutrients from the “right source:” “Fertilizer nutrients can be formulated to match crop needs; however, manures have more P than N compared to crop needs. For instance, the ratio of N:P in manure (2 to 4:1) is three to four times lower than that taken up by major grain and hay crops (8:1). As a result, applications of manure to meet crop N needs, apply three to four times more P than annual crop needs. Repeatedly applying manure at rates to provide sufficient N, will increase soil P levels and the risk of P runoff.”

Manure pond test results (Table 3) show nitrogen to phosphorus ratios averaged 3:1 in pond 1 and 7:1 in pond 2. The maximum N:P ratio was 11:1 while the minimum was 2:1. This wide variability in pond sample results indicates waste application fields are receiving waste loads with significantly variable nutrient contents. For example, the pond 1 phosphorus result from January 5, 2016 was

\[ \text{Comment 354:} \quad \text{Another recommendation of Dr. Sharpley is to utilize nutrients from the “right source:” “Fertilizer nutrients can be formulated to match crop needs; however, manures have more P than N compared to crop needs. For instance, the ratio of N:P in manure (2 to 4:1) is three to four times lower than that taken up by major grain and hay crops (8:1). As a result, applications of manure to meet crop N needs, apply three to four times more P than annual crop needs. Repeatedly applying manure at rates to provide sufficient N, will increase soil P levels and the risk of P runoff.”}

Manure pond test results (Table 3) show nitrogen to phosphorus ratios averaged 3:1 in pond 1 and 7:1 in pond 2. The maximum N:P ratio was 11:1 while the minimum was 2:1. This wide variability in pond sample results indicates waste application fields are receiving waste loads with significantly variable nutrient contents. For example, the pond 1 phosphorus result from January 5, 2016 was

\[ \text{12 BCRET Quarterly Report for October 2016 to December 2016, Table 10, page 71.} \]
6.7 times greater than the April 17, 2015 result. Yet the April 17, 2015 P result was used in the developing the NMP, and is significantly lower than the average. Using this lower value could guide phosphorus management at C&H for an undetermined time period because there is no requirement in Regulation No. 5 or the draft permit to update the NMP.

The NMP does not meet the “Right Source” requirement because the nutrient source provides more phosphorus than the crop needs. Given the variable nutrient levels of pond samples, actual nutrients provided to individual fields could differ significantly both spatially and temporally. Fields are also not likely to be receiving nutrients over the long-term as specified in the NMP, because projections were made on the basis of one sample from a highly variable sample set. Part of the reason for the variable results could relate to poor mixing and stratification within the ponds. Table 4 shows the stratification of nutrients in the ponds (bigcreekresearch.org). Both N and P increase with depth, with pond 1 showing very high P concentrations in the accumulating sludge, as predicted. The waste sample used to develop the NMP significantly underestimates the amount of phosphorus in Pond 1. N:P ratios approaching 0.5:1 are found in the accumulating sludge (bigcreek research.org).

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 requires soil analyses every five years and waste analyses annually. The Department only permits land application when the API value is a low or medium class.

APC&EC Regulation 5.402 incorporates both the AWMFH and NRCS Field Office Technical Guides. The AWMFH Part 651.0106(i) lists applicable NRCS Conservation Practice Standards, which includes NRCS Conservation Practice Standard Nutrient Management Code 590 for nutrient management. NRCS Conservation Practice Standard Nutrient Management Code 590 for the State of Arkansas allows for land application based on the API, which does not limit land application of phosphorus to agronomic need.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA1029, “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA9516 states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 355: The NOI submitted by C&H on June 25, 2012 for coverage under the general NPDES permit, ARG590001, described C&H as a “2,500 head farrowing farm.” It also stated that the barns would have a “maximum capacity of 6,503 head of swine weighing an average 150 lbs.” (Section C: “Design Report,” p. C-1) The breakdown was:

3 Boars @ 450 lbs.
2,100 Gestation Sows @ 375 lbs
400 Lactating Sows @ 425 lbs
4,000 Nursery Pigs @ 10 lbs


It appears the 4,000 “Nursery Pigs” was estimated by assuming that a nursing litter would be 10 piglets per sow being weaned. The weaning process requires 23 to 24 days (www.nationalhogfarmer.com/health-diseases/0615-producing-quality-
pigs.) The 4,000 estimate is an average but this number will be relatively constant because as sows give birth to new litters, litters are weaned and then shipped off-site.

Reg. 5.901(D) states that “A permit renewal, permit modification, or new permit issued pursuant to Reg. 5.901(C) shall not increase the number of swine permitted at a facility.”

However, the “Application Packet” submitted by C & H on April 6, 2016 in support of its request for a Reg. 5 permit, states it now has:

6 Boars @ 450 lbs
2,252 Gestating Sows @ 425 lbs
420 Lactating Sows @ 400 lbs
750 Nursing Pigs @ 14 lbs.


In contrast to its 2012 NOI, in its Reg. 5 permit application C & H defines “Nursery Pigs” as pigs that have completed the weaning process. The “750” is arrived at as the average of 1,500 weaned pigs on the farm before the weekly shipment and the zero number on the farm just after the shipment. Id. at pp. 5-6. This ignores pigs in the weaning process that weigh from 3 to 5 pounds at birth and 14 pounds or more when weaned. (www.nationalhogfarmer.com/health-diseases/0615-producing-quality-pigs.) The weaning period is from 23 to 24 days. (Id.) In order to ship 1,500 pigs at a given time, there must be over 4,000 pigs being weaned at the time of the shipment.

If C & H’s Reg. 5 permit application had used the same method for determining the number of “Nursery pigs” as in the original NOI, the numbers would currently be:

6 Boars @ 450 lbs
2,252 Gestating Sows @ 425 lbs
420 Lactating Sows @ 400 lbs
4,200 Nursing Pigs @ 10 lbs

Thus, the original approved NOI is being violated since there are now approximately 6,878 pigs on the farm instead of the original 6,503. If approved, the new Regulation 5 permit would violate Reg. 5.901(D).

Comparisons of pounds of swine and waste permitted in the original NOI and the current Reg. 5 draft permit and application further confirm these estimates. In the NOI (DeHaan, Grabs & Associates, 2012), C&H was permitted to raise 998,850
pounds of swine producing 1.5 million gallons of waste. The current permit lists 1,138,000 pounds of swine (Hancock et al., 2016) producing 1.9 million gallons of waste (Permit No. 5264-W Statement of Basis, p. 3).

In addition, the waste calculations in the permit application are incorrect. Along with the boars and sows, waste volumes should have been based on 4,200 pigs weighing 10 pounds instead of 750 pigs weighing 14 pounds. This means the volume of waste will be significantly greater. The draft permit should be denied because it violates Reg. 5.901(D).

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The number of swine previously permitted under the APC&EC Regulation 6 Permit (Permit Tracking No. ARG590001) was 6,503 while the maximum number of swine proposed under the individual APC&EC Regulation 5 Draft Permit (5264-W) is 4,178. The permit application reduces the maximum number of swine allowed at the facility by 2,325. Because 5264-W reduces maximum number of swine allowed, the potential for the total amount of waste produced is less than previously permitted under ARG590001.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 356: ADEQ imposed a moratorium for Regulation No. 5 permits in the Buffalo River watershed in 1992 (1992 Moratorium). This moratorium specifically mandated the completion of site specific studies, and the use of those studies to inform regulatory changes to protect the watershed prior to the moratorium being lifted. C&H was designed and is managed in a similar manner to the previous swine CAFOs studied by ADEQ from 1994 – 2002, but the operation functions on a much larger scale. Not only did ADEQ fail to complete the requirements of the previous moratorium, the agency never provided public notice that the 1992 moratorium was to be lifted. ADEQ did not disclose the modifications and corrections it made, if any, based on the results of its own studies and investigations. Because lifting this moratorium would have been a major environmental decision with potential to impact the Buffalo National River, and the outstanding national resource designation by the State of Arkansas, public notice and analysis of this decision was warranted.
The Buffalo River watershed was off-limits to new CAFO permits for 20-years prior to granting C&H coverage under the general permit. Had the public been adequately informed of the decision to grant C&H coverage under a state-wide general NPDES permit, concerned citizens and responsible agency representatives would have voiced strong opposition, especially if made aware that the CAFO threatened the Buffalo National River. By not announcing that it was lifting the moratorium, ADEQ effectively circumvented public participation in protecting and maintaining the water quality of the Buffalo National River. ADEQ should deny this permit because it has yet to fulfill the mandates of the moratorium. ADEQ has not yet gone through the public notice and public comment process, nor has the agency explained to concerned citizens of the state of Arkansas how it addressed the requirements of the moratorium. The goal of this effort as stated in the moratorium was to adjust the regulatory, mitigation, and evaluation requirements of Regulation No. 5 permits issued in the Buffalo River watershed. Until ADEQ addresses the concerns identified in its own studies, ADEQ is in violation of the 1992 moratorium.

Design and management of swine farm waste streams was a noted problem in ADEQ’s investigations of permitted swine operations in the Buffalo River watershed circa 1992 (Arkansas Soil and Water Conservation Commission, 1994). In ADEQ’s words “the current system by which confined animal operations are designed, permitted, and regulated is failing to curtail discharges from the waste storage and disposal systems.” ADEQ staff recommended a moratorium on CAFOs to allow them time to assess operational and regulatory means to improve swine waste management. ADEQ Director Randall Mathis signed the moratorium on October 12, 1992.

ADEQ studies revealed accumulated solids in the bottom of the waste storage ponds represented a seemingly intractable problem under existing waste pond construction and management scenarios permitted through Regulation No. 5. The solids, or sludge, was very high in nutrients, especially phosphorus. The nutrient management plan under which these CAFOs were permitted had not accounted for these elevated nutrients (Van Epps et al., 1998). Removal of the sludge also proved problematic. Expense of agitation and waste application exceeded financial capability of producers. Because the nutrient management plan had not accounted for sludge build up, field soil testing of nutrient levels revealed there was not enough acreage available to dispose of the accumulated swine waste sludge due to the anomalously high phosphorus content.

Sludge management is a critical need based on previous work and associated research (Formica et al., 2001; ADPCE, 1993; ADEQ, 2002; https://www.bae.ncsu.edu/topic/animal-waste-mgmt/program/lagoon/sludge-mgmtclosure.pdf). Dr. Sharpley has performed some limited experiments on sludge removal from C&H’s waste stream (bigcreekresearch.org), but has stated
there is no encouragement or incentive for application of sludge management at C&H, and the experiments have terminated.

The results of these studies, and the issues and concerns they raise, have not been used by ADEQ in conditioning permit 5264-W. C&H was designed, and is managed in a similar manner to the previous swine CAFOs studied by ADEQ from 1994 – 2002. However C&H is much larger in scale, and in turn, this CAFO generates more nutrient rich waste and sludge. (ADEQ, 2002; DeHaan, Grabs & Associates, 2012). The only reference to sludge management in the current NMP states:

“As needed, to maintain available volumes, both ponds will be agitated during pumping to remove solids.” (Hancock et al., 2016)

The NMP portrays sludge management as an issue related only to storage volume. The NMP developers have not accounted for the high phosphorus characteristics of this sludge. A separate analysis of the nutrient concentrations in this sludge, or forecast of the rate of build-up, is not provided in the NMP. The NMP does not describe the equipment to be used for agitation, or the methods by which sludge volume loss is to be quantified.

The NMP does not assess the risk agitation could pose to the clay liner and there is no reporting checkoff sheet required by ADEQ to confirm that agitation of the waste was performed. It is unknown if the sludge has ever been “agitated” at C&H. If it has been agitated, it is unknown to what extent sludge agitation was successful. Knowing the chemistry of the sludge compared to the chemistry of the liquid and the forecast nutrient concentrations used to develop the waste application rates in the NMP would also be considered highly beneficial. The NMP and the permit do not address the primary concern of the previous ADEQ CAFO study. Sludge management was concluded to be an intractable problem under existing waste stream management approaches, and showed a high potential to overwhelm soil and water quality protection efforts (ADEQ, 2002).

ADEQ should deny this permit until completing the process it started in 1992. If ADEQ decides to allow swine CAFOs in the Buffalo River watershed, it should evaluate permit conditions, including appropriate operational practices, mitigation requirements, monitoring, and regulatory adjustments to determine what permit conditions are appropriate for a large source of nutrients and bacteria in the Buffalo River watershed. This process should be conducted under public scrutiny and use appropriate scientifically peer reviewed studies to ensure conditions intended to safeguard natural resources are included in the final permit.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The administrative notice issued on October 12, 1992, was not a moratorium because it was not a final decision by the Department. The administrative notice clearly stated that any person adversely affected by a subsequent action by the Department could challenge that action as provided by applicable law. In the administrative notice, the Department indicated that it would signal the Department’s final decision through a subsequent permitting decision.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Jason Henson described the equipment used for agitation of the waste storage ponds in his deposition of May 15, 2018. Dr. Sharpley, in his deposition of May 25, 2018, briefly discussed agitation of the waste storage ponds.

Comment 357: Although the C&H permit application mentions a few steps that will be taken for odor control at the barns and waste ponds, nothing is stated as to what measures will be put in place for odor and emissions control during field applications.

An in depth study in North Carolina looking at ammonia emissions on swine farms found that approximately 30 percent of the emissions came from the barns, 20 percent from the waste ponds, and, if normal air spraying were employed, 50 percent from field application. (http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.517.6355&rep=rep1&type=pdf). This occurs when normal spraying methods are used such employed by C&H, i.e. Vac Tankers with splash plates and spraying from elevated nozzles from spray irrigation pipes.

Spraying waste in this manner gives several negative results. Ammonia is volatilized resulting in the loss of nitrogen as a fertilizer and perhaps more importantly the gaseous ammonia as well as other components of the waste such as hydrogen sulfide and fine liquid droplets containing entrained pathogens are now in the atmosphere. There will not only be an odor issue but a health issue as well.

Thus odor control for field application as required by Reg. 5 and Code 590 should be employed. The AWMFH, Chapter 12, states that significant reduction in
reducing odor, other emissions, and ammonia volatilization can be obtained if either band spreading or shallow injection is used. Band spreading is laying down the liquid in a thin film on the surface. Injection is, as the name implies, injecting the waste a few inches into the ground. The AWFMH lists a number of ways that this can be done without damage to vegetation growing in a field. A Vac Tanker, when rigged out with proper accessories, will have a substantial advantage over spraying for protection of the environment and human health. Odor (and emissions) control should be required for the waste application fields.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 358: Recently an article in the Newton County Times featured news that the state highway department had awarded a contract of almost $90,000 to improve a short .6-mile segment of extremely rural road in the Mt. Judea area, specifically #466 (see below) lying between the C&H CAFO and its increasing number of spreading fields. In addition to the stated inability of the $75,000 botched Harbor drilling investigation to accomplish its goals, and the cumulative $700,000 costs of BCRET’s limited monitoring of just three unrepresentative spreading fields with no evaluation or interpretation of results for ADEQ to use in making its permit decision, how can ADEQ not support a reasonable rationale and acknowledge applicable scientific evidence for denying this boondoggle permit? Taxpayers are footing the bill for a road improvement to haul a private business’s swine waste for disposal on unsuitable application field destinations. Will ADEQ’s approval of the permit cause more increases in unnecessary taxpayer subsidies? Who chooses such road “improvements”? Does this take advantage of the limited allocations of state road improvement funds? Does Governor Hutchinson condone this expenditure for a road that benefits nobody but the C&H CAFO?
See the photographs below for the location of this “improvement” and its connection to C&H and its swine waste application fields: In the first photo, C&H is on the bottom right. The second photo shows the route to added EC fields. The third shows a Google map of locations of the increased number of fields in the BR watershed. After just three years most of these fields will likely be at above optimum phosphorus levels, just as the original application fields are right now. With a Reg 5 permanent permit how will ADEQ even know when this actually occurs since reporting soil test results is only required every 5 years? Where will C&H find additional fields as fields become oversaturated with phosphorus? Will state government approve additional remote “improvements” to rural roads then to ease the continuing spread of C&H waste across more fields in the watershed? When will enough be enough to end the mitigations that obviously only serve to amplify the original permitting mistake? Isn’t it time to deny the permit instead of making it permanent? Why are the citizens of Arkansas paying for the unnecessary support of a private operation by state government agencies? Other local businesses are not benefiting from government funds in this way.

Original Commenter: Marti Olesen

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The Department acknowledges the commenter’s statements. Decisions to award contracts by the Arkansas Department of Transportation are not within the Department’s regulatory authority.

The API is used to develop loading rates for land application based on phosphorus. There are many factors taken into account to determine whether land application on a specific field is allowable. While the soil test phosphorus, referred to as “above optimum” by the commenter, is one of those factors, it is not the determining factor. A field with high soil test phosphorus may still be appropriate for land application. The Department only permits land application when the API value is a low or medium class.

APC&EC Regulation 5.407(C) states that “soils shall be sampled and analyzed at least once every five (5) years.”

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA1029, “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA9516 states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504(a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 359: In light of scientific data that now show the operation is destined to fail, isn’t it timely to deny the permit? High phosphorus levels don’t dissipate easily or quickly. The Arkansas Phosphorus Index misrepresents the Soil Test Phosphorus levels, and results in over application on sensitive fields. Erosion from oversaturated thin soiled fields carries these phosphorus laden sediments and peak levels of nitrates during rain events into Big Creek and subsurface fractures. Low dissolved oxygen is killing off the prized Smallmouth Bass of Big Creek (See previous concerned comments from Arkansas Game and Fish Commission.)

Undeniably, karst terrain carries surface waters from application fields approved despite inaccurate agronomic uptake calculations to undetermined local drinking water wells, aquifers, streams and springs through fractures, voids and epikarst. Does ADEQ acknowledge that the C&H facilities and application fields are located atop karst terrain? Why was a detailed geologic investigation as specified in the AWMFH Section 651.0704(b) not required? Why is ADEQ attached to continuing to permit this facility instead of protecting the environmental quality

16 https://www.uaex.edu/publications/PDF/FSA-9516.pdf
of the watershed for the many hard working residents and the millions of visitors
who depend on its preservation and protection instead? Will ADEQ take this last
and fitting opportunity to deny the C&H Reg 5 permanent permit based upon the
available science from so many exhaustive studies, textbooks, handbooks,
manuals, investigations, and its own acknowledgement and understanding of the
unsuitability of the Buffalo River watershed karst terrain for a CAFO location as
described in Reg 5.9?

ADEQ must recognize, acknowledge, and act upon the presence of karst and the
harm that previous obfuscation, intentional or not, has caused through the original
permitting of the C&H facility and its application fields, on Big Creek, and the
Buffalo National River. In order to avoid adhering to the stringent measures for
liquid waste disposal management in karst as described in the AWMFH, ADEQ
has misled the public, the CAFO owners, JBS, Governor Hutchinson and our
Arkansas state legislators. Honesty and integrity must guide ADEQ’s present
actions and require it to deny this Reg 5 permit based upon its unfortunate site in
the highly variable karst terrain of the Buffalo National River watershed.

Original Commenter:  Marti Olesen

Response:   The Department made this permitting decision in accordance with
state laws and APC&EC Regulation 5, Liquid Animal Waste Management
Systems. Upon consideration of the completed permit application, the public
comments on the record, and additional data and information submitted during the
permitting process, the Department denies issuance of the permit. The geologic
investigation of the waste storage ponds does not comply with AWMFH Chapter
7.

APC&EC Regulation 5 does not prohibit liquid animal waste management
systems or associated land application from being located in karst.

Data collected in Big Creek in the Buffalo National River watershed by the
Department shows no statistical difference in dissolved oxygen levels before and
after issuance of APC&EC Regulation 6 permit coverage.

Consideration of tourism and revenue is not within the Department’s regulatory
authority.

Response:   The Department amends its previous response. Upon consideration
of the submitted permit application, the public comments on the record, and other
subsequently available and relevant data and information, the Department denies
issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone
Formation, an area known to have karst. While APC&EC Regulation 5 does not
prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 360: Condition #28; “alterations to the design, plans or specifications may be approved as a minor modification in accordance with Reg 5.306”. Here it appears ADEQ has other plans to make modifications to this permit prior to its approval and are predetermining the need to modify C&H Hog Farms again. This information has not been released for public review and to preset conditions not allowing for public participation is capricious and arbitrary.

Original Commenter: Carol Bitting

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 361: Section 2; Application for Regulation 5 Permit Engineering Plans and Review Sept 1,, 2015;

I could understand an engineer would be needed to go over the building plans, but when it comes to application fields I would think ADEQ would request a geologist and with the sensitive nature of this CAFO in the Buffalo River Watershed I would expect a hydrogeologist, the best in the state. I would also expect that Regulation 2, and Regulation 22 would be taken into account due to
the karst terrain and high probability of fast transport of pollutants to the Buffalo River. There is no mention of the karst terrain presented in the ERI by BCRET that identify field 5 and 12 karst. I did not find any reference to the leakage allowed by the lagoons and due to the low permeability of the lining feel this should have been explored more thoroughly. BCRET and ADEQ have had time to install and require monitoring of the daily levels of the lagoons, yet when requested, this information is unavailable. One bore hole, again, is below standard.

Original Commenter: Carol Bitting

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 regulates liquid animal waste management systems, which is defined in APC&EC Regulation 5.201. APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

APC&EC Regulation 22 is not applicable to this permitting decision. Applicable provisions of APC&EC Regulation 2 were considered in this permitting decision.

The Department did not review or approve the study design and has no authority over the day-to-day activities of BCRET. While the Department may consider the research conducted by the University of Arkansas, questions regarding the study should be more appropriately directed to the University of Arkansas.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Seepage from waste storage ponds has the potential to pollute surface and ground water. The record included one recompacted permeability test that is insufficient to determine liner integrity. The necessary soil investigations including, but not limited to, percentage of fines and soil permeability evaluations, have not been performed at this facility in accordance with the AWMFH 651 Table 10-4 and Appendix 10D. Plasticity index analysis was performed on one sample of the in situ clay material in boring 2. The variability in the regolith expected in this geologic setting coupled with the insufficient data creates additional concerns about the siting and soil sources for the clay liner. The required number of borings were not advanced within the pool areas in accordance with AWMFH
651.0704(b)(4); these additional borings would have provided more data for assessment of clay source material. Proper soil investigations for the liner material are necessary to determine the suitability and location of the clay source material and to consider any additional geotechnical testing to confirm material properties, which will reduce the potential for downward and/or lateral seepage of the stored wastes.

Pursuant to Appendix 10D of the AWMFH, it is the position of NRCS that special design measures are necessary where agricultural waste storage ponds are constructed in soils with high calcium content or highly unfavorable geologic conditions, such as karst formations.

**Comment 362:** Part II Specific Condition - Specific Condition #13: Previous waste lagoon leakage deemed in accordance with the NRCS Field Office Technical Guide for compacted clay liners appears incompatible with karst geologic conditions and the new permit requirements of "no discharge" to "waters of the State" that include groundwater. A synthetic liner should be required fix waste lagoons in this particular situation given the greater risk to downgradient and downstream resources from this particular facility given the amount of waste generated from the size of the facility, the karst geology present, the high potential rate of groundwater flow under fractured limestone bedrock conditions with associated limited potential for contaminant assimilation or reduction and despite possible regulatory concerns of precedent setting for such a requirement.

There is no stipulation within the conditions relative to the impoundment size. A limitation should be designated so as to limit potential for releases during storm events or through other impoundment failure. Please stipulate the maximum storage capacity of waste in any impoundment to reflect sufficient buffering to avoid overflow during storm events (see Comment 12, Part 8)

Original Commenter: National Park Service

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other

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17 BCRET Quarterly Report for October 2016 to December 2016, Table 10, page 71.
subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. Pursuant to Appendix 10D of the AWMFH, it is the position of NRCS that special design measures are necessary where agricultural waste storage ponds are constructed in soils with high calcium content\(^{18}\) or highly unfavorable geologic conditions, such as karst formations.

**Comment 363:** Part II Specific Conditions- Specific Condition #16, #17 & #18: These land application buffer and boundary conditions including those for slopes with a grade greater than 15%, setbacks from buildings, property lines and streams, appear to require at least some initial effort to flag or mark in some manner these features and their boundaries to ensure these application conditions are met and enforcement is a reasonable option. However there is no mention of marking such boundaries or their initial documentation on maps or in imagery of any kind to allow for their future unambiguous implementation. This would seem to leave their enforcement to highly arbitrary subsequent interpretations of the operations manager and the regulator should third party disputes arise.

We advise that ADEQ strongly consider limiting application of waste on lands identified as karst areas and evaluate each of the proposed land applications sites for this sensitivity. Please include the word "karst areas" within the list of limitations stipulated in Condition #17.

Original Commenter: National Park Service

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

APC&EC Regulation 5.406(D) prohibits the application of waste within 100 feet of streams including intermittent streams, ponds, lakes, springs, sinkholes, rock outcrops, wells and water supplies, or 300 feet of extraordinary resource waters as defined by APC&EC Regulation 2. Buffer distances for streams, ponds and lakes must be measured from the ordinary high water mark.

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\(^{18}\) BCRET Quarterly Report for October 2016 to December 2016, Table 10, page 71.
**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

**Comment 364:** Part II Specific Conditions- Specific Condition #28: There is no requirement for a synthetic liner with geotextile base material but instead only an acknowledgement that the permittee is "authorized" (presumably at the permittee's discretion?) to construct and operate such base material in Waste Storage Ponds 1 and 2 "provided the work is commenced within 24 months from the effective date of this permit." While a synthetic liner "requirement" may be precedent-setting for such facilities under Regulation 5 and the basis for not making a synthetic liner a requirement in this permit, the scale of this operation in terms of waste generation and the potential downstream resource impacts from a waste lagoon release should drive the regulator to look for a means to "require" a synthetic liner installation by making it subject to site conditions (e.g. underlain by karst geology, upstream from waters subject to water quality special protection, and/or ecological & resource significance). Past liner designs (compacted clay) under the General Permit referencing the NRCS Field Office Technical Guide acknowledges and allows for significant leakage (5,000 gallons per day per acre of pond) that could affect and degrade waters found "underground" or Waters of the State. In the absence of a specifically required synthetic liner, it appears incompatible with the "no discharge" basis under Regulation 5 of the new permit. Given site and area specific conditions of the facility, the state should ensure that all waste lagoon design measures are taken to minimize leakage to the environment and "Waters of the State" and this may only be accomplished through installing the least permeable bottom and side liner for the waste lagoons. If the "permit modification approved by the Department on March 25, 2016" includes the installation of a synthetic liner at the permittee's waste ponds, it should be indicated in this permit so that stakeholders can understand this is a contingency for issuance of this permit under Regulation 5. It also seems reasonable to require a synthetic liner installation ideally prior to but certainly within 12 months of any permit issuance.
Additionally, if an impermeable liner on the ponds is installed and allowable leakage is currently occurring through the compacted earth liner, pond volumes may increase even with the same amount of influent. This may necessitate more frequent pump-out for land application, which in turn could lead to field saturation of certain nutrients more quickly.

Original Commenter: National Park Service

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst.

Seepage from waste storage ponds has the potential to pollute surface and ground water. The record included one recompacted permeability test that is insufficient to determine liner integrity. The necessary soil investigations including, but not limited to, percentage of fines and soil permeability evaluations, have not been performed at this facility in accordance with the AWMFH 651 Table 10-4 and Appendix 10D. Plasticity index analysis was performed on one sample of the in situ clay material in boring 2. The variability in the regolith expected in this geologic setting coupled with the insufficient data creates additional concerns about the siting and soil sources for the clay liner. The required number of borings were not advanced within the pool areas in accordance with AWMFH 651.0704(b)(4); these additional borings would have provided more data for assessment of clay source material. Proper soil investigations for the liner material are necessary to determine the suitability and location of the clay source material and to consider any additional geotechnical testing to confirm material properties, which will reduce the potential for downward and/or lateral seepage of the stored wastes.

Pursuant to Appendix 10D of the AWMFH, it is the position of NRCS that special design measures are necessary where agricultural waste storage ponds are constructed in soils with high calcium content or highly unfavorable geologic conditions, such as karst formations.

19 BCRET Quarterly Report for October 2016 to December 2016, Table 10, page 71.
Comment 365: The health of Arkansans? CAFOs are notorious for producing not only liquid but also airborne toxins that cause asthma and other respiratory problems. You allowed this farm to be built less than a mile from a school and its playground. Some states have already outlawed CAFOs for these and other reasons. Any sensible person can see that spreading millions of gallons of hog waste over a large acreage is a disgusting idea.

Original Commenter: Nancy Baxter

Response: The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

Buffers from neighboring occupied buildings are required by regulation and are included in all APC&EC Regulation 5 permits.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 366: The C & H Hog Factory Farm, has willfully threaten the health of our children, seniors, and all community members by their practices. With freedom comes the responsibility of doing the right thing. Spreading hog manure next to the school should be against the law, and if I had school age children I would take them out as I would see this for what it is, Bioterrorism.

Original Commenter: Dorothy Walters

Response: The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

Buffers from neighboring occupied buildings are required by regulation and are included in all APC&EC Regulation 5 permits.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 367: I write to ask that you deny C&H Hog Farms request and application to their current permit. It was bad enough that they received a permit in the first place, but to allow this business to escape further review would be the height of negligence. C&H has failed completely to take any useful action to avoid a
cataclysmic pollution event that will occur. Seeking to spread hog manure over a wider acreage which is still located over karst is not any mitigation. C&H’s current situation has no viable nor concrete methods or means for addressing a breach or accidental release of waste from impoundments. Once nitrate-rich waste finds its way into waterways, including the Buffalo River, the damage is done. Like every greedy, arrogant business person from the builder of the Titanic to the hog farm owners in Illinois, North Carolina, Ohio, and Missouri whose businesses befouled waterways in those states, saying “it will never” happen, is wishful thinking at best, and is delusional in actuality. Please deny C&H Hog Farm’s application and put some teeth into the requirements of any on-going permit.

Summarized Commenters:  C. Collier, Chris Williams, Pippa Pearthree, Megan Saunders

Response:  The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

Response:  The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond
construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

**Comment 368:** I am deeply concerned about the following 6 things:

- Granting a No-Discharge Permit is Inappropriate
- Failure to Acknowledge Karst
- Lack of Compliance with AWMFH (Agricultural Waste Management Handbook)
- Evidence of Discharge is being ignored
- Violates Current Moratorium
- Deficient Nutrient Management Plan

In addition to these six points from the Buffalo River Watershed Alliance, I am also concerned about the following:

If, either by a flood that washes waste from the fields and into the river, or be seeping or leaking sewage ponds the waste trickles through the karst and into the river, or by another disaster, our Buffalo National River loses its value as a tourist attraction, many lives will be adversely affected, both human and animal. Even if the waste never enters the stream, an unlikely possibility, the odor of the manure throughout the region will deter tourist dollars as well as Arkansan’s enjoyment of this extraordinary River.

It is well documented that exposure to hog waste increase asthma and other health issues, especially in children. Yet permits allow this waste from C&H to be spread in close proximity to an elementary school. That’s just wrong.
I know that some people feel that everyone should have a right to do whatever they like with land they own. I think this right does not hold when what that private landowner does has such a potentially devastating affect on the ability to earn a living, quality of life, and health of neighbors who do not even reap benefit from the activity. Long term, only ten jobs, at most, are created by C&H, contrasting with hundreds in the tourist industry surrounding the Buffalo.


Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes, rock outcrops, and neighboring occupied buildings are required by regulation and are included in all APC&EC Regulation 5 permits.

APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

The Department emailed public notice of the draft permit to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, the Department of Arkansas Heritage, and the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health or Endangered and Threatened Species from the agencies with the jurisdiction over these matters.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

**Comment 369:** Please deny the permit due to lack of compliance with the Agricultural Waste Management Field Handbook (AWMFH)

1. The failure to acknowledge the presence of karst and follow the subsequent requirements for a detailed geologic investigation (Chapter 7),
2. Application of waste in excess of agronomic need (Ch 2-3),
3. Failure to perform a “substantive evaluation of the impact of sudden breach or accidental release from waste impoundments” (Ch 2-14),
4. Failure to “develop an emergency action plan which should be considered for waste impoundments where there is potential for significant impact from breach or accidental release” (Ch 2-15)
5. Inability to comply with guidance regarding waste application on flood prone and sloping (8-15%) fields. Guidance recommends injection or incorporation which is impractical in this terrain, requiring those fields be removed from the NMP (601.0504(f) and (m))
6. Failure to account for proximity of a waste impoundment to sensitive groundwater areas or to investigate groundwater flow direction, especially the failure to identify the presence of an improperly abandoned hand dug well located less than 600 feet downgradient from the ponds. (651.0703 and 651.0702)

Summarized commenters: Dorothy Mangold, David Wimberly, George Knight, Duane E. Curby, Pete Petersen, Ken Leonard, Frank Millett, Eunice Millett, Jan McMahon, Steven Miller, Pamela E. Stewart

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management
Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in this permit.

The API is used to develop loading rates for land application based on phosphorus. There are many factors taken into account to determine whether land application on a specific field is allowable. While the soil test phosphorus is one of those factors, it is not the determining factor. A field with high soil test phosphorus may still be appropriate for land application. The Department only permits land application when the API value is a low or medium class. NRCS Conservation Practice Standard Nutrient Management Code 590 for the State of Arkansas allows for land application based on the API, which does not limit land application of phosphorus to agronomic need.

APC&EC Regulation 5.406(B) prohibits land application when soil is saturated, e.g. during a precipitation event, or when significant precipitation is reasonably anticipated in the next 24 hours. The AWMFH does not prohibit land application in areas where flooding frequency is occasional or frequent.

The AWMFH Amendment 61, dated August 2012, does not require incorporation of animal waste on moderate limitation slopes (8–15%). APC&EC Regulation 5.406(C) allows waste or wastewater to be land applied on to slopes of up to fifteen percent (15%) and prohibits land application in any manner that will allow waste to enter Waters of the State or to run onto adjacent property without the written consent of the affected adjacent property owner.

Documentation that the well has been properly plugged and certified has been provided by the applicant.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application...
from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

Although the AWMFH does not prohibit land application in areas where flooding frequency is occasional or frequent, the API compensates for flooding as a factor in its calculations.

Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA102920, “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA951621 states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport

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21 [https://www.uaex.edu/publications/PDF/FSA-9516.pdf](https://www.uaex.edu/publications/PDF/FSA-9516.pdf)
potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 370: I strongly urge you to deny the permit for the future operation of the C&H Hog Farm (CAFO) near Big Creek, West of Mt. Judea, in Newton County, Arkansas. The C&H Hog Farm Concentrated Animal Feeding Operation (CAFO) dumps millions of gallons of hog urine and feces each year into giant waste lagoons just a few miles from the Buffalo National River. That waste is then sprayed onto fields that are adjacent to Big Creek, a major tributary flowing into the Buffalo National River. That waste will result in the serious pollution of the Buffalo National River. The Buffalo National River is the Crown Jewel of Arkansas, and draws visitors from across the nation and around the world. A new National Park Service report shows that there were 1,463,304 visitors to Buffalo National River in 2015, and they spent $62,243,200 in communities near the park. That spending supported 969 jobs in the local area and had a cumulative benefit to the local economy of $72,009,000. All of that enormous benefit to the people of Arkansas will be in jeopardy if the C&H Farm permit is not denied.

I personally have a strong attachment to the Buffalo National River. My family and I have been canoeing and hiking on the Buffalo National River every year since 1972, when it was designated the first National River in the USA. Our children and grandchildren have grown up canoeing and hiking on the Buffalo River.

I strongly urge you to deny the C&H Hog Farm permit due to lack of compliance with the Agricultural Waste Management Field Handbook (AWMFH). The specific reasons for this denial are the following

1. The failure to acknowledge the presence of karst and follow the subsequent requirements for a detailed geologic investigation (Chapter 7),
2. Application of waste in excess of agronomic need (Ch 2-3),
3. Failure to perform a “substantive evaluation of the impact of sudden breach or accidental release from waste impoundments” (Ch 2-14),
4. Failure to “develop an emergency action plan which should be considered for waste impoundments where there is potential for significant impact from breach or accidental release” (Ch 2-15)
5. Inability to comply with guidance regarding waste application on flood prone and sloping (8-15%) fields. Guidance recommends injection or incorporation
which is impractical in this terrain, requiring those fields be removed from the NMP (601.0504(f) and (m)).

6. Failure to account for proximity of a waste impoundment to sensitive groundwater areas or to investigate groundwater flow direction, especially the failure to identify the presence of an improperly abandoned hand dug well located less than 600 feet downgradient from the ponds. (651.0703 and 651.0702).

Original Commenter: Frank Millett and Eunice Millett

Similar Comments Received from: Dorothy Mangold, David Wimberly, George Knight, Duane Curby, Pete Petersen, Ken Leonard, Jan McMahon, Steven Miller, Kenneth Lee Smith.

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

Consideration of tourism and revenue is not within the Department’s regulatory authority.

The API is used to develop loading rates for land application based on phosphorus. There are many factors taken into account to determine whether land application on a specific field is allowable. While the soil test phosphorus is one of those factors, it is not the determining factor. A field with high soil test phosphorus may still be appropriate for land application. The Department only permits land application when the API value is a low or medium class. NRCS Conservation Practice Standard Nutrient Management Code 590 for the State of Arkansas allows for land application based on the API, which does not limit land application of phosphorus to agronomic need.

APC&EC Regulation 5.406(B) prohibits land application when soil is saturated, e.g. during a precipitation event, or when significant precipitation is reasonably anticipated in the next 24 hours. The AWMFH does not prohibit land application in areas where flooding frequency is occasional or frequent.
The AWMFH Amendment 61, dated August 2012, does not require incorporation of animal waste on moderate limitation slopes (8–15%). APC&EC Regulation 5.406(C) allows waste or wastewater to be land applied on to slopes of up to fifteen percent (15%) and prohibits land application in any manner that will allow waste to enter Waters of the State or to run onto adjacent property without the written consent of the affected adjacent property owner.

Documentation that the well has been properly plugged and certified has been provided by the applicant.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.
Although the AWMFH does not prohibit land application in areas where flooding frequency is occasional or frequent, the API compensates for flooding as a factor in its calculations.

Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA102922, “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA951623 states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 371: The issue I see is an obfuscation of the term “karst” that doesn't employ the accepted geologic definition specifying a terrain or region, nor does it recognize the complexities of karst environments and their attendant risks. Using singular terms like fractures, voids, sinkholes, dry creeks, losing streams, caves, epikarst, etc., without acknowledging that all are individual characteristics and prime examples of the chemical make up of the karst limestone, dolomite, etc., terrain out of which these features develop, is confusing and employed apparently intentionally to distract the public, Governor Hutchinson, the regulatory agencies and the legislators. Without this basic understanding of the definition of karst, good and informed scientific decisions about land and water resources in karst terrains are impossible, and the results devastating. I will share some common

23 [https://www.uaex.edu/publications/PDF/FSA-9516.pdf](https://www.uaex.edu/publications/PDF/FSA-9516.pdf)
examples of reliable information from several sources that I have found defining karst.

Karst terrain has been explained by several representative reliable definitions above. I will take this opportunity to point out some of the obfuscating and contradictory descriptions in the Harbor Environmental Drilling Report and its Work Plan regarding karst and its inherent features. Note that except for the “potential concerns” raised by a citizen’s group… due to karst terrain” in the initial “Purpose” section, karst is not mentioned at all in the entire “Physical Setting 2.2” section of the report. Instead, subcategories of karst characteristics and features are employed to describe the physical geology, soils, and terrain. This provides the illusion that karst is not present to most readers, just a possible but remote “concern raised by a citizen’s group”. A person unfamiliar with the definition of karst terrain would not understand that the following descriptions have omitted the elephant in the room, or that a truth seeking investigation into karst would necessarily have incorporated an evaluation of groundwater flow direction and lithology with several bore holes. (Despite the stated purpose above, note that Tai Hubbard, the study’s principal geologist, remarks in his report in the appendix that this was not accomplished.)

It should be pointed out that ADEQ is well aware of the guidelines for karst terrain set forth in the AWMFH that state the necessity to investigate groundwater flow direction in karst terrains, (651.0703 and 651.0702) Why was flow direction specifically left out of the investigation, especially when this rare opportunity of investigative drilling was already taking place, and the relative ease of evaluating flow and drilling several holes was at hand?

Original Commenter: Marti Olesen

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other
subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

**Comment 372:** Citation 5.402 of Regulation 5 reads as follows:

"Design Requirements (A) Designs and waste management plans shall be in accordance with this Chapter and the following United States Department of Agriculture Natural Resource Conservation Service technical publications: (1) Field Office Technical Guide, as amended. (2) Agricultural Waste Management Field Handbook, as amended".

Therefore, C&H Concentrated Animal Feeding Operation (CAFO) should be in accordance with the guidelines set forth in the Natural Resources Conservation Service (NRCS, 2012) Agriculture Waste Management Field Handbook (AWMFH), as amended before a Regulation 5 permit can be mistakenly issued to the C&H CAFO.

The draft referenced Regulation 5 Permit does not provide sufficient information regarding citation 5.402. Please provide documentation that each citation in the Agricultural Waste Management Field Handbook has been addressed for the referenced Regulation 5 permit. Regardless, if the citations are considered guidance are not. Please give special attention to Chapters 2, 5, 7 and 10. The AWNFH categorizes risk factors associated with siting a CAFO in Table 10-4 as Slight, Moderate, High and Very High. Numerous professional scientific reviewers, primarily Arkansas Registered Professional Geologists, have agreed that the C&H CAFO is categorized as "Very High" risk. In other words, this
facility and associated spreading fields are definitely sited in an unacceptable area and should not have been initially permitted based on karst geology and floodplains. Table 10-4 in addition with documented elements of the Harbor (2016) investigation regarding loss of circulation of potable water, large amounts of potable water needed during drilling, "possible void" and the additional 104 gallons of Portland cement needed to grout the borehole directly adjacent to the swine waste lagoons and above 28.5 feet below ground surface (b.g.s.) dictates that this CAFO is definitely not eligible for a Regulation 5 permit according to the AWMFH. The Arkansas Department of Environmental Quality (ADEQ) has stated, "we made a mistake" with respect to permitting the C&H CAFO. Does ADEQ want to make another costly taxpayer "mistake"? If so, this is insane and defies logic.

Original Commenter: Ray Quick

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.
Comment 373: Delevan (2017), Brahana (2017, 2016, 2015, 2014, et.al.), Mott (2016), Hubbard (2016), Murdoch (2016 et. al.) and I as well as numerous Arkansas Registered Professional Geologists believe the C&H Facility and the spreading fields are situated on karst. Please note that the AWMFB citation 651.0702 states the following:

"Sinkholes or caves in karst topography or underground mines may disqualify a site for a waste storage pond or treatment lagoon. Sinkholes can also be caused by dissolving salt domes in coastal areas. The physical hazard of ground collapse and the potential for groundwater contamination through the large voids are severe limitations". I agree with Mr. Hubbard's and Mott (2016) evaluation that the C&H Waste Lagoons have epikarst (i.e. a karst feature) below them. Epikarst has the potential of developing into a sinkhole. In particular, with the weight of over 2,337,074 million gallons of swine waste in the lagoons resting on top of it. Additionally there is another 615, 946 gallons of swine waste in the in-barn storage tanks that are constructed on fill material. Fill material often subsides over time. This would cause the tanks to potentially rupture. Why is ADEQ willing to accept these potential catastrophic risks in karst terrain when there is little or no attenuation of waste in conduit flow which is on-site and the surrounding area that drains to the BNR?

Original Commenter: Ray Quick

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex
geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

**Comment 374:** The Draft Permit does not adequately take into consideration the karst geology of the region in the siting of the facility and in the waste management plan. Arkansas Pollution Control and Ecology Commission (APCEC) Regulation 5.402 requires “Designs and waste management plans shall be in accordance with this Chapter and the following United States Department of Agricultural Resource Conservation Service technical publications: (1) Field and Office Technical Guide, as amended. (2) Agricultural Waste Management Field Handbook, as amended.” The Agricultural Waste Management Field Handbook (AWMFH) provides guidance around “Geologic and Groundwater Considerations” in Chapter 7. C&H Hog Farm, Inc.’s permit application and waste management plan fail to recognize the karst topography of the region and that is characterized in the AWMFH as being “important in determining potential siting problems” and the “common problems associated with karst terrain” and should therefore not be issued.

Original Commenter: Anna Weeks

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 375: ADEQ should not issue a “no discharge” permit to C&H. The facility was originally designed and has been operating in a manner that results in a discharge of wastes to Waters of the State. The planning, studies and assessments required by Regulation 5 and the NRCS Agricultural Waste Management Field Handbook (AWFMH) have not been conducted. The facility is causing or contributing to water quality impacts. For these reasons, the facility should be closed, with all wastes remaining at the facility removed from the Buffalo River Watershed.

C&H commenced operations in 2012 under NPDES permit No. ARG590001. C&H has applied for and received a draft permit pursuant to APCEC Regulation 5. In the Statement of Basis, ADEQ uses the terms “no-discharge facility” and “no-discharge permit” repeatedly. (See, e.g. second sentence in Statement of Basis -- “This draft permit decision is for the issuance of a no-discharge facility under draft permit number 5264-W and AFIN 51-00164.” Paragraph 3 of the Statement of Basis -- “The permittee submitted a permit issuance application for a no-discharge permit . . .” “It is proposed that the water no-discharge permit be issued.” Paragraph 12 – “The [ADEQ] has made the determination to issue a draft permit for the no-discharge facility described in the application and NMP.”)

The draft permit contains a prohibition against discharges: “Waste shall not be discharged from this operation to Waters of the State or onto land in any manner that may result in ... runoff to Waters of the State.” See Part II, Specific Condition 2. The permit goes on to define Waters of the State:

‘Waters of the State’ means all streams, lake, marshes, ponds, watercourses, waterways, wells, springs, irrigation systems, drainage systems, and all other
bodies or accumulations of water, surface and underground, natural or artificial, public or private, which are contained within, flow through, or border this state or any portion of the state as defined by the Act. See, Part IV, Definitions.

C&H’s Nutrient Management Plan (NMP) submitted with its permit application makes it clear that it contemplates discharges to Waters of the State:

**Purpose of Plan** – The goal of nutrient management is to effectively and efficiently use the nutrient resources to adequately supply soils and plants with the proper amount of nutrients to produce food, forage, fiber, and cover while minimizing transport of nutrients to ground and surface water and environmental degradation. (emphasis added).

C&H concedes in its NMP that there will be “transport of nutrients to ground and surface water” and that its “goal” is to “minimize” these discharges. (Whether or not it is actually meeting this goal is discussed in detail below. It is not.) The NMP is incorporated into and made a part of the permit. See, Part II, Specific Conditions, para. 2. ADEQ fails to explain how it can issue a no-discharge permit to a no-discharge facility prohibiting the discharge of waste to Waters of the State when the permit application contemplates, and the facility design and operation necessitates, discharges of wastes to “Waters of the State.” Moreover, the BCRET work actually documents discharges. BCRET set up three flumes to measure flow from waste fields and to sample discharges. One of these flumes is depicted in Figure 5 below. The results of sampling from this discharge point reflect the presence of elevated nutrients and other parameters. It is important to note that because the ISCO samplers cannot meet *Escherichia coli* (e.coli) bacteria holding times, there is no bacteria data from field flumes or most Big Creek storm flow samples even though bacteria is undoubtedly present in these storm flow events.

The waste holding ponds were designed and constructed to permit waste leakage to “Waters of the State.” Based on construction certification documents, it is estimated that leakage rates are 1,090 gallons per acre per day for Pond 1 and 1,334 gallons per acre per day for Pond No. 2. Pond 2 is also designed to permit a discharge in the event of a large (25 year 24 hour) precipitation event (“the storm volume is only encroached during a 25 year 24 hour storm event.”) C&H NMP at p. 14. The recent “Harbor Drilling Report” concludes that the waste holding ponds sit atop karst features. Karst features provide a mechanism for rapid transport of wastes that leak from the waste ponds to ground and surface waters.

The waste application sites contain excess phosphorous, the nutrient that most directly contributes to water quality impairment by stimulating nuisance algae blooms. It is undisputed that phosphorous will migrate from these sites both through groundwater infiltration and during storm events. This phosphorous will end up in Big Creek and the Buffalo River. As discussed in greater detail below,
stream monitoring shows impacts in water quality downstream of the facility, both in Big Creek and the Buffalo River.

In summary, the prohibition both in Regulation No. 5 and the draft permit against discharging wastes to “Waters of the State” will be violated if this permit is granted. That the facility is discharging wastes to Waters of the State is plain both from the current permit, the Regulation 5 permit application and the results of the work done by BCRET, USGS, and the NPS. Furthermore, it cannot be disputed that waste discharges to Waters of the State will continue to occur unless the permit is denied.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system. Conditions for land application are prescribed by APC&EC Regulation 5.406. These land application requirements are necessary for compliance with APC&EC Regulation 5.102 and 5.303.

The Department did not review or approve the study design and has no authority over the day-to-day activities of BCRET. While the Department may consider the research conducted by the University of Arkansas, questions regarding the study should be more appropriately directed to the University of Arkansas.

The API is used to develop loading rates for land application based on phosphorus. There are many factors taken into account to determine whether land application on a specific field is allowable. The Department only permits land application when the API value is a low or medium class.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application
from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Data supplied from the C&H Hog Farms, Inc. 2014–2017 annual reports document an increase of soil test phosphorus (STP) from 20 ppm to 68 ppm in Field 17 to a more significant increase in Field 1, which increased from 45 ppm to 173 ppm. As stated in University of Arkansas Division of Agriculture Soil Phosphorus: Management and Recommendations FSA102924, “Arkansas scientists agree that there is no agronomic reason or need for STP to be greater than about 50 ppm (Mehlich-3 extraction).” As of the C&H Hog Farms, Inc. 2017 Annual Report, results of all soil test phosphorus were greater than 50 ppm. FSA951625 states that the phosphorus index approach is most appropriate as it accounts for multiple risk factors and provides a better risk assessment of P loss in runoff. Despite a reported increase of soil test phosphorus in waste application fields, the Arkansas Phosphorus Index may still allow application of swine waste because of other factors including phosphorus source potential, transport potential, and best management practice multipliers. However, “with the move from agronomic to environmental concerns with P, soil P testing has been used to indicate when P enrichment of runoff may become unacceptable. A common approach has been to use agronomic soil P standards, following the rationale that soil P in excess of crop requirements is vulnerable to removal by surface runoff or leaching” (FSA1029). “A large amount of research between 1985 and 2000, showed that as STP (Soil Test Phosphorous) increased, especially in the top 2–4 inches of soil, so did the concentrations of soluble P in runoff (Figure 1)” (FSA1029). Geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3 are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Pursuant to the Memorandum of Agreement between the Board of Trustees of the University of Arkansas System for and on behalf of the University of Arkansas System-Division of Agriculture and the Arkansas Department of Environmental Quality, the study performed by BCRET is being carried out for the use and benefit of ADEQ; however, the study shall be funded and conducted independently of ADEQ and shall meet the requirements of an independent study conducted by professionals in the field of water quality.

Comment 376: Chapter 5, Role of Soils in Manure Management, (210–VI–AWMFH, Amend. 61, August 2012) states “A well-planned agricultural waste management system (AWMS) that uses manure as a land improving resource considers landscape features and the physical, chemical, and biological properties of soils.” It goes on to state that “Soil data should be collected early in the planning process.”

The “physical, chemical, and biological properties of soils” include:

(a) Available water capacity;
(b) Bulk density;
(c) Cation-exchange capacity;
(d) Depth to bedrock or cemented pan (e.g. Bedrock or a cemented pan, less than 40 inches limits plant growth and root presentation and reduces soil waste adsorptive capacity. Limits to application of waste are moderate at a depth of 20 to 40 inches and severe at less than 20 inches;
(e) Depth to high water table;
(f) Flooding;
(g) Fraction greater than 3 inches in diameter—rock fragments, stones, and boulders;
(h) Intake rate;
(i) Permeability rate;
(j) Soil pH;
(k) Ponding;
(l) Salinity;
(m) Slope (Slope greater than 15 percent is shown by C&H but slope between 8 and 15 percent should be shown since this requires an application limitation beyond that of the PI; and
(n) Sodium adsorption ratio (SAR) (relative to calcium and magnesium).

Note: Table 5-3 in Chapter 5 lists many of the soil data characteristics above versus the degree of limitation that they put on application of waste.

Chapter 6 Role of Plants in Manure Management states:

“The objectives of a complete system approach to manure management are to:
• recycle nutrients in quantities that benefit plants,
• builds levels of soil organic matter,
• limit nutrient or harmful contaminant movement to surface and ground water”

Chapter 7 “Geologic and Groundwater Considerations” lists additional requirements. On page 7-1 it states “An appropriately conducted onsite investigation is essential to identify and evaluate geologic conditions, engineering constraints, and behavior of earth materials.” Factors that must be considered, investigated, and measured for the contaminant source, i.e. the waste application field surface include:

(a) Attenuation potential of soil (page 7-15) (this includes (1) clay content, (2) depth of soil to bedrock, (3) vertical distance to groundwater supply and horizontal distances to wells and springs);
(b) Groundwater flow direction (page 7-16);
(c) Permeability of aquifer material (page 7-16);
(d) Hydraulic conductivity (page 7-16);
(e) Hydraulic head (page 7-16);
(f) Hydraulic gradient (page 7-18);
(g) Hydrogeologic setting (page 7-18);
(h) Land topography (page 7-18);
(i) Proximity to designated use aquifers, recharge areas, and well head protection areas (page 7-18);
(j) Type of aquifer (page 7-18); and
(k) Vadose zone material (page 7-18)

Table 7-2 (p. 7-10) lists the engineering geology components that may need to be investigated for various waste management components. For land application areas it lists “topography”. Topography includes karst and since the Arkansas Geological Survey Map for the Mt. Judea area shows Boone Formation underlying the C&H waste application fields, karst is undoubtedly present as the top layer of the bedrock. As outlined above in Chapter 5(d), the depth to bedrock should be determined for each waste application field as well as for the pond area. The “Topography” section on page 7-14 states the importance of mapping the karst terrain. For the waste application fields this may require test pits and/or ground penetrating radar and the services of a geologist. The karst as the top layer of the bedrock in areas of shallow soil may rule out some waste application fields or areas of some waste application fields for use.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public
comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

The AWMFH recommends reduced application rates and using split application based on soils with severe limitations based on soil depth. For soils with moderate limitations based on soil depth, the AWMFH recommends reduced application rates.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 377: Chapter 2 Planning Considerations also discusses the need to properly evaluate the waste storage component of the AWMS. Section 651.0204 “Waste impoundment planning considerations” states:

“Waste impoundments include earthen waste storage ponds and waste treatment lagoons. See chapter 10 of this handbook for the design detail of these AWMS components. The planning of waste impoundments must consider the potential consequences if they fail. Safeguards or measures to reduce the
potential for failure or the consequences of failure should be considered as warranted.

Not all waste impoundments are planned to have an embankment. **Those that do must consider the risk to life and property should the embankment fail.** (emphasis added)

The two major categories considered are:

- embankment breach or accidental release
- liner failure

At page 2-14 it states:

Significant consequences in the event of sudden embankment breach or accidental release may occur, particularly if there is impact to a surface waterbody. The primary consequence to a surface waterbody is contamination with microorganisms, organic matter, and nutrients. This contamination may kill aquatic life and make the water unsuitable for its intended use.

... Regardless of the impact, it must be recognized that releasing wastewater in any amount or concentration into a surface waterbody is seldom socially acceptable. For this reason, precautionary measures should be considered in planning and design to minimize the risk or consequences of embankment breach or accidental release if a hydraulic analysis indicates that a surface waterbody may be impacted. This would be even more important from a social acceptability aspect if the affected waterbody is off-farm.

... Features, safeguards, or management measures to minimize the risk of embankment failure or accidental release or to minimize or mitigate impact of this type of failure should be considered if one or more of the categories listed in table 2–1 may be significantly impacted...

... A substantive evaluation of the impact of sudden breach or accidental release from waste impoundments should be made on all waste impoundments. Waste impoundments planned with embankments where significant direct property damage may occur should be evaluated with an appropriate breach routing procedure, such as that in NRCS Technical Release No. 66, Simplified Dam Breach Routing Procedure.
Table 2–1 “Potential impact categories from breach of embankment or accidental release” states:

- Surface waterbodies—perennial streams, lakes, wetlands, and estuaries
- Critical habitat
- Farmstead or other areas of habitation
- Off-farm property

Development of an emergency action plan should be considered for waste impoundments where there is potential for significant impact from breach or accidental release. In addition, consideration should be given to actions to minimize damage from breach. Actions would include wellhead protection, dikes, and diversion channels. These actions should be taken to augment, not replace the measures to reduce the risk of breach.”

At C&H, storage pond embankment failure has not been addressed, a breach routing procedure has not been completed, and an emergency action plan has not been developed. Once again the lack of planning at C&H leaves significant requirements of the AWMFH unaddressed. Section 651.0204 (b) of the AWMFH also discusses the potential hazard of liner failure for waste impoundments and states:

“Waste impoundments present a risk of contaminating underlying groundwater aquifers and surface water that may be fed by these aquifers because of the nutrients and microorganisms contained in the wastewater. To minimize this risk, NRCS practice standards require that waste impoundments be located in soils of acceptable permeability or be lined. Despite this, risk remains because of the possibility of poor performance of these measures in preventing the movement of contaminants to the groundwater. Any of a number of causes could lead to nonperformance of liners. These causes would include such things as not being homogenous with lenses of more permeable material, being constructed with inadequate compaction, having desiccation cracks develop following impoundment emptying, and being damaged during agitation. Flexible membrane liners may fail by such things as cracks, tears, seam separation, or loosened connections. Concrete liners may leak if they crack or joint seals fail. The acceptability of the risk depends on the importance of the underlying aquifer, location and type of aquifer, and geologic site conditions that may be unforgiving to poor performance.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

Comment 378: The seepage protection planned for a waste impoundment should correspond to the risk involved. A thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. Special consideration should be given to seepage control in any one of the following conditions:

• any underlying aquifer is at a shallow depth and not confined
• the vadose zone is rock
• the aquifer is a domestic water supply or ecologically vital water supply
• the site is located in an area of carbonate rock (limestone or dolomite).” (Emphasis added)

At C&H, all of the requirements for “special consideration” are present. Waste holding ponds are not appropriate and should never have been approved. Adding synthetic liners will not cure this problem. Almost all of the site characteristics conflict with the siting provisions of the AWMFH and thus conflict with Regulation 5. The AWMFH discusses how the planner is to analyze the relationship of the waste storage system to the site-specific environmental conditions and how to proceed when selecting an appropriate waste storage solution. This is ignored by the permit applicant and approver.

Chapter 7 Geologic and Groundwater Considerations section 651.0701 states:
“Although karst topography (fig. 7–2) is well known as a problem because of its wide, interconnected fractures and open conduits, almost any near-surface rock type will have fractures that can be problematic unless treated in design.

The planners of agricultural waste management practices should be familiar with the principles of groundwater. NRCS references that include information on groundwater are Title 210, National Engineering Handbook (NEH), Section 16, Drainage of Agricultural Lands, Part 631, Chapter 30, Groundwater Hydrology and Geology, Chapter 31, Groundwater Investigations; Chapter 32, Well Design and Spring Development, and Chapter 33, Groundwater Recharge, and Part 650, Engineering Field Handbook (EFH), Chapter 12, Springs and Wells and Chapter 14, Water Management (Drainage).

When designing any agricultural waste management component, it is important to know:

- what type(s) of aquifers are present and at what depth
- the use classification of the aquifer, if any”

Section 651.0702 Engineering geology considerations in planning states:

“This section provides guidance in determining what engineering geology considerations may need to be investigated for various waste management components (table 7–2). The significance of each consideration is briefly described with some guidance given on how to recognize it in the field. Most issues serve as signals or red flags that, if found, justify requesting assistance of a geologist or other technical specialist.

Sinkholes or caves in karst topography or underground mines may disqualify a site for a waste storage pond or treatment lagoon. Sinkholes can also be caused by dissolving salt domes in coastal areas. The physical hazard of ground collapse and the potential for groundwater contamination through the large voids are severe limitations…

Karst topography is formed on limestone, gypsum, or similar rocks by dissolution and is characterized by sinkholes, caves, and underground drainage. Common problems associated with karst terrain include highly permeable foundations and the associated potential for groundwater contamination, and sinkholes can open up with collapsing ground. As such, its recognition is important in determining potential siting problems.” (Emphasis added).

Section 651.0704 describes the detailed AWMS planning and design process utilizing the site investigation factors listed previously:
“The purpose of a preliminary site investigation is to establish feasibility for planning purposes. A preliminary site investigation also helps determine what is needed in a detailed investigation. A site investigation should be done only after local regulations and permit requirements are known. The intensity of a field investigation is based on several factors including:

- quality of information that can be collected and studied beforehand
- previous experience with conditions at similar sites
- complexity of the AWMS or site

The purpose of a detailed geologic investigation is to determine geologic conditions at a site that will affect or be affected by design, construction, and operation of an AWMS component. Determining the intensity of detailed investigation is the joint responsibility of the designer and the person who has engineering job approval authority. **Complex geology may require a geologist.** Detailed investigations require application of individual judgment, use of pertinent technical references and state-of-the-art procedures, and timely consultation with other appropriate technical disciplines. Geologic characteristics are determined through digging or boring, logging the types and characteristics of the materials, and securing and testing representative samples. An onsite investigation should always be conducted at a proposed waste impoundment location. State and local laws should be followed in all cases.” (Emphasis added).

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

The nutrient management planner certification is not within the Department’s regulatory authority.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Seepage from waste storage ponds has the potential to pollute surface and ground water. The record included one recompacted permeability test that is insufficient to determine liner integrity. The necessary soil investigations including, but not limited to, percentage of fines and soil permeability evaluations, have not been performed at this facility in accordance with the AWMFH 651 Table 10-4 and Appendix 10D. Plasticity index analysis was performed on one sample of the in situ clay material in boring 2. The variability in the regolith expected in this geologic setting coupled with the insufficient data creates additional concerns about the siting and soil sources for the clay liner. The required number of borings were not advanced within the pool areas in accordance with AWMFH 651.0704(b)(4); these additional borings would have provided more data for assessment of clay source material. Proper soil investigations for the liner material are necessary to determine the suitability and location of the clay source material and to consider any additional geotechnical testing to confirm material properties, which will reduce the potential for downward and/or lateral seepage of the stored wastes.

Pursuant to Appendix 10D of the AWMFH, it is the position of NRCS that special design measures are necessary where agricultural waste storage ponds are constructed in soils with high calcium content or highly unfavorable geologic conditions, such as karst formations.

Comment 379: Upon completion of the preliminary and detailed site analysis above, the information is to be used to examine the critical requirements of Chapter 8 Siting.
Agricultural Waste Management Systems. The AWMFH goes into significant detail and provides clear guidance on the appropriate approach to siting waste storage components. The design of an AWMS must consider measures to improve and protect water quality. Chapter 9 of the AWMFH further discuses important considerations for Agricultural Waste Management Systems and states in 651.0900:

“An agricultural waste management system (AWMS) is a planned system in which all necessary components are installed and managed to control and use byproducts of agricultural production in a manner that sustains or enhances the quality of air, water, soil, plant, animal and energy resources.” (Emphasis added).

Section 651.0901 directs the planner to develop the AWMS through a “total systems approach” and includes an introduction to waste stream treatment stating:

“Treatment is any function designed to reduce the pollution potential or modify the physical characteristics of the waste, such as moisture and TS content, to facilitate more efficient and effective handling. Manure treatment is comprised of physical, biological, and chemical unit processes. It also includes activities that are sometimes considered pretreatment, such as the separation of solids. The plan should include an analysis of the characteristics of the waste before treatment; a determination of the desired characteristics of the waste following treatment; the selection of the type, estimated size, location, and the installation cost of the treatment facility; and the management cost of the treatment process.” (Emphasis added).

C&H and ADEQ have provided no evidence that they have considered treatment of the swine waste in any manner previous to discharging the waste to storage ponds, or prior to allowing the disposal of this environmentally damaging waste stream to waste application fields. This waste stream is sprayed into the Buffalo River watershed in raw form where it seeps into aquifers and runs off to surface streams.

Chapter 10 of the AWMFH brings all the inventory, analysis, planning, conservation, environmental protection, and farm operator considerations to bear on the agricultural waste management system component design. This discussion describes preferred waste storage alternatives based on a risk assessment of the planning information developed in the previous AWMFH prescribed planning steps and states:

“A successful manure management system must address production, operation, regulatory guidelines, and environmental considerations…Operating a livestock facility creates an environmental risk for pollution. Climatic conditions and operating procedures can lead to an accidental discharge into surface waters. Foundation problems can result in seepage into subsurface waters. Location of a
facility is an extremely important consideration during the planning process to minimize exposure to vulnerability and risk.

Earthen storage is frequently the least expensive type of storage; however, certain restrictions, such as limited space availability, high precipitation, water table, permeable soils, or shallow bedrock, can limit the types of storage considered. **Table 10–4 provides guidance on siting, investigation, and design considerations.**

Pond liners are used in many cases to compensate for site conditions or improve operation of the pond. Concrete, geomembrane, and clay linings reduce permeability and can make an otherwise unsuitable site acceptable. **Table 10–4 provides criteria on selection between types of liners.”** (Emphasis added).

Table 10-4 categorizes C&H as an AWMS that meets the “very high vulnerability” criteria and requires the planner to “Evaluate Other Storage Alternatives” because of the karst geology and associated ground water contamination, leakage, and collapse potential. The “Other Storage Alternatives” include all alternatives with the exception of storage ponds with synthetic or clay liners. The preferred alternative is some type of storage tank:

“Liquid manure can be stored in aboveground (fig. 10- 22) or belowground (fig. 10–23) tanks. Liquid manure storage tanks are usually composed of concrete or glass-lined steel... A variety of manufactured, modular, and cast-in-place tanks are available from commercial suppliers...Cast-in-place, reinforced concrete, the principal material used in belowground tanks, can be used in aboveground tanks, as well.”

The AWMFH states flexible membrane liners are unsuitable for karst settings due their limited ability to reduce the collapse risk and the inherent “puncturability” of the liner. ADEQ inspectors have voiced concerns with the current clay liner, one of which is the large and sharp exposed chert fragments (Morris, 2013):

“Puncturability is the ability of foundation materials to puncture a flexible membrane liner or steel tank. Angular rock particles greater than 3 inches in diameter may cause denting or puncturing in contact with a tank. Angular particles greater than 0.5 inch can puncture plastic and synthetic rubber membranes. Sharp irregularities in the bedrock surface itself also can cause punctures. Large angular particles can occur naturally or be created by excavation and construction activity.”

The choice of a waste storage system must also consider potential waste treatment options. The planner is to develop waste treatment options based on “a total system design” which properly accounts for the karst environment, soil and waste nutrient levels, and environmental sensitivity. Section 651.1005 states:
“In many situations, manure treatment is necessary before final utilization. Adequate treatment reduces pollution potential of the manure through biological, physical, and chemical processes using such components as lagoons, oxidation ditches, composting, and constructed wetlands. These types of components reduce nutrients, reduce pathogen counts, and reduce total solids. Composting also reduces the volume of the material. Treatment may also include solids separation, drying, and dilution that prepare the material for facilitating another function. By their nature, treatment facilities require a higher level of management than that of storage facilities.”

The AWMFH also discusses how to plan and design a facility to reduce the problems associated with sludge and solids build up in the waste storage system. Sludge management was noted as one of the most significant operational and environmental concerns in the ADEQ CAFO studies undertaken in the Buffalo River watershed in the late 1990s and early 2000s:

“Primary treatment includes the physical processes such as solids-liquids separation, moisture adjustment, and dilution. Although not required, primary treatment is often followed by secondary treatment prior to storage or land application.

Separators also facilitate handling of manure. Separation facilities should be planned and designed in accordance with NRCS Conservation Practice Standard 632, Solid/Liquid Waste Separation Facility…Several kinds of mechanical separators can be used to remove by-products from manure (fig. 10–24).

Secondary treatment includes biological and chemical treatment such as composting, lagoons, oxidation ditches, and vegetative treatment areas. This additional treatment step reduces the pollution potential prior to land application by reducing the nutrient contents of the material.”

Section 651.0304 (a) of the AWMFH further describes what should be done in the event that an improperly designed and operated AWMS is resulting in off-site impacts to water quality and the natural environment:

“The following examples illustrate how animal waste or the particular constituents within the waste (nutrients, bacteria) can be limited in a watershed or at waste application sites, assuming a water quality problem has been identified and the source is a livestock operation. Measures to be used are:

• Remove all animals from the watershed.
• Reduce the number of animals.
• Use cropping systems that require more nutrients throughout the year.
• Apply wastes in split applications throughout the growing season, thereby making smaller amounts of manure available each time.
• Apply wastes over more acres at recommended rates. (Nutrient application rates far exceeding agronomic recommendations can result if, for convenience sake, wastes are applied to only the fields nearest the confinement facility.)
• Incorporate the manure, thus limiting the availability of particular constituents. P and NH₄ will become bound within the soil profile and be less available for detachment.
• Collect and transport wastes to fields in other watersheds or bag the material for sale elsewhere.”

The draft permit does not satisfy the requirements of the AWFMH for C&H’s location. The fact that the location drives the selection of the most protective design elements of the AWMFH is ignored. Because C&H is having a measurable impact on aquifers, surface water, and Buffalo National River, the primary concern of ADEQ should not be the issuance of a new permit to C&H, rather ADEQ should be focused on eliminating the ongoing water quality degradation resulting from this facility in accordance with the AWMFH.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system. Conditions for land application are prescribed by Regulation 5.406. These land application requirements are necessary for compliance with APC&EC Regulation 5.102 and 5.303.

The ADEQ Office of Water Quality Planning Branch routinely evaluates and assesses water quality data from approximately forty stations across the Buffalo National River Watershed to evaluate attainment of water quality standards.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 380: Section 5.402 of Reg. 5 states:
(A) Designs and waste management plans shall be in accordance with this Chapter and the following USDA Natural Resource Conservation Service technical publications:
• Field Office Technical Guide, as amended
• Agricultural Waste Management Field Handbook, as amended. (Emphasis added).

The requirement is mandatory. Merriam-Webster defines “in accordance with” as “in a way that agrees with or follows something.” The design of this CAFO and its agricultural waste management system (AWMS) must follow or agree with the AWMFH. However, the Regulation No. 5 application submitted by C&H ignores the conservation planning processes and provisions of the AWMFH. Rather, it permits a facility designed and operated under a permitting scheme (NPDES ARG59000) that does not require conformance with the AWMFH. Data collection, assessments, and hard choices required by the AWMFH to protect areas recognized as particularly susceptible to adverse impacts caused by CAFOs (as this site is) have not been undertaken at C&H. ADEQ has issued a draft permit to an inadequately designed facility based on an incomplete permit application (that is one that doesn’t meet the requirements of Regulation 5). The final decision must be to deny the permit because it is not “in accordance” with the AWMFH.

Specific requirements of the AWMFH and the major shortcoming of the current AWMS, permit application, and draft permit are addressed in detail in this comment and include:

• A detailed planning and analysis of the AWMS has not been conducted. If the information submitted with the permit application is to be considered C&H’s AWMS plan, it lacks many important considerations defined in the AWMFH.
• A NRCS Conservation Plan is required and has not been developed.
• A “complete systems approach” was not followed and this led to numerous incorrect decisions including the ongoing disposal of excess phosphorus in soils.
• The AWMS must be designed with maintenance or improvement of surface and ground water quality as a priority.
• Alternative construction and operation scenarios have not been developed for the AWMS. Specific measures to reduce contaminated runoff have not been assessed.
• The required site evaluation criteria have not been collected or analyzed, including the many sources of data and information that have become available since operation commenced.
• Appropriate experts such as geologists, water quality specialists, and NRCS staff, were not utilized in planning and construction.
• The original NOI and construction planning documents did not include a recognition or assessment of the area’s karst geology or its karst aquifer. The result is a facility design not compatible with the AWMFH.
• The use of waste storage ponds with synthetic or clay liners is not allowed in karst settings in recognition of numerous commonly acknowledged risks.
• The disposal of nutrients from the swine wastes to waste application fields at rates that exceed plant uptake and soil test based recommendations is not justified for sensitive areas such as karst near Buffalo National River.
• The permit application did not assess primary and secondary waste treatment options.
• Because water quality degradation and soil phosphorus loading is identified in the available data, the planning process must incorporate NRCS recommended approaches to reduce waste impacts on the environment.

Original Commenters: Ozark Society, Alan Nye, David Peterson, Robert Cross

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

It is the applicant’s responsibility to design its own liquid animal waste management systems in accordance with state laws and APC&EC Regulation 5. It is then the Department’s charge to evaluate the proposed systems for compliance with state laws and APC&EC Regulation 5.

APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.
The API has been adopted by the NRCS Practice Standard Nutrient Management Code 590 to manage the application of phosphorus in the State of Arkansas. Therefore, the API is an approved NRCS tool to develop phosphorus application rates in the State of Arkansas.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH.

**Comment 381:** This permit should be denied because karst as a predominant and well known geological risk factor in the Springfield Plateau and topographic vicinity of the facility and its spreading fields, is not recognized or investigated adequately in either the prior or current permit application.

The AWMFH devotes the entirety of Chapter 7 to guidance around “Geologic and Groundwater Considerations”. AWMFH 651.0702 Engineering Geology Considerations in Planning states the following under Part (I) Topography:

> "Karst topography is formed on limestone, gypsum, or similar rocks by dissolution and is characterized by sinkholes, caves, and underground drainage. Common problems associated with karst terrain include highly permeable foundations and the associated potential for groundwater contamination, and sinkholes can open up with collapsing ground. As such, its recognition is important in determining potential siting problems."

The original Environmental Assessment (EA) with a finding of no significant impact submitted by the Farm Services Agency (United States Department of Agriculture) on Sept 26th 2012, does not discuss any topographic concerns. The words “karst” and “groundwater” are conspicuously absent. Neither does the original permit or the new permit application mention karst as a risk factor.

The original EA of 2012 was challenged as insufficient and a court order was filed 12/2/2014 by U.S. District Judge D.P. Marshall finding that Farm Services Agency (FSA) and Small Bus Administration (SBA) violated the provisions of the National Environmental Policies Act (NEPA) and the Endangered Species Act (ESA) and that they “arbitrarily and capriciously guaranteed the loans” to C & H Hog Farms. The court required the agencies to re-do their “cursory and flawed” Environmental Assessment.

A new Environmental Assessment was submitted by FSA in August of 2015. The rewritten EA provided responses to concerns regarding the original EA, one of
which was that the original EA did not consider karst. The response of the 2015 EA on the subject of karst topography was as follows (excerpt page 22 under “Karst”):

“As stated in Section 3.3 of the EA, the soluble nature of limestones gives rise to karst terrain in the southern Ozarks region. Highly soluble conditions in certain areas of the Buffalo River watershed, distant from the C&H Farms, including the western and north-central parts of the watershed, have produced pervasive occurrence of karst features, including caves, sinkholes, springs, and sinking streams (Hudson et al. 2001 and Soto 2014). However, the C&H Hog Farms site and vicinity do not exhibit strongly developed karst landforms as demonstrated by a review of the Mt. Judea USGS 7.5 Minute Topographic Quadrangle Map and aerial photograph information. Our topographic and aerial photography review indicates that limited numbers of karst ponds are located on upper reaches of floodplains, where a separation of shallow perched groundwater in alluvial and epikarst (Hudson et al. 2013) from deeper groundwater in the Boone Formation may explain development of sinkhole ponds in overburden, due to dewatered secondary porosity in the underlying bedrock.”

Expert testimony specifically directed to this topographic overview in the 2nd EA was provided on 8/27/2015 by Tom Aley, a professional licensed geologist specializing in karst in Arkansas as well as in the Mt. Judea area (the EA writers were not licensed in AR):

“In karst areas the adjective “Dry” is commonly applied to streams and valleys where the proportion of surface water lost to the groundwater system is exceptionally great. The vicinity of the C&H Hog Farm is characterized by an exceptionally large proportion of the surface water being lost to the groundwater system as illustrated by the following:

• Dry Creek, a stream with a topographic basin of 7.23 square miles, is located along the southern margin of the hog farm operations. Three of the manure disposal fields (Fields 15, 16, and 17) are topographically tributary to Dry Creek.
• Dry Branch, a steam tributary to the Left Fork of Big Creek at a point 11,600 ft west of Field 5.
• Dry Branch, a northward flowing stream tributary to Big Creek. The small community of Mt. Judea is on the ridge between Dry Branch (to the east) and Big Creek (to the west) and roughly parallels Big Creek. Dry Branch is within 2200 ft of Field 1 and is 3,500 to 6,100 feed from Fields 5,6,7,9, and 10.

The hog farm operation is bordered on the west, south, and east by streams named Dry Creek and Dry Branches. The hog farm operation is on the Mt. Judea 7.5 minute topographic quadrangle map. There are few if any other 7.5
minute quadrangle maps in the karst areas of north Arkansas that a have three separate streams with the adjective “Dry” in the name. The hog farm is clearly in the middle of a well developed karst area.”

Dr. Todd Halihan of Oklahoma State University who performed an Electrical Resistivity Study (ERI) on three of the facility spreading fields entitled: Electrical Resistivity Surveys of Applied Hog Manure Sites, Mount Judea, AR (2016). Dr. Halihan characterized observations of the three fields in the Executive Summary of his report:

Several datasets were collected and the following observations were made from the ERI data:

• ERI provided delineation of boundaries between soil, epikarst, and competent bedrock.
• The potential for rapid transport pathways in the underlying bedrock as joints or potential karst features were observed as conductive electrical features in a resistive background.
• Soil depth was measured to range from 0.5 to 3.5 meters (1.5 to 11.5 feet). On Fields 5a and 12, the thickness of soil increases moving toward the stream and thins towards higher elevations. This is consistent with the thickening of the alluvium as it is deposited closest to the stream.
• The average epikarst thickness is highly variable, ranging from 2.0 to 23.0 meters thick (6.0 to 75.0 feet).

Tai Hubbard, the on-site geologist monitoring the drilling process for Harbor Environmental, described a specific zone as characteristic of epikarst between the barns and the holding ponds:

“The highly weathered limestone bedrock and unconsolidated clay intervals observed between 13.8 and 28.0 ft.bgs. appeared to have the characteristics of epikarst. With the understanding that epikarst is the weathered zone found at the interface of unconsolidated soils and bedrock, the Site setting would support this characterization.”

Likewise the Harbor Environmental drilling log uses geologic terminology to describe features encountered at increased depths; terms that include: “fractures”, “increased fracturing”, “weathered fractures”, and “bedding planes”, all terms indicative of karst. M.D. Smolen, PH.D. who has 35 years of experience in water quality management as affected by agricultural waste and other aspects of watershed management, had this to say (2017):

“Recent electrical resistance study by Halihan and Fields suggested, and followup drilling by Harbor Environmental confirmed, that the ponds and the
application fields are all underlain by Boone Formation limestone. This limestone, clay, and chert geology is noted for fractures and karstic groundwater features. Although leakage from the ponds has not been confirmed to date, any seepage or direct leakage from the ponds would be transmitted to groundwater and ultimately to the Buffalo River. The fact that Harbor Environmental did not confirm any groundwater contamination is not conclusive because they only drilled one hole.”

David Mott in a 2016 report for the National Park Service states:

"The waste storage ponds and land application sites are predominantly underlain by the Boone Formation; therefore, karst geohydrology”.

Further, a report titled “Surface-Water Quality In The Buffalo National River, 1985-2011” by the Watershed Conservation Resource Center, 2017 states:

"The Ordovician through Mississippian rocks [which characterizes the Buffalo River watershed geology] host a complex karst terrain where losing streams, sinkholes, springs, and caves dominate much of the landscape. Most of these rocks are carbonates, either limestone or dolomite. They are particularly susceptible to dissolution. These rocks are highly permeable to the movement of groundwater. Subsurface flow directions and rates of groundwater flow are difficult to predict and may rapidly change based upon the hydrologic events.”

Dr. Van Brahana produced a peer reviewed report (in press 2017) entitled: “Utilizing Fluorescent Dyes to Identify Meaningful Water-Quality Sampling Locations and Enhance Understanding of Groundwater Flow Near a Hog CAFO on Mantled Karst—Buffalo National River, Southern Ozarks”. Dr. Brahana’s dye tracing results can be observed topographically in Appendix E2. In this appendix illustration the swine facility and many of the primary spreading fields lie directly in the path between the dye introduction point and the corresponding dye detection points. Dr. Brahana’s conclusions were as follows:

Based on the results of the dye tracing described herein, the following observations of groundwater flow in the Boone Formation in the Big Creek study area can be used for designing a more reliable and relevant water-quality sampling network to assess the impact of the CAFO on the karst groundwater and to gain further understanding of the karst flow.

1. Although the study area is mantled karst, subsurface flow is very important, and forms a significant part of the hydrologic budget.
2. Groundwater velocities in the chert/limestone portion of the middle Boone Formation were conservatively measured to be in the range of 600-800 m/d.
3. Conduits in pure-phase limestones of the upper and lower Boone have flow velocities that can exceed 5000 m/d.
4. Groundwater flow in the Boone Formation is not limited to the same surface drainage basin, which means that anomalously large springs should be part of the sampling network (Brahana, 1997).

5. Because the Buffalo National River is the main drain from the study area, and the intensive contact of the river water by uses such as canoeing, fishing, swimming, and related activities, large springs and high-yield wells should be included in the sampling network.

6. Maximum potential transport times of CAFO wastes from the land surface appear to be greatest during and shortly after intense precipitation events. Minimum groundwater flow occurs during droughts. Sampling should accommodate these considerations.

The history of both the old and new permit applications and the corresponding EA (both old and new) appear to have avoided the discussion of karst as a risk factor and have only acknowledged it vaguely when forced to respond directly, despite the fact that the AWMFH devotes extensive guidance on its recognition as it pertains to risk factors and design considerations. This failure to acknowledge even the possibility of the presence of karst suggests a low level of investigative due diligence that is not proportional to the high cost of potential consequences discussed in Part A.

Original Commenter: Buffalo River Watershed Alliance

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

The Environmental Assessment was prepared by the United States Department of Agriculture Farm Service Agency and the United States Small Business Administration as part of their process in issuing loan guarantees, which is not part of the permitting process for permits issued by the Office of Water Quality.

The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other
The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 382:  

This permit should be denied because an increase in the permitted number of swine at the facility violates the moratorium as defined in Regulation 5.901(D)

Reg 5.901(D) states, “A permit renewal, permit modification, or new permit issued pursuant to Reg. 5.901(C) shall not increase the number of swine permitted at a facility.” The current C&H NPDES permit allows for 2,500 sows and 4,000 pigs. The new draft permit includes 2,672 sows, an approximately 7% increase in gestating and lactating sows. But the number of pigs has been reduced from 4,000 to only 750, based on the estimated average present at any time. However, annual production is more meaningful and common sense indicates that an increase in the number of sows will result in an increase in the number of pigs (in this case 78,000 per year) and consequently the amount of waste produced annually. According to “The National Hog Farmer”, http://www.nationalhogfarmer.com a gestating sow on average will have 2.6 litters per year and produce 29.1 piglets per sow per year surviving through weaning. Weaning takes up to 24 days, producing a weight of around 14 pounds. Using these numbers, the average number of piglets on the farm at any one time would be 4,309 and the total number of swine would be 6,987. This is calculated as follows:

6 boars @ 450 lbs = 2,700 lbs!
2,252 gestating sows @ 425 lbs = 957,100 lbs
420 lactating sows @ 400 lbs = 168,000 lbs
4,309 nursery pigs @ 14 lbs = 60,326 lbs
Total = 1,188,126 lbs

This represents an increase from the original authorized number by 7.4%. Relative to weight of pigs this represents an increase of 18.9%. By volume of manure produced this is an increase of 17.4%. This increase violates both the spirit and the letter of the moratorium as described in Reg 5.901(D) and this permit should be denied.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Based on the permit application, this facility meets the requirements of APC&EC Regulation 5.901.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 383: The Harbor Environmental study does not provide scientific support for this permit and in fact yields evidence that it should be denied

Harbor Environmental drilled a single bore hole to a depth of 120 ft as a result of an electronic resistivity study (ERI) performed by Dr. Todd Halihan of Oklahoma State University in 2015. The transects that resulted from the Halihan study (Appendix C11) suggest conductive zones consistent with high moisture content. The concern that prompted the Harbor drilling exercise was possible leakage and/or fractures near the ponds. The Harbor Drilling Study work plan described the following as its “goals”:

- Evaluate the lithology/geology below the waste storage ponds; and
- Assess potential subsurface impact from the waste storage ponds.

It is possible that ADEQ may consider the Harbor Environmental study as supportive of the applied regulation 5 permit. To that end, the BRWA expresses the following concerns (A, B, & C):

A) The Harbor Study was scientifically limited
These are some, but not all of the concerns with how the study was conducted from a scientific standpoint:
1. Several experts suggested that at least three holes be drilled in order to arrive at a supportable conclusion regarding subsurface conditions. Dr. Tai Hubbard the on site geologist stated the limitation as follows: “Evaluation of lithologic contacts and bed orientations are limited, both horizontally and vertically, due to the inability to correlate observations collected at a single location to any other bore holes.”

2. The drilling method damaged the rock core extracts, inhibiting the ability to examine fracturing that would have shed light on subsurface karst formations. Dr. Tai Hubbard the on site geologist stated a similar concern as follows: “The drilling method employed during this investigation consisted of a rotosonic drill rig without a high speed rotation implement used for typical rock coring. This limitation resulted in poor rock core quality, preventing the calculation of Rock Quality Determination (RQD) as proposed.”

3. The rotosonic drilling process used a 6” turning pipe with water pumped into the pipe and exiting around the sides. The water pumped in served to a degree as a lubricant and it was recaptured and stored in barrels as part of the process. A noticeable volume of water was lost at about 25’ indicating open subterranean space near the ponds, which suggests a significant risk factor (see Comment C12). The volume of water lost (pumped vs recaptured) was critical information for determining the total cubic footage of a confirmed subterranean void that Harbor did not provide.

4. Chlorinated municipal drinking water was pumped in during the drilling process. Chlorine and other chemicals are used specifically to eliminate E. coli and other contaminants. As E. coli was one of the elements being examined, chlorinated water could have significantly influenced the results. There were two other drilled wells located on the site which could have been accessed to provide untreated water for the drilling process.

5. When Harbor Environmental provided an initial report on Dec 1st, 2016 the presentation was attended by the public, geologists, hydrologists, and others who had a professional interest in reviewing the results. No interactive questions were accepted. Interactive questioning which is considered part of the normal scientific protocol in vetting technical studies was not permitted by Harbor or ADEQ. All questions were directed to be submitted in writing with answers to be returned in summary form.

B) The Study does not serve as a means to satisfy Reg. 5.404

Regulation 5.404 Subsurface Investigation Requirements reads as follows: “The subsurface investigation for earthen holding ponds and treatment lagoons suitability and liner requirements may consist of auger holes, dozer pits, or backhoe pits that should extend to at least (2) feet below the planned bottom of the excavation.”

Likewise, Reg. 5.402 Design Requirements states the following:
Designs and waste management plans shall be in accordance with this Chapter and the following United States Dept of Agriculture Natural Resources Conservation Service Technical Publications:
(1) Field Office Technical Guide, as amended!
(2) Agricultural Waste Management Field Handbook (AWMFH), as amended

Review of the AWMFH identifies the following shortfalls in the subsurface investigation which the Harbor Environmental drill study will not satisfy:

1. Comment C2 - Facility plans do not investigate groundwater flow direction as suggested by AWMFH.
2. Comment C6 - Pond subsurface investigation does not conform to AWMFH guidance. “For structures with a pool area, use at least five test holes or pits or one per 10,000 square ft of pool area, whichever is greater”.
3. Comment C7 - Berm subsurface investigation was not performed as per AWMFH guidance. “for foundations of earth fill structures, use at least four test borings or pits on the proposed embankment centerline, or one every 100 ft.”
4. Comment C3 - Permeability analysis for liner material does not include particle analysis as per AWMFH guidance.
5. Comment C4 - Laboratory compaction analysis to determine hydraulic conductivity uses only one sample.
6. Comment C5 - Type IV soils to be used for the liner, suggest special considerations in the AWMFH that were not addressed

C) Risk factors identified by the study support permit denial

The Harbor Environmental single drill hole study in conjunction with the Oklahoma State University ERI study by Dr. Todd Halihan’s team have turned up geological anomalies since the date in which first Regulation 6 permit was granted. These anomalies suggest that the Regulation 5 permit should now be denied.

1. Comment C11 - ADEQ single bore hole investigation provides information that confirms the facility is located over geologic karst
2. Comment C12 - Containment ponds are located on a geologic foundation near voids and/or fractures
3. Comment C13 - Evidence of perched groundwater close to pond inverts.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public
comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 384: The permit should be denied because criteria for location of a CAFO in karst geology are not adequately developed or implemented

The standards that are being applied to the location of the C&H facility are the same as those that would be applied to any location in Arkansas. The standard ignores the fact that the C&H facility is located in a karst geology, which greatly exacerbates the potential for migration of any contaminants that are or may be released from the facility, and the difficulty of containing or even locating any such contaminants, once released.

The AWMFH provides the entirety of Chapter 7 as guidance to the engineer regarding karst and groundwater as a risk factor, and yet the engineering documents do not acknowledge or allude to fast moving ground water as a concern, though the circumstances identified in Chapter 7 regarding karst geology were certainly present.

ADEQ did not conduct or require an enhanced geological and hydrological assessment of the facility site. It is important to know the nature and extent of the geology; the degree to which the underlying rock formations have been fractured; the potential routes of migration of contamination in the event of a release; the environmentally-sensitive areas that might be affected from a surface or subsurface release due to groundwater flow direction; and other related facts. ADEQ has the legal authority and the mandate to require additional conditions or investigations where special risk factors are present, yet they chose not do so for this permit application in the sensitive geologic watershed of a national river.

The fact that private and public institutions have both failed to recognize the need for a higher standard of investigation in a karstic rapid groundwater environment indicates that there is a need for a legal delineation of standards designed specifically for permits that are proposed for geologic karst locations. This delineation is particularly important in the state of Arkansas as a large portion of the state is underlain by karst geology. Simply put, karst geology and hydrology
present an entirely different set of risks than south Arkansas Mississippi bottom land soils.

This permit should be denied as the current standards are inadequate in that they do not take karst into consideration.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes and rock outcrops are required by regulation and are included in all APC&EC Regulation 5 permits.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504(a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 385: This permit should be denied because containment ponds are located on a geologic foundation near voids and/or fractures
Harbor Environmental drilled a single bore hole to a depth of 120 ft as a result of an electronic resistivity study (ERI) performed by Dr. Todd Halihan of Oklahoma State University published in 2016. The transects that resulted from the study (Appendix C11) suggest conductive zones consistent with high moisture content. The concern that prompted the Harbor drilling exercise was possible leakage and/or fractures near the ponds. The comments and logs from the drilling process say on several occasions that “no voids were encountered”. However, there were some very noticeable events in the process of drilling and filling the bore hole that the members of the Harbor drilling team did not address. In 3.2 Subsurface conditions encountered it states:

“Weathered and fractured, fossiliferous gray to buff limestone was encountered from 20 to 28.5 feet. The driller reported potable drilling water loss in this zone.”

This loss of water is noted in the drilling log as well. The drilling process uses a 6” turning pipe with water pumped into the pipe and exiting around the sides. The water pumped in serves to a degree as a lubricant and it should all be recaptured as part of the process unless it is lost into an open subsurface space of some sort. The Harbor report does not indicate how much water was recovered vs how much was used, though it should have provided this as it is critically important. A large void will generally be noticeable during the drilling process, but not necessarily. A narrow fracture or cobble filled void that may be of considerable volume may not be noticeable by the driller. An example of typical fractures in the Boone formation that would not easily be detected by a driller are illustrated in this cross section photo.

When filling the hole with cement there was a similar issue encountered discussed under 3.3 Borehole Abandonment:

“After completion of the drilling and sampling operations and geophysical logging, the borehole was abandoned in accordance with the Arkansas Water Well Construction Commission Rules and Regulations (May 2016) and ADEQ Interim Policy 96-4. The borehole was grouted to the land surface via tremie method (from bottom up) using Portland cement (no bentonite). Due to fracture zones encountered in the subsurface, the borehole took more grout than calculated for its volume (see boring log in Appendix B). Borehole volume was estimated at 23.6 cubic feet (176 gallons). Total estimated grout placed in the borehole was approximately 280 gallons. The borehole was grouted on Friday, 9/23/16; however, the driller ran out of grout and was unable to grout the borehole to the surface.”

It is important to note that the loss of grout occurred in the same zone as the loss of water which was between 20 and 28.5’ (“about 25’ ”). Experienced drillers will
do a pretty good job at estimating the amount of grout to mix for filling a hole as they don’t want to find themselves short. As described above, they pumped all that they had Friday afternoon and stopped for the day, hoping that the fracture(s) were narrow enough that the grout pumped would set and seal the openings. On Monday, the fractures did apparently seal and they were able to finish the process. What should be noted is that the fractures may have taken quite a bit more grout Friday had they chosen to mix additional grout and continue pumping at that time. The amount of extra grout used before they ran out was determined to be 23.6 cubic ft, about the size of a small closet. It would be much more indicative of the size of this subterranean opening if we knew instead how much water was lost, which was not provided. Experts indicate that to come across an underground opening like this is generally unlikely with a single drill hole. This raises some concern in regard to the extent of possible subsurfaces openings that may exist around the ponds. In fact Tai Hubbard, the onsite geologist noted the limited scope of the Harbor study:

“Evaluation of lithologic contacts and bed orientations are limited, both horizontally and vertically, due to the inability to correlate observations collected at a single location to any other bore holes.”

The extent of voids or fractures can’t be known but to find one with only one bore hole suggests heightened risk. This indication of a subterranean opening tends to validate Dr. Todd Halihan’s ERI transects which suggest fractures. What we know for certain is that there is at the very least 23.6 cubic ft area of subsurface open space at a depth of 20 to 28.5 ft where drilling water was lost and where the grout would not rise. The elevation of where the bore hole was drilled was about 914.3 ft (see Appendix C12 page 2) which means the subterranean opening occurred at an elevation between 894.3 and 885.8 ft (where water was lost) or 889.3 (where grout would not rise). The elevation of the floor of Pond #2 is 894.3 ft which places a clearly identified opening of some sort roughly even with the floor of pond 2 or a few feet below.

AWMFH table 10-4 (Appendix C10) that identifies vulnerability to risk, lists “Large voids (e.g, karst, lava tubes, mine shafts) OR highest anticipated ground water elevation within 5 ft of invert” as a “Very high” vulnerability and suggests Evaluate other storage alternatives.

In AWMFH Appendix 10-D under When a liner should be considered the following is stated:

“Some bedrock may contain large openings caused by solutioning and dissolving of the bedrock by ground water. Common types of solutionized bedrock are limestone and gypsum. When sinks or openings are known or identified during the site investigation, these areas should be avoided and the proposed facility located elsewhere.”
The evidence of subsurface openings discovered so readily this close to the pond inverts suggests that the impoundment locations present risk that is disproportional to the surrounding environment as discussed in Part A. Note that ADEQ has approved a modification allowing for the installation of synthetic pond liners, but they have not yet been installed. Synthetic membranes are inadequate to address the risk identified in the Harbor drilling investigation (see Comment E1). Had a proper subsurface investigation been conducted prior to construction, AWMFH guidance table 10-4 would clearly have directed that “these areas should be avoided and the proposed facility located elsewhere”.

Original Commenter: Buffalo River Watershed Alliance

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504.
Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Pursuant to Appendix 10D of the AWMFH, it is the position of NRCS that special design measures are necessary where agricultural waste storage ponds are constructed in soils with high calcium content\textsuperscript{27} or highly unfavorable geologic conditions, such as karst formations.

Comment 386: This permit should be denied due to evidence of perched groundwater close to pond inverts.

Please review comment C12 regarding subsurface openings close to the Pond 2 invert.

The ERI transects resulting from Dr. Todd Halihan’s study were compiled as a result of two separate visits. On the 2nd visit, Dr. Halihan’s team produced ERI transects on field 1 and also generated four transects around the ponds. Note his description of the conditions that day:

\textit{``Precipitation previous to and during the investigation resulted in both sites having moist to saturated soil conditions. The site soil of Field 1 was saturated.''}

Three of the ERI transects from the study around the ponds noted several highly conductive zones indicative of moisture in the 13’ to 28’ range.

The bore hole drilled by Harbor Environmental was drilled Sept 21st through the 23rd during and following dry conditions. As this hole was only drilled near the middle of the west ERI transect, the following discussion is limited to that area. The Harbor Environmental report noted loss of water at 20 to 25’ and they had difficulty grouting above 25’. We know for certain (Comment C12) that there is at least 23.6 cubic ft of subsurface open space at a depth of 20 to 28.5 ft. This corresponds with where the drilling water was lost and the grout would not rise.

Dr. Halihan’s west transect indicates moisture at this depth. We know that conditions were very wet and that field 1 which he had tested earlier was described as “saturated”. The conductivity in Halihan’s west transect suggests the possibility of perched groundwater in the same subsurface zone where Harbor Environmental lost water and grout. See Appendix C13. Dr. Halihan describes in his report the likelihood of perched ground water in epikarst:

\textsuperscript{27} BCRET Quarterly Report for October 2016 to December 2016, Table 10, page 71.
“In geologic settings like northern Arkansas, the epikarst zone is a significant source of water storage and transmission and many springs have been tapped to support local communities (Galloway, 2004). These types of groundwater systems can include perched water tables, which exist above regional water tables. These are called perched because they are places where low permeability soil or bedrock layers hold water above an unsaturated zone and often produce springs on the side of a bluff or sometimes in an open field if the relief is high enough to expose this feature.”

Tai Hubbard, the on-site geologist monitoring the drilling process for Harbor Environmental, described this exact zone as characteristic of epikarst which Halihan points out as a significant source of water storage:

“The highly weathered limestone bedrock and unconsolidated clay intervals observed between 13.8 and 28.0 ft.bgs. appeared to have the characteristics of epikarst. With the understanding that epikarst is the weathered zone found at the interface of unconsolidated soils and bedrock, the Site setting would support this characterization.”

The Harbor Environmental drilling log confirms subsurface conditions suggesting that perched groundwater might be supported by consolidated material at the 28’ level.

- At 20 ft: “LIMESTONE, fine grained, weathered and fractured, gray (5Y 5/1) to buff, fossiliferous.”
- At 28 ft: “LIMESTONE, competent w/ some fracturing and bedding planes, gray (5Y 5/1) to buff, fossiliferous.”

AWMFH 651.0701 Overview of geologic material and groundwater under Aquifers page 7-7 says this about perched aquifers:

“A perched aquifer (fig. 7–8) is a local zone of unconfined groundwater occurring at some level above the regional water table, with unsaturated conditions existing above and below it. They form where downward-percolating groundwater is blocked by a zone of lesser permeability and accumulates above it. This lower confining unit is called a perching bed, and they commonly occur where clay lenses are present, particularly in glacial outwash and till. These perched aquifers are generally of limited lateral extent and may not provide a long-lasting source of water. Perched aquifers can also cause problems in construction dewatering and need to be identified during the site investigation.”

The elevation of where the bore hole was drilled was about 914.3 ft (see Appendix C12 page 2) which means the subsurface opening that likely contained perched groundwater during Halihan’s ERI occurred at an elevation between 894.3 ft and 885.8 ft (where water was lost) or 889.3 ft (where grout would not
rise). The elevation of the floor of Pond #2 is 894.3 ft which places a clearly identified open space of some sort (Comment 12) within 5 ft of elevation of the invert of pond #2.

AWMFH table 10-4 (Appendix C10) that identifies vulnerability to risk, lists “Large voids (e.g., karst, lava tubes, mine shafts) OR highest anticipated ground water elevation within 5 ft of invert” as a “Very high” vulnerability and suggests “Evaluate other storage alternatives”.

The evidence of a subsurface opening combined with the saturated conditions during Halihan’s ERI study and the conductivity shown in the west ERI transect suggest that the pond impoundment inverts are located within five ft of perched groundwater tables.

Original Commenter: Buffalo River Watershed Alliance

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504.
(a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.
Comment 387: There are serious concerns regarding the existing clay liner at the C&H CAFO because of oversized rocks incorporated into the clay liner that did not meet the Quality Assurance/Quality Control Plan (QA/QC) submitted by C&H's engineer that was approved by ADEQ (Attachment A). This is not in accordance with the permitting process at ADEQ. These oversized rocks were cited by an ADEQ inspector and photographs are on the ADEQ website as well as other locations. Erosion rills were also photographed. This inspector was stationed in ADEQ's former Jasper, AR office which is approximately 10 miles away from the CAFO. He was not allowed to inspect the CAFO again. All of the inspector's that conducted inspections at the CAFO started coming from Little Rock at an additional cost to taxpayers. Please explain why this occurred when there were qualified personnel available to inspect the CAFO in Jasper, AR?

Original Commenter: Ray Quick

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The response by the applicant to the referenced inspection report for the compliance assistance inspection conducted on July 23, 2013 was deemed sufficient to the items referenced in the inspection report. A subsequent inspection by EPA documented the corrective actions taken by the applicant to prevent future erosion rills and desiccation cracks.

Inspections are conducted by qualified personnel and are assigned based on personnel availability at the time of the inspection.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 388: As stated above, C&H's engineering consultant affirmed in their QA/QC plan, which was approved by ADEQ, that no rocks larger than four inches would be incorporated into the clay liner (Attachment A). I am a former ADEQ employee in the Water Division and the Hazardous Waste Division and I possess knowledge of the permitting process. ADEQ should have issued a notice of deficiency (NOD) and not approved the CAFO permit until C&H met the approved QA/QC design criteria for the liner. This is typical permitting protocol within ADEQ. Therefore, why did a Professional Engineer at ADEQ approve the existing clay liner and why was the initial permit issued when
QA/QC objectives approved by ADEQ were not met on this extremely important aspect of the Regulation 6 and currently the Draft Regulation 5 CAFO permit?

Original Commenter: Ray Quick

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 389:** Please provide a copy of your emergency action plan if a breach, overtopping, or large discharge occurs at C&H. Please include the responding/coordinating agencies, timeline for emergency response/remediation, costs for such an emergency and the entity that pays for the investigation and remediation.

Original Commenter: Teresa Turk

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments...
to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

Comment 390: **Condition No. 26** requires that the interceptor trenches be sampled quarterly; however, these data are being collected much more frequently than that by the BCRET team. **Please update this condition so that all data collected must be reported,** otherwise this obviously opens up an opportunity for data to be cherry picked to only include data with lowest concentrations.

Also, it is stated that the monitoring and reporting of the interceptor trenches will provide a method to the liner integrity, but at best this is an indirect method of assessing that. A detailed water balance study was suggested by the expert review team and has been completely ignored. From the very first inspection report from the facility it was noted that there were significant flaws with the integrity of the liner; however, the permittee never addressed these concerns and the Department still came to the conclusion that all issues had been resolved without any indication that there had been anything done to address this (Table 1). Just because the permittee has a daily inspection log in which they check a box indicating the ponds were checked, obviously does not ensure that self-inspecting is actually sufficient.

Really, just in general, Condition No. 26 makes no sense. **Please describe the study design and anticipated inferential statistics that will be used to determine this statistical significance.** The interceptor trenches were installed after the installation of the ponds, so there are no “Before” data that can be used for comparison purposes. Likewise, there is not a “Control” site that can be used to make comparisons of the liner integrity. So, one would not anticipate there would be a statistically significant change in the monitoring results given that the study was not designed to find one in the first place. Other no-discharge permits that propose to monitor for groundwater contamination require the additional monitoring of upgradient wells to use for comparison purposes. There is actually no other scenario in which statistical significance could be determined, so this should certainly be added to the permit requirements. Functionally, the waste produced at this CAFO is just as harmful as industrial waste and should be treated as such.

Original Commenter: Jessie J. Green

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public
comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

A groundwater flow study has not been submitted to the Department for review. The Department has no knowledge of any groundwater studies that may have informed the placement of the interceptor trenches. The information on the interceptor trenches provided in the BCRET Quarterly Report for July 1 to September 30, 2014 is not sufficient to determine the appropriateness of the placement of the interceptor trenches for the purpose of monitoring leakage from the waste storage ponds. At this time, the Department does not have sufficient information to comment on the appropriateness of placement of the trenches or on the sufficiency of those trenches as a monitoring system for the waste storage ponds.

Pursuant to the Memorandum of Agreement between the Board of Trustees of the University of Arkansas System for and on behalf of the University of Arkansas System-Division of Agriculture and the Arkansas Department of Environmental Quality, the study performed by BCRET is being carried out for the use and benefit of ADEQ; however, the study shall be funded and conducted independently of ADEQ and shall meet the requirements of an independent study conducted by professionals in the field of water quality.

**Comment 391:** Physical health risks such as toxic or inflammatory respiratory effects have been found to be significantly higher in close proximity to a large swine CAFO compared to rural residents living near minimal livestock production. This should be of upmost consideration given the proximity to Mt. Judea School.

Pollutants expected to be found in swine waste poses a huge risk to human health considering X percentage of Newton County relies on groundwater as a drinking water source. In addition, the thousands of people that recreate on the Buffalo National River each year are at a huge risk of falling suspect to ailments from pathogens transported through the subsurface or through surface runoff.

**Original Commenter:** Jessie J. Green

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public
comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The Department emailed public notice of the draft permit to the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health from this agency.

Buffers from neighboring occupied buildings are required by regulation and are included in all APC&EC Regulation 5 permits.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

**Comment 392:** This permit should be denied because preventive investigative measures are not proportional to the risk.

A common theme of the most spectacular failures is that the efforts applied to mitigate the risk were not proportional to the enormity of the consequential costs. For agricultural waste management facilities, the Agricultural Waste Management Field Handbook (AWMFH) provides the engineer with a broad selection of investigative and design suggestions, yet also allows latitude to choose whether or not to act on those suggestions. Engineering firms have a natural competitive incentive to minimize costs for clients and may be inclined to not exceed the basic requirements that satisfy the law. Yet engineering to minimal lawful requirements may not be proportional to the enormity of a failure. There is a remedy provided in the law that is intended to ensure that special circumstances with significant consequences are engineered appropriately, and that remedy lies within the latitude provided to the Arkansas Department of Environmental Quality (ADEQ). ADEQ’s capability to apply independent oversight is illustrated by the following quote on the water division web page:

“An individual permit is tailored specifically for each application and allows ADEQ to put specific conditions on each permitted facility or activity depending on its unique conditions.”

Without question, this permit application has “unique conditions” that ADEQ should recognize and in turn require additional investigative and engineering due
diligence. By failing to acknowledge the enormous cost of possible consequences, ADEQ is in effect abandoning its mission to “protect, enhance and restore the natural environment for the well-being of all Arkansans”.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

Comment 393: This permit should be denied because the application buffers for fields 7 and 3 do not sufficiently consider activity areas of nearby high school

The fields appear to be outside the 500 ft range of buildings as Reg 5 requires, however they are well within 400 feet of school property and the athletic track where children will be present.
The seasonality and weather in which children are likely to be active corresponds with ideal conditions for spreading. ADEQ has the ability to apply conditions to a permit for unique situations like this where the health of children are a consideration.

The 500 foot buffer should not only accommodate children's outdoor activity areas at the high school, but ADEQ should exercise their legal prerogative to act on this as a special condition and expand the buffers to school property to 1,000 feet. The maps should reflect the expanded buffer with the spreadable acreage recalculated.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Buffers from neighboring occupied buildings are required by regulation and are included in all APC&EC Regulation 5 permits.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 394: This permit should be denied because of the extreme difficulty of complying with the application buffer zones and because compliance is impractical to monitor or enforce

Many of the fields, particularly the upland ones, include buffer zones which are so fractured, convoluted and circuitous that the chances of applying waste outside the buffer areas are very high. Many of the fields, such as fields 13, 15, 16, and 21, are broken into multiple segments by the buffer zones. Fields 1, 2, 4, 6, 8, 10, 13, 14, 15, 19, 20, 21, 22, and 35 include multiple 50 and 100-foot buffers and some 500 foot buffers to avoid adjacent streams, drainage areas, ponds, steep slopes, rock outcroppings as well as adjacent homes and property lines. Flagging or other marking has not been observed demarcating any exclusion zones and, even if proper flagging was present, the logistics of navigating and applying swine waste from “honey wagons” to these fields is difficult at best and the risk of applying waste inside the buffer zones is inordinately high. There are no provisions other than “self-reporting” to determine if waste is being applied in accordance with the buffer zones and the remote locations of the fields and lack of
visible flagging makes it impossible for concerned citizens to observe and report any violations that might occur.

M.D. Smolen, Ph.D. who has 35 years of experience in water quality management as affected by agricultural waste management states it this way (Smolen, 2017). Please refer to Appendix B8, column: “Suitability for waste Application”, and Appendix B10 - Unrealistic Buffer Zones:

**Suitability of Fields for Waste Application**

“The last column of Table 1 also shows my assessment of each field’s suitability for waste application based on shape and steepness. Most fields in the NMP have reasonably good shape, with large open areas where a spray rig could maneuver easily to follow boundaries of buffer zones. Some, however, have few restricted areas, or at least areas that are easy to identify!. Several fields, however, are so contorted, with buffer areas and steep slopes, it would be difficult or even impossible to follow. Examples of fields with severe limitations include fields 2, 4, 6A, 11, 13B, 20, and 21B. Figure 4 shows the example of Field 21A, where an operator would have difficulty. These six fields include 71.5 acres that should be removed from the permitted application area.”

Comments submitted by the Arkansas Department of Health in regard to buffer zones https://www.adeq.state.ar.us/downloads/WebDatabases/PermitsOnline/NPDES/PermitInformation/5264-W_ADH%20Comment%20Letter_20170307.pdf state:

“Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

As noted, strict adherence with the exclusion zones is unlikely and the odds of pathogens leaving the approved application sites are unacceptably high, therefore this permit should be denied.

Original Commenter: Buffalo River Watershed Alliance

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Conditions for land application are prescribed by APC&EC Regulation 5.406, Land Application Requirements. APC&EC Regulation 5 permits include conditions that require the permittee to monitor the facility and submit annual reports to demonstrate compliance.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 395: This permit should be denied because facility plans do not account for proximity of a waste impoundment to sensitive groundwater areas as suggested by AWMFH

AWMFH 651.0703 Factors affecting groundwater quality considered in planning page 7-15 describes a number of engineering considerations for siting and planning a facility. Under this on page 7-18(i) is Proximity to designated aquifers, recharge areas, and well head protection areas in which the following is stated:

State water management and assessment reports and the following maps should be reviewed to ascertain the proximity of sensitive groundwater areas:
• sole source or other types of aquifers whose uses have been designated by the State
• important recharge areas
• Wellhead protection areas

Location within the recharge area of a major tributary of a national river, a designated ERW, qualifies as “a sensitive groundwater area”. Such considerations not only apply to seepage but to the possibility of containment failure. The original NOI and the current Reg 5 application do not address this. Nor does the original NOI provide any evidence that this was seriously considered. Evidence of due diligence in regard to alternative sitings as suggested in AWMFH 651.0202 Conservation Planning Process step 6: Evaluate Alternatives would at least suggest that the investigators considered the sensitivity of the watershed. AWMFH 651.0801 Process in Chapter 8: Siting Agricultural Waste Management Systems notes:

“During the planning process, it is critical to arrange and locate the various AWMS components so they are functional and compatible with the surrounding landscape.”

No such alternatives were provided or alluded to. Chapter 7 of the AWMFH does not require a review for sensitive ground waters, but the circumstances for which these suggestions are provided are clearly present. The lack of such a review suggests that there has not been adequate due diligence demonstrated in the permit application that is proportional to the significant risk factors described in Part A.

Original Commenter: Buffalo River Watershed Alliance
**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not require the applicant to submit alternative considerations with the permit application.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

**Comment 396:** This permit should be denied because compliance with detailed investigative requirements triggered by “complex geologic conditions” as suggested in AWMFH were ignored.

Regulation 5.402(A) states:

*Designs and waste management plans shall be in accordance with this Chapter and the following United States Department of Agriculture Natural Resource Conservation Service technical publications:*

1. **Field Office, Technical Guide, as amended**
2. **Agricultural Waste Management Field Handbook, as amended**

The Agricultural Waste Management Field Handbook (AWMFH) 651.0704 Site Investigations for planning and design states the following:

*The intensity of a field investigation is based on several factors including:*

1. **quality of information that can be collected beforehand**
2. **Previous experience with conditions at similar sites**
3. **complexity of the AWMS or site**
The Springfield Plateau and the known prevalence of karst geology is well understood and it is readily available background information typical of what is suggested in point #1 above. It is reasonable to assume that any experienced engineering firm will view complex karst geology as a risk factor to be carefully considered in the investigative process and that there is a corresponding likelihood of additional “detailed investigative” steps as described in AWMFH 651.0704(b). However, the presence of karst terrain in the vicinity of the facility and its application fields was not addressed in the investigation. That karst geology is not disclosed or even alluded to is an indication that the engineers who conducted the investigation either lacked sufficient prior experience with the complexities of karst environments, or that there was an intent to avoid additional investigative steps, otherwise the presence of karst and its attendant risks would have at least been mentioned if not directly addressed. As such, the quality of the geologic information collected and studied beforehand is suspect and was inadequate and not sufficiently reliable to meet the requirements of a preliminary geologic investigation per 651.0704(a) of the AWMFH. Karst terrain alone presents sufficient “complexity of geology” to the site, its waste management system, and the spreading fields that had it been acknowledged, a detailed geologic investigation per 651.0704(b) would have been triggered and should have been conducted.

651.0704(b) Detailed Investigation

“The purpose of a detailed geologic investigation is to determine geologic conditions at a site that will affect or be affected by design, construction, and operation of an AWMS component. Determining the intensity of detailed investigation is the joint responsibility of the designer and the person who has engineering job approval authority. Complex geology may require a geologist. Detailed investigations require application of individual judgment, use of pertinent technical references and state-of-the-art procedures, and timely consultation with other appropriate technical disciplines.”

Note that the components of a “detailed investigation” have the potential to significantly increase costs. Many of the following comments relate to the specifications of a detailed geologic investigation and show that, had a proper investigation been conducted, this site would have been found to be inappropriate and an alternative location would have been required or the permit denied.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.
APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accord with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 397: This permit should be denied because the proposed fields do not have 100 foot buffers completely surrounding ponds

Regulation 5.406(D) states:

"Application of waste/wastewater shall not be made within 100 feet of streams including intermittent streams, ponds, lakes, springs, sinkholes, rock outcrops, wells and water supplies"

Buffers appear to be only partially applied around ponds. The engineer may be considering down gradients but Regulation 5 does not offer such exceptions. Ponds need to be fully buffered by 100 ft on all sides. Incomplete pond buffering occurs for the following fields which should be remapped and spreadable acreage should be recalculated:

- Field 1, 17.7 ac
- Field 6a, 17.5 ac
- Field 9, 29.6 ac
- Field 13A, 36.9 ac
- Field 13B, 15.5 ac
- Field 14, 15.1 ac
- Field 18, 29.6 ac
- Field 19, 13.3 ac
- Field 20, two ponds, 24.8 ac
- Field 21, two ponds, 49.8 ac
- Field 33, 5.9 ac
- Field 35, 16.5 ac
• Field 15B, 21 ac
• Field 36, 12.1 ac
• Field 15, 28.2 ac

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5.406(D) proscribes buffer distances.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department reviews all buffers to ensure that the applied buffers are in accordance with the buffer distances proscribed in APC&EC Regulation 5.406(D).

Comment 398: This permit should be denied because the soils of application fields are too thin for described waste application methodology according to AWMFH

An electrical resistivity survey commissioned by the Big Creek Research and Extension Team (BCRET) under the authorization of ADEQ was performed on three of the spreading fields under the Reg 6 General permit. As part of this study Dr. Todd Halihan’s Oklahoma State University team performed a Soil Structure Analysis. The following discussion from the reporting results (6.2.1) Fields, Halihan (2016) will reference fields as they were numbered under their prior Reg 6 permit. An excerpt from the analysis:

“The soil structure analysis consists of soil thickness and soil properties. Soil thicknesses for each site were picked and confirmed through hand dug borings on site conducted during previous University of Arkansas work on these fields. The borings were dug to refusal, or where the soil turns to epikarst (significantly weathered bedrock).”

The following are excerpts from the soils analysis of the three distinct fields. The reader should take note of the thinness of soils particularly to references under 40” in depth and also under 20” in depth.

Field 5a analysis:
“Field 5a is a low-lying grazing area with low relief and an uneven topsoil surface. Field 5a exhibits average soil thicknesses of 0.5 to 4.5 meters (1.5 to 14.75 feet). Soil thickness on Field 5a varies throughout. There is a significant resistivity difference between the highly to very resistive north and more electrically conductive southern portion (Figure 10). A broad topographic mound is situated northwest of the center of Field 5a; the soil thickness is thinner to the far north and far west of the field (see Appendix 3). This trend is consistent with the direction to which the alluvium would be deposited nearest to the stream. Soils on transects MTJ06 and MTJ07 (Figure 12A) are electrically conductive features, which thin to near zero soil thickness toward the far north.”

Field 12 analysis:
“Field 12 exhibits similar average soil thicknesses at 0.7 to 4 meters (2.25 to 13 feet). Soil thickness on Field 12 is not as variable as Field 5a, but there is a very resistive region of the site in the shallow soil area of the southwest portion of the investigation area (Figure 11). Field 12 is flatter and the soil thins to the west (see Appendix 3). MTJ12 (Figure 13A) shows thinning where the electrically conductive features become thicker as the image gets closer to the stream. This trend is consistent with the direction to which the alluvium would be deposited nearest to the stream. Areas where the soil profile is thinner on the images are consistent with the rocky soils encountered when electrodes were placed for data collection.”

Field 1 analysis:
“Field 1 is a grazing area situated on a hillside east of the stream. It has low to moderate relative relief and an uneven topsoil surface. Field 1 shows an average soil thickness of 0.5 meters (1.5 feet) determined from the ERI surveys of MTJ111 and MTJ112 (Figure 17) and soil sampling. Hand dug confirmation borings were not conducted on this field. This site was not studied extensively enough to determine differences in resistivity correlations across the entire field. Field 1 has thinner and rockier soils than either Fields 5a or 12.”

The AWMFH 651.0504(d) Soil Characteristics, depth to bedrock states the following in regard to thin soils:

“The depth to bedrock or a cemented pan is the depth from the soil surface to soft or hard consolidated rock or a continuous indurated or strongly cemented pan. A shallow depth to bedrock or cemented pan often does not allow for sufficient filtration or retention of agricultural wastes or agricultural waste mineralization by-products. Bedrock or a cemented pan at a shallow depth, less than 40 inches, limits plant growth and root penetration and reduces soil agricultural waste adsorptive capacity. Limitations for application of agricultural wastes are slight if bedrock or a cemented pan is at a depth of more
than 40 inches, moderate if it is at a depth of 20 to 40 inches, and severe at a depth of less than 20 inches.”

“Agricultural wastes continually applied to soils that have moderate or severe limitations because of bed-rock or a cemented pan can overload the soil retention capacity. This allows waste and mineralization byproducts to accumulate at the bedrock or cemented pan soil interface. When this accumulation occurs over fractured bedrock or a fractured cemented pan, the potential for ground water and aquifer contamination is high. Reducing waste application rates on soils that have a moderate limitation diminishes ground water contamination and helps to alleviate the potential for agricultural waste overloading. If the limitations are severe, reducing waste application rates and split applications will lessen overloading and the potential for contamination.”

Field 1’s average depth falls into the severe limitation range. Field 5a has areas that include both moderate and severe limitations and field 12 has areas that fall under the moderate limitation. In addition, it is a serious concern that the point of refusal is epikarst which means that unabsorbed nutrients applied to thin soils will filter directly into fractured limestone pathways. The Oklahoma State study identifies epikarst beneath the soil layer for all three fields:

6.2.2 Epikarst Structure
“The epikarst zone consists of the weathering profile of the underlying competent bedrock. Epikarst is visible on Field 5a (Figure 12), Field 12 (Figure 13), and Field 1 (Figure 17) as a more resistive to electrically conductive region below the base of the soil and above the highly resistive competent bedrock zones. No confirmation borings are available to evaluate rock properties in these zones on any of the sites. The thickness of the epikarst zone is highly variable (thicknesses range from 2 to 23 meters or 6.5 to 75.0 feet) throughout each field but averages 4 to 7 meters (13 to 23 feet) thick.”

AWMFH 651.0703(2) page 7-15 Factors affecting groundwater considered in planning states the following regarding shallow soils over epikarst:

“Deeper soil increases the contact time a contaminant will have with mineral and organic matter of the soil. The longer the contact time, the greater the opportunity for attenuation. Very shallow (thin to absent) soil overlying permeable materials provides little to no protection against groundwater contamination.”

Authors of the permit application must acknowledge the scientific soil analysis performed with public funds by the Oklahoma State team by mapping these three fields for light and split applications as recommended by the AWMFH 651.0504(d). Likewise, these limitations need to be specifically called out in the nutrient management plan and spreading areas limited and mapped accordingly.
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The AWMFH recommends reduced application rates and using split application based on soils with severe limitations based on soil depth. For soils with moderate limitations based on soil depth, the AWMFH recommends reduced application rates.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 399: The corroborative data and information presented from a variety of studies and investigators show a significant decline in water quality along Big Creek and the BNR at Carver during the past 4 years. C&H became operational in May 2013 and began applying manure to fields in fall of 2013. The decline in water quality for dissolved oxygen, nitrate, chloride, and E. coli correlates to the application of manure, in some cases, to fields directly adjacent to Big Creek on thin alluvial soils that experience moderate flooding events. Even without storm or flooding events, the karst substrate is populated with fissures and voids that can leach nutrients into subterranean channels carrying unfiltered and unattenuated waste into Big Creek and the BNR. Dye tracing studies have demonstrated the complex hydrology in the area illustrate how nutrients are rapidly transported to areas as far away as 10 miles from C&H.

In addition to immediately impacting the water quality of Big Creek, the over application of phosphorous creates a surplus reservoir of legacy phosphorus that can continue to be transported to Big Creek and the BNR for decades, if not centuries, to come.
C&H generates over three times the amount of waste of all the people living in Newton County. The hog waste and manure application is concentrated in a discrete valley, spread on thin soils in fields underlain by karst, in close proximity to Mt. Judea elementary and high school, and is untreated. Untreated hog waste can contaminate drinking water and people who come in direct contact with water. Interspecies (between humans and animals) transfer of pathogens account for 60% of all human disease and are responsible for the majority of the newly introduced infectious diseases to the human population. Big Creek is the fifth largest tributary in the Buffalo River watershed and feeds into the BNR at Carver, one of the most heavily used sections of the river. Over 1.46 million people visited the BNR in 2015 with many of them recreating on the river and coming into direct contact with the water. The hog waste generated from C&H presents a significant health risk to local residents through airborne contaminants and a health and environmental risk to residents who obtain water from wells and recreationalist that frequent Big Creek and the BNR.

The conspicuous absence of regulations allows for self-monitoring of the CAFO and leaves the public concerned about the fox guarding the hen house. The lack of waste management oversight by the Department of Health and ADEQ is troubling given documented high incidence of MRSA and respiratory problems associated with living close to a CAFO. High use by recreationalists on the BNR is a disease outbreak waiting to happen. Recent anecdotal information from 2 adolescents who floated the BNR from Tyler Bend to the White River in 2016, immediately following the trip, experienced severe and life threatening health issues. The two adolescents are intermittently in the hospital with undiagnosed conditions from an unknown origin of the disease. It is unclear if they will ever fully recover or lead normal lives.

ADEQ is funded by the taxpayers of Arkansas and the nation. ADEQ professes to “protect, enhance and restore the natural environment for the well-being of all Arkansans”. Please do your job and live up to your tag line by denying this permit and any future permit that allows C&H to continue to operate in the Buffalo National River watershed.

Original Commenter: Teresa Turk

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5.406(B) states that “land application of waste/wastewater shall not be undertaken when soil is saturated, frozen, covered with ice or snow, or when significant precipitation is reasonably anticipated in the next 24-hours.”
The AWMFH does not prohibit land application in areas where flooding frequency is occasional or frequent.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst. Buffers from sinkholes, rock outcrops, and neighboring occupied buildings are required by regulation and are included in this permit.

Data collected by the Department shows no statistical difference in dissolved oxygen, E. Coli, or nitrates on Big Creek before and after prior permit issuance. The EPA did not include Big Creek on the approved 2016 303(d) list.

BCRET data analyzed by Mott (2016) indicate that chloride concentration increased from 1.6 mg/L to 1.9 mg/L. The APC&EC Regulation 2 ecoregion value for chloride is 13 mg/L.

The API is used to develop loading rates for land application based on phosphorus. There are many factors taken into account to determine whether land application on a specific field is allowable. A field with high soil test phosphorus may still be appropriate for land application. The Department only permits land application when the API value is a low or medium class.

The AWMFH recommends reduced application rates and using split application based on soils with severe limitations based on soil depth. For soils with moderate limitations based on soil depth, the AWMFH recommends reduced application rates.

The Department emailed public notice of the draft permit to the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Arkansas Game and Fish Commission, the Department of Arkansas Heritage, and the Arkansas Department of Health for review and comments. During the comment period, no concerns were raised in regards to public health or Endangered and Threatened Species from the agencies with the jurisdiction over these matters.

All individual permits issued by ADEQ’s Office of Water Quality have self-regulating and self-monitoring conditions and requirements that require the permittee to monitor the facility and submit reports to demonstrate compliance. The Office of Water Quality Compliance Branch makes every effort to inspect facilities at least once every five years or more frequently, as needed. The inspectors may visit random land application sites to observe the application of waste to ensure the waste is being land applied in the proper manner and in the appropriate location. The Office of Water Quality Compliance Branch inspects any facility when the Department receives citizen complaints that may indicate non-compliance with permit conditions.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

BCRET data document that nitrate-N is variable; however, Figure 12 of the April 1 to June 30, 2018 BCRET Quarterly Report demonstrates that nitrate-N is higher downstream (BC7) than upstream (BC6). Chlorides and nitrates follow similar seasonal fluctuations in that they are higher during summer and autumn months when stream discharge is most influenced by groundwater. ADEQ reviewed Jim Petersen’s May 31, 2018 expert report, which presents an analysis of temporal trends among nitrate-N and E. coli from January 2014–December 2017 at BC6 and BC7. Mr. Petersen’s analysis presents decreasing trends of ammonia and chlorides and increasing concentrations of E. coli at BC6. Yet, increasing concentrations of nitrate-N were observed downstream at BC7. The conflicting temporal analysis prompted Mr. Petersen to further review trends upstream to downstream. By analyzing paired concentration data (collected same day) at BC6 and BC7 from January 2014 through December 2017, Mr. Petersen reports significant increases in total nitrogen, ortho-phosphorus, and chlorides, but non-significant changes in E. coli and nitrate-N. The significant increase of nitrate-N in the house well and ephemeral stream does correspond to increases of total nitrogen at BC7. Mr. Petersen’s analysis illustrates the complexities of evaluating water chemistry in karst systems.

The Department reviewed data analysis by Watershed Conservation Resource Center (2017) of chlorides for the Buffalo River and its tributaries. This data reports mean base flow chloride concentrations for Big Creek at the confluence with the Buffalo National River (Monitoring station at Carver (BUFT06)) from
2003–2011 at 3.31 mg/L. Values reported by Mott (2016) are below the base flow average chloride concentration.

The Department received a comment from the Arkansas Department of Health regarding C&H Hog Farms, AFIN 51-00164, ADEQ Permit No. 5264-W that stated, “Permit requirements for best management practices and stream buffer zones should be strictly adhered to during the land application of swine wastes to prevent water-borne pathogens from leaving the sites.”

Comment 400: This permit should be denied because the geologic assessments of spreading soils are inadequate and not proportional to risks.

The comments in Part A discuss the special circumstances of this permit in regard to the disproportionately high consequences of contamination. The degree of risk introduced by the permit calls for higher investigative due diligence. Comment B4 discusses the thin soils underlain by epikarst as outlined by the Oklahoma State University Electronic Resistivity Study (Fields, Halihan, 2016). Only three fields were checked in the study, yet two of them had soils falling into the severe limitation range and one of them had soils falling into the moderate limitation range. All three fields were determined to be underlain with highly porous epikarst. The AWMFH 651.0504(d) Soil Characteristics, depth to bedrock states the following in regard to thin soils:

“The depth to bedrock or a cemented pan is the depth from the soil surface to soft or hard consolidated rock or a continuous indurated or strongly cemented pan. A shallow depth to bedrock or cemented pan often does not allow for sufficient filtration or retention of agricultural wastes or agricultural waste mineralization byproducts. Bedrock or a cemented pan at a shallow depth, less than 40 inches, limits plant growth and root penetration and reduces soil agricultural waste adsorptive capacity. Limitations for application of agricultural wastes are slight if bedrock or a cemented pan is at a depth of more than 40 inches, moderate if it is at a depth of 20 to 40 inches, and severe at a depth of less than 20 inches.”

“Agricultural wastes continually applied to soils that have moderate or severe limitations because of bed-rock or a cemented pan can overload the soil retention capacity. This allows waste and mineralization byproducts to accumulate at the bedrock or cemented pan soil interface. When this accumulation occurs over fractured bedrock or a fractured cemented pan, the potential for ground water and aquifer contamination is high. Reducing waste application rates on soils that have a moderate limitation diminishes ground water contamination and helps to alleviate the potential for agricultural waste overloading. If the limitations are severe, reducing waste application rates and split applications will lessen overloading and the potential for contamination.”
AWMFH 651.0703(2) *Factors affecting groundwater considered in planning*

page 7-15 states the following regarding depth of soil:

“*Deeper soil increases the contact time a contaminant will have with mineral and organic matter of the soil. The longer the contact time, the greater the opportunity for attenuation. Very shallow (thin to absent) soil overlying permeable materials provides little to no protection against groundwater contamination.*”

As only three of 38 fields were tested, it is reasonable to expect that many if not most of the other proposed spreading fields will have similar thin soil limitations that need to be identified in the nutrient management plan. The upland fields will be especially prone. All fields should be inspected and tested via electronic resistivity by a qualified geologist. AWMFH 651.0202(c) *Inventory of resources*, page 2–8 states the following:

“*…variations in depth to bedrock or in soil depth, potential for sink-holes, and fractured or cavernous rock often eliminate use of some types of AWMS components. Geologic information, including depth to the water table and geologic reports, should be reviewed for any given site. Onsite geologic investigations with the assistance of a qualified geologist should be given a high priority…*”

In addition, the on-site geologist should evaluate for “stoniness”, particularly the upland fields. These should be assigned into one of the three classes as outlined in AWMFH 651.0504(g) *Fraction greater than 3 inches in diameter-Rock fragments, stones, and boulders*, page 5–10.

“*Rock fragments, stones, and boulders can restrict application equipment operations and trafficability and affect the incorporation of agricultural wastes. Incorporating agricultural wastes that have high solids content may be difficult or impractical where:

- Rock fragments between 3 and 10 inches in diameter make up more than 15 percent, by weight, (10 percent, by volume) of the soil
- Stones and boulders more than 10 inches in diameter make up more than 5 percent, by weight, (3 percent, by volume) of the soil
- The soil is in stoniness class 2 or higher

Because of this, agricultural wastes applied to these areas may be transported offsite by runoff and have the potential to contaminate the adjacent surface water. Local evaluation of the site is required to determine if the size, shape, or distribution of the rock fragments, stones, and/or boulders will impede application or incorporation of agricultural wastes.*”

The survey for “stoniness” is particularly important for the fields mentioned in Comment B3 where fields contain grades between 8 and 15% and incorporation is
suggested but likely impractical. These limitations need to be identified, mapped, and planned for in the nutrient management plan.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The AWMFH recommends reduced application rates and using split application based on soils with severe limitations based on soil depth. For soils with moderate limitations based on soil depth, the AWMFH recommends reduced application rates.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to the degradation of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.

Comment 401: This permit should be denied because facility plans do not investigate groundwater flow direction as suggested by AWMFH

AWMFH 651.0703 Factors affecting groundwater quality considered in planning page 7-15 describes a number of engineering considerations for siting and planning a facility. On page 7-16(b) Groundwater flow direction reads as follows:

“A desirable site for a waste storage pond or treatment lagoon is in an area where groundwater is not flowing away from the site toward a well, spring, or important underground water supply”.

“The direction of flow in a water table aquifer generally follows the topography, with lesser relief. In most cases, the slope of the land indicates the groundwater flow direction.”
There are two improperly abandoned wells (no sealed liner) and one abandoned drilled well down gradient from the site. The first well is within 594 ft of the pond wall. The second (which we will refer to as B-39 in Brahana’s study) is 1,710 ft. The drilled well (which we will refer to as B-40 in Brahana’s study) is 2,066 ft. Although elevation shows a rise between the ponds and the wells for B-39 and B-40, the down gradient of flow will not be a straight line. See Appendix C2-A for well sittings and gradients. The original NOI notes the distance to the nearest watercourse in SECTION D: *SITE SPECIFIC INFORMATION*, but does not mention the wells. Likewise, a 2,000 ft radius map is provided in SECTION E: *FACILITY PLANS* (see Appendix C2-B), makes no reference to down gradient wells. 7-16(b) goes on to discuss alternative flow patterns:

“Radial flow paths and unusual subsurface geology can too often invalidate this assumption. Consider the case where secondary porosity governs the flow. A common example is bedrock in upland areas where the direction of groundwater flow is strongly controlled by the trend of prominent joint sets or fractures. Fracture patterns in the rock may not be parallel to the slope of the ground surface. Thus, assuming that groundwater flow is parallel to the topography can be misleading in terrain where flow is controlled by bedrock fractures.”

As the Boone formation is the predominant geology, epikarst and karst evidenced by fractures and weathered limestone are the more likely drivers of groundwater flow direction in regard to this Reg 5 application. Evidence of alternative flows are discussed in a study published by Dr. John Brahana: August 3rd, 2016 “*Characterization of the karst hydrogeology of the Boone Formation in Big Creek Valley near Mt. Judea, Arkansas documenting the close relation of groundwater and surface water*”. The study links rapid changes in well levels for B-39 and B-40 with precipitation events (see Appendix C2-A page 3). Note that the “hand dug well” in the appendix was not part of this study. Only wells B-39 and B-40 are referenced in the excerpt below.

“For the groundwater wells, time lag was essentially identical to the time lag of the surface- water stage, indicating that groundwater levels started rising no later than an hour after precipitation started. Rapid response of the groundwater level is an indicator that karst conditions facilitate rapid flow of precipitation into the ground. The magnitude of the water-level increases can be caused by several factors including: variation of permeability or porosity of the aquifer materials; variation in storage as the groundwater moves downgradient, variations in the epikarst (upper eroded zone) at the top of the Boone (BS-39); and variations in Big Creek alluvium and terrace deposits (BS-40) that directly overlie the Boone in Big Creek Valley (Braden and Ausbrooks 2003).”

“For the period of record, from May 1, 2015, through early June, 2015, 10 storms of varying intensity were recorded. Hydrograph records of the wells and
streams indicate that water level rises rapidly after the onset of precipitation in Big Creek and contiguous basins, with little delay (less than an hour) between the wells and the streams (Figs. 13, 14, 15). This coincidence of the start of water-level rise in the hydrographs reflects the close relation of surface and ground water. The time to maximum crest of each hydrograph, however, indicates the duration the water takes to move laterally below ground through aquifers to the hydrologic drains. Variations in time-to-crest of each of the hydrographs indicate details of the rainfall intensity and variations in the underground flow system, including permeability, pre-storm water levels and hydrologic conditions, rainfall distribution, flow constrictions or constraints for intervening flow paths, and degree of karstification.”

This study and the corresponding hydrographs in Appendix C2-A page 3 suggest rapid subsurface water movement as evidenced by changes in down gradient well levels during storm events. This corresponds with the suggestion by AWMFH “that secondary porosity can govern flows” and that “Radial flow paths and unusual subsurface geology can too often invalidate assumptions”. Also see Watershed Conservation Resource Center, 2017, Brahané, et al, 2017, and Mott, 2016 regarding likely interbasin transfer of groundwater from one surface watershed to another.

The authors of the original NOI and the Regulation 5 permit application have not provided any evidence of due diligence in regard to groundwater flow direction for either of the down gradient wells or for karstic springs and seeps. Chapter 7 of the AWMFH does not require such an investigation, but the circumstances for which these suggestions are provided are clearly present. The lack of a groundwater flow investigation suggests that there has not been adequate due diligence demonstrated in this permit application proportional to the significant of risk factors in Part A.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH.
The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 402:  This permit should be denied because permeability determination for liner material does not include particle analysis as per AWMFH guidance.

The AWMFH appended 10D under soil properties page 10D-5 describes the criteria for determining permeability.

“The permeability of soils at the boundary of a waste storage pond depends on several factors. The most important factors are those used in soil classification systems such as the Unified Soil Classification System (USCS). The USCS groups soils into similar engineering behavioral groups. The two most important factors that determine a soil’s permeability are:

1. The percentage of the sample which is finer than the No. 200 sieve size, 0.075 millimeters. The USCS has the following important categories of percentage fines:
   - Soils with less than 5 percent fines are the most permeable soils.
   - Soils with between 5 and 12 percent fines are next in permeability.
   - Soils with more than 12 percent fines but less than 50 percent fines are next in order of permeability.
   - Soils with 50 percent or more fines are the least permeable.

2. The plasticity index (PI) of soils is another parameter that strongly correlates with permeability.”

To recap, point #1 is the particle analysis of the soil determining percent of “fines”. Point #2 is the plasticity index (PI). To review some of the testing documents in the original NOI, reference Appendix C3. The information in geologic soil testing process in the original NOI that resulted from drilling 3 holes: B1, B2, B3. Only B2 and B3 are in proximity to the ponds so only these samples are used to evaluate liner material (see Appendix C6). Note that the number of holes drilled does not conform to AWMFH guidelines (discussed in Comment C6).

First page of Appendix C3 shows 3. Geologic Investigation page from the original NOI. The arrow pointing to the statement by the engineer regarding at what level the liner material will be sourced from bore holes B2 and B3. The chart on the
page shows the calculated plasticity index (PI) after it has been determined by lab analysis. The text identifies the unified soil classification system (USCS) designation as CL - Fat Clay w/sand.

Step 2: The boring log designates the sample numbers from the targeted depth of 7 to 11 ft where the liner material is to be sourced. The USCS designations are included here are all CH - FAT CLAY.

Step 3: The Plasticity Index (PI) is determined by the lab. For B2 sample 5 it is 55. The PI is one of the two suggested criteria (10D-5 above) for determining permeability.

Step 4: The unified soil classification system (USCS) designation is noted as determined visually.

Step 5: Note that the particle analysis has not been performed. All values in the percent passing column next to sieve size are listed as “N/A”. Sieve and percent fine is the particle analysis and the 2nd of the two listed criteria (10D-5 above).

Step 6: Although an experienced engineer will likely do pretty well at determining the USCS visually, a precise determination is suggested by AWMFH via particle analysis. The USCS of CL in step 1 is different than the USCS of CH in the bore logs which suggests there are different people in the process making different estimations.

Conclusions: The engineer has determined only one of the two suggested criteria for permeability and that is the (PI) plasticity index. The engineer is also using his experience to estimate the USCS.

The lab determined PI of the samples between 7 & 11’ which will be the depth of the material used in the liners:

1. Boring 2, sample 5, PI: 55
2. Boring 2, sample 6, PI: 41
3. Boring 3, sample 5, PI: 22
4. Boring 3, sample 6, PI: 37

AWMFH states that when the PI values are above 20, this suggests a flocculated (blocky) structure subject to high desiccation and shrinkage which also affects permeability. This high PI suggests a USCS closer to CH in the type IV permeability group (see table 10D-4 in Appendix C3, page 5 (this document). For soil types III and IV the AWMFH appendix 10D page 10D-6 under Permeability of soils states:
“Some soils in groups III and IV may have a higher permeability because they contain a high amount of calcium. High amounts of calcium result in a flocculated or aggregated structure in soils. These soils often result from the weathering of high calcium parent rock, such as limestone. Soil scientists and published soil surveys are helpful in identifying these soil types. High calcium clays should usually be modified with soil dispersants to achieve the target permeability goals. Dispersants, such as tetrasodium polyphosphate, can alter the flocculated structure of these soils by replacement of the calcium with sodium. Because manure contains salts, it can aid in dispersing the structure of these soils, but design should not rely on manure as the only additive for these soil types.”

The facility is located atop the Boone formation which is karst limestone. The soil laboratory notes in the visual classification “chert fragments”. There is a likelihood that high calcium limestone is the parent rock of this soil. However, no tests for calcium levels were mentioned in the geological investigation. The lack of the particle analysis or determination of calcium levels in the liner source material suggests weakness in the geological investigation that is not proportional to the significant of risk factors in Part A.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Seepage from waste storage ponds has the potential to pollute surface and ground water. The record included one recompacted permeability test that is insufficient to determine liner integrity. The necessary soil investigations including, but not limited to, percentage of fines and soil permeability evaluations, have not been performed at this facility in accordance with the AWMFH 651 Table 10-4 and Appendix 10D. Plasticity index analysis was performed on one sample of the in situ clay material in boring 2. The variability in the regolith expected in this geologic setting coupled with the insufficient data creates additional concerns about the siting and soil sources for the clay liner. The required number of borings were not advanced within the pool areas in accordance with AWMFH 651.0704(b)(4); these additional borings would have provided more data for assessment of clay source material. Proper soil investigations for the liner material
are necessary to determine the suitability and location of the clay source material and to consider any additional geotechnical testing to confirm material properties, which will reduce the potential for downward and/or lateral seepage of the stored wastes.

Pursuant to Appendix 10D of the AWMFH, it is the position of NRCS that special design measures are necessary where agricultural waste storage ponds are constructed in soils with high calcium content or highly unfavorable geologic conditions, such as karst formations.

**Comment 403:** This permit should be denied because the laboratory compaction analysis to determine hydraulic conductivity uses only one sample.

Though the engineers did not perform the particle analysis suggested in AWMFH, they did perform a laboratory compaction to determine hydraulic conductivity. The one sample used is described as a “grab sample” (see page 6 of Appendix C3). The testing documents indicate it came from bore #2 from 7 to 11 ft. There are several problems with using only a single grab sample.

1. **Hydraulic conductivity can vary from 7 to 11 ft.** We know the PI varies between from 41 to 55 in bore #2. Also, the level of calcium in soils can affect permeability, though no calcium testing was performed (Comment C3). As soil levels approach the soil-to-epikarst transition zone, chert along with calcium levels will tend to rise. Tai Hubbard, the geologist who participated in the Harbor Environmental study suggested the epikarst zone starts at about 13.5 ft (see Comment C11):

   “The highly weathered limestone bedrock and unconsolidated clay intervals observed between 13.8 and 28.0 ft.bgs. appeared to have the characteristics of epikarst. With the understanding that epikarst is the weathered zone found at the interface of unconsolidated soils and bedrock, the Site setting would support this characterization.”

   A single grab sample from 7 ft could have different calcium content resulting in different hydraulic conductivity than a sample from 11 ft.

2. **Hydraulic conductivity can vary between bore hole locations.** First it should be mentioned that AWMFH suggests based on the area of the ponds that six bore holes should have been drilled (see comment C6). However, even with only two bore holes the samples have PI ranges that vary from 22 to 55. This PI variability can exhibit significantly different hydraulic conductivity.

In regard to the grab sample used, we don’t know the exact depth from which it was taken and we don’t know the calcium content. Likewise, the soils from Bore hole #3 which were also used in pond construction have very different PI readings...
which can result in variable hydraulic conductivity. M.D. Smolen, PH.D. who has 35 years of experience in water quality management as affected by agricultural waste management and other aspects of watershed management, had this to say in a report dated Jan 2nd, 2014:

“The liner design was based on a single sample of in situ clay that was used as a liner. With only one sample, there is no way to determine how consistent this clay is, and whether or not the conductivity measured is representative of the entire stock pile. The inspection report from July 23, 2013 indicates that “gravel to cobble-sized coarse content” was observed in the clay liner (073447-INSP.pdf). This suggests the final clay liner could be quite different from the sample tested, which was supposed to be “fat clay.” The presence of coarse particles can reduce the permeability of the liner. Cracks and rocks are visible in the photograph by ADEQ, Tony Morris 7/23/13, shown in Figure 1.”!

See Appendix C5 for photos referenced above. The single grab sample was not sufficient to represent overall hydraulic conductivity. This was an engineering decision that was not proportional to the risks as described in Part A.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Seepage from waste storage ponds has the potential to pollute surface and ground water. The record included one recompacted permeability test that is insufficient to determine liner integrity. The necessary soil investigations including, but not limited to, percentage of fines and soil permeability evaluations, have not been performed at this facility in accordance with the AWMFH 651 Table 10-4 and Appendix 10D. Plasticity index analysis was performed on one sample of the in situ clay material in boring 2. The variability in the regolith expected in this geologic setting coupled with the insufficient data creates additional concerns about the siting and soil sources for the clay liner. The required number of borings were not advanced within the pool areas in accordance with AWMFH 651.0704(b)(4); these additional borings would have provided more data for assessment of clay source material. Proper soil investigations for the liner material are necessary to determine the suitability and location of the clay source material.
and to consider any additional geotechnical testing to confirm material properties, which will reduce the potential for downward and/or lateral seepage of the stored wastes.

Pursuant to Appendix 10D of the AWMFH, it is the position of NRCS that special design measures are necessary where agricultural waste storage ponds are constructed in soils with high calcium content or highly unfavorable geologic conditions, such as karst formations.

Comment 404: This permit should be denied because type IV soils to be used for the liner suggest special considerations in AWMFH that were not addressed

Please review comments C3 and C4 for background. This discussion assumes that soils used for the liners were in or near the type IV soils group due to the high plasticity index (PI) determined by the laboratory analysis. There was no particle analysis performed to make an exact soil group determination. For soils types III and IV the AWMFH appendix 10D page 10D-6 under Permeability of soils states:

“Some soils in groups III and IV may have a higher permeability because they contain a high amount of calcium. High amounts of calcium result in a flocculated or aggregated structure in soils. These soils often result from the weathering of high calcium parent rock, such as limestone. Soil scientists and published soil surveys are helpful in identifying these soil types.”

“High calcium clays should usually be modified with soil dispersants to achieve the target permeability goals. Dispersants, such as tetrasodium polyphosphate, can alter the flocculated structure of these soils by replacement of the calcium with sodium. Because manure contains salts, it can aid in dispersing the structure of these soils, but design should not rely on manure as the only additive for these soil types.”

As the Boone formation is the predominant limestone geology in the region and evidence of chert is mentioned in the lab analysis, it is very possible that the soil has a high calcium content.

AWMFH suggests modification with soil dispersants to achieve permeability goals. More on dispersant recommendations discussed in AWMFH appendix 10-D page 10D-32:

Design and construction of clay liners treated with soil dispersants “Previous sections of this appendix caution that soils in groups III and IV containing high amounts of calcium may be more permeable than indicated by the percent fines and PI values. Groups III and IV soils predominated by calcium usually require some type of treatment to serve as an acceptable liner. The most common
method of treatment to reduce the permeability of these soils is use of a soil dispersant additive containing sodium.”

Unfortunately no particle analysis was performed and calcium levels were not determined either. No mention of a dispersant modification in the geological investigation of the NOI.

Under appendix 10D: Construction considerations for compacted clay liners under Soil Type on page 10D-20:

“The most ideal soils for compacted liners are those in group III. The soils have adequate plasticity to provide a low permeability, but the permeability is not excessively high to cause poor workability. Group IV soils can be useful for a clay liner, but their higher plasticity index (PI greater than 30) means they are more susceptible to desiccation. If clay liners are exposed to hot dry periods before the pond can be filled, desiccation and cracking of the liner can result in an increase in permeability of the liner. A protective layer of lower PI soils is often specified for protection of higher PI clay liners to prevent this problem from developing.”

The notation mentions plasticity levels > 30. Three sources of the liner material are over > 30. If used in equal parts the average PI will be 38.75.

1. Boring 2, sample 5, PI: 55
2. Boring 2, sample 6, PI: 41
3. Boring 3, sample 5, PI: 22
4. Boring 3, sample 6, PI: 37

There is no mention in the NOI engineering of a protective layer of lower PI soils as suggested in AWMFH. Note that high PI soils are generally highly flocculated (coarse granularity with clods). Although flocculation is suggested, we don’t know for a certainty since there was no particle analysis. AWMFH Appendix 10D page 10D-23 states:

Macrostructure in plastic clay soils
“Clods can create a macrostructure in a soil that results in higher than expected permeability because of preferential flow along the interfaces between clods. Figure 10D–13 illustrates the structure that can result from inadequate wetting and processing of plastic clay. The permeability of intact clay particles may be quite low, but the overall permeability of the mass is high because of flow between the intact particles.”

This permeability concern with type IV soil is reiterated in AWMFH Appendix 10D under Permeability of soils page 10D-6:
“Soils in group IV usually have a very low permeability. However, because of their sometimes blocky structure, caused by desiccation, high seepage losses can occur through cracks that can develop when the soil is allowed to dry. These soils possess good attenuation properties if the seepage does not move through cracks in the soil mass.”

Desiccation, cracking, and coarse content consistent with type IV soils with suggested permeability risk is identified by an ADEQ inspector on July 23, 2013. See Appendix C5 for accompanying photos:

“3.) The wastewater pond liners were observed to have erosion rills, desiccation cracks and gravel to cobble-sized coarse content within the liner clay. If the liner is to be exposed for extended periods of time, it should be protected from deterioration by erosion and desiccation.”

On Jan 23rd, 2014 (six months later), a second ADEQ inspection noted that the liner desiccation continued to be a problem. See Appendix C5 for photos:

“The holding pond embankments were not stabilized and erosion rills were found within the inside banks of the holding ponds. Stabilization of the embankments needs to occur to 1) prevent sediment from entering the holding ponds which may decrease the capacity of the holding ponds, and 2) ensure the integrity of the holding ponds are maintained. Please see Photographs 1 and 2.”

The inspector recognized deterioration characteristics consistent with type IV soils as an ongoing problem that should have been addressed immediately following construction as stated in this passage in AWMFH Appendix 10D under Permeability of soils page 10D-6:

“High plasticity soils like those in group IV should be protected from desiccation in the interim period between construction and filling the pond. Ponds with intermittent storage should also consider protection for high PI liners in their design.”

The AWMFH also suggests construction techniques for high PI soils:

Clods in borrow soil
“If borrow soils are plastic clays at a low water content, the soil will probably have large, durable clods. Disking may be effective for some soils at the proper water content, but pulverizer machines may also be required. To attain the highest quality liner, the transported fill should be processed by adding water and then turned with either a disk or a high-speed rotary mixer before using a tamping roller.”
The construction specification does not mention what techniques were used in laying down the clay liners. M.D. Smolen, PH.D. who has 35 years of experience in water quality management as affected by agricultural waste management and other aspects of watershed management, mentions that ponds will be subject to ongoing exposure issues that may have risk implications:

“The storage ponds at C&H are designed to be pumped down very close to the bottom periodically (at least once every 6 months). Consequently much of the clay liner will be exposed for long periods. This will lead to cracks developing in the liner, reducing the effectiveness of the seal. [Note cracking has already been observed during a site inspection on July 23, 2013 (see item 3 in letter from Jason Bolenbaugh, ADEQ, to Jason Henson in reference 073447-INSP.pdf).] The NRCS recommends protecting the clay liner from cracking by applying a layer of lower PI material over the clay, not allowing the liner to dry out, or using a more specialized system with dispersants or bentonite added. If the ponds are pumped dry and cracking occurs at the bottom, consequences could be very serious.”

Conclusion: What is known for sure is that the material used in the liners has a very high plasticity index (PI) with chert suggesting the possibility of high calcium content. No testing for calcium was done. One grab sample was used to determine hydraulic conductivity for the entire range of material used in the liners though PI was variable. No dispersant modifications are mentioned. No protective layer of lower PI soils is mentioned. Inspections confirm desiccation, cracking, and coarse content consistent with type IV soils. No protection or maintenance for the liner for at least six months prior to filling as suggested in AWMFH. Exposure of liner floor to drying after pump down risks cracking. Construction technique is not mentioned in specifications. These issues are all suggestive of a low level of due diligence that is not proportional to the high cost of potential consequences discussed in Part A.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.
Seepage from waste storage ponds has the potential to pollute surface and ground water. The record included one recompacted permeability test that is insufficient to determine liner integrity. The necessary soil investigations including, but not limited to, percentage of fines and soil permeability evaluations, have not been performed at this facility in accordance with the AWMFH 651 Table 10-4 and Appendix 10D. Plasticity index analysis was performed on one sample of the in situ clay material in boring 2. The variability in the regolith expected in this geologic setting coupled with the insufficient data creates additional concerns about the siting and soil sources for the clay liner. The required number of borings were not advanced within the pool areas in accordance with AWMFH 651.0704(b)(4); these additional borings would have provided more data for assessment of clay source material. Proper soil investigations for the liner material are necessary to determine the suitability and location of the clay source material and to consider any additional geotechnical testing to confirm material properties, which will reduce the potential for downward and/or lateral seepage of the stored wastes.

Pursuant to Appendix 10D of the AWMFH, it is the position of NRCS that special design measures are necessary where agricultural waste storage ponds are constructed in soils with high calcium content or highly unfavorable geologic conditions, such as karst formations.

Comment 405: This permit should be denied because the pond subsurface investigation does not conform to AWMFH guidance

Regulation 5.404 Subsurface Investigation Requirements states:

“The subsurface investigation for earthen holding ponds and treatment lagoons suitability and liner requirements may consist of auger holes, dozer pits, or backhoe pits that should extend to at least two (2) feet below the planned bottom of the excavation.”

The AWMFH 651.0704(4) Guide to detailed geologic investigation page 7-21 goes further suggesting the following for sampling the subsurface where ponds are planned. This is noted as to be particularly applicable for complex and inconsistent environments such as karst.

“For structures with a pool area, use at least five test holes or pits or one per 10,000 square feet of pool area, whichever is greater. These holes or pits should be as evenly distributed as possible across the pool area. Use additional borings or pits, if needed, for complex sites where correlation is uncertain. The borings or pits should be dug no less than 2 feet below proposed grade in the pool area or to refusal (limiting layer).”
The original NPDES Reg 6 NOI specifies pond area in section C2 “design calculations” as follows:

- Top of Waste Storage Pond 1 20,857 Square feet
- Top of Waste Storage Pond 2 35,262 Square feet

It should be noted that the Reg 5 permit application specifies different square footage areas for the two ponds than the original NOI. Likewise the application also specifies square footage for a total drainage area. None of these figures agree, but for the purposes of this comment they do not vary enough to make a difference.

The original NPDES Reg 6 NOI shows records for three borings in the Geologic Investigation document. These are numbered B-1, B-2, B-3. Only B-2 and B-3 were in the area of the ponds (see Comment C3). Using the guide from AWMFH page 7-21(4), there should have been at least 6 distributed borings if “pool area” is interpreted as encompassing both pools. More borings if “pool area” is interpreted as per pool. It is unclear how much latitude Chapter 7 provides the engineer regarding the detailed investigation. Certainly the risk factors were present to justify the AWMFH recommendations. The fact that the engineer recognized that drilling two holes was important but chose not to follow AWMFH guidance for the recommended number in the pond area suggests that the geologic investigation in this permit application is not proportional to the risk factors as discussed in Part A. The sensitivity of the watershed calls for the detailed geologic investigation to be revisited prior to the permit being granted.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit. The geologic investigation of the waste storage ponds does not comply with AWMFH Chapter 7.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies,
borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 406: This permit should be denied because the berm subsurface investigation was not performed as per AWMFH guidance

The AWMFH 651.0704(4) *Guide to detailed geologic investigation* page 7-21 specifies the following for sampling the subsurface where ponds are planned:

“For foundations of earthfill structures, use at least four test borings or pits on the proposed embankment centerline, or one every 100 feet, whichever is greater. If correlation of materials between these points is uncertain, use additional test borings or pits until correlation is reasonable. The depth to which subsurface information is obtained should be no less than equivalent maximum height of fill, or to hard, unaltered rock or other significant limiting layer.”

The berm walls of the pits are on the opposite sides from the barn and come to roughly 335ft in length. There were no test borings recorded in the original NOI geologic investigation. There is a “core trench” noted in the Engineering Plan Sheets but this was a trench to be filled with material to reduce berm wall permeability; it was not a geological investigation. That the engineer chose not to follow the AWFMW detailed investigation guidance suggests that the geologic investigation in this permit application was not proportional to the risk factors as discussed in Part A. The sensitivity of the watershed calls for the detailed geologic investigation to be revisited prior to the permit being granted.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other
Permit No: 5264-W
AFIN: 51-00164

subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 407: This permit should be denied because contingencies for storage pond overtopping are inadequate

AWMFH Appendix 10D, page 41 states the following:

“If overtopping can cause embankment failure, an emergency spillway or overflow pipe should be provided.”

M.D. Smolen, PH.D. who has 35 years of experience in water quality management as affected by agricultural waste and other aspects of watershed management, has the following to say regarding overtopping contingencies in a report dated 1/02/2014:

“If the embankment of Pond 2 were overtopped due to unusual weather or poor management, there would be erosion of the embankment with possible catastrophic failure. The waste storage ponds are built on the side of a hill with 10% slope, making stability of the embankment structure critical.”

Smolen elaborates in a later report dated 8/28/2015:

“The two waste storage ponds are situated on the side of a steep slope and designed to contain all waste, wash water, and rain water, including a 25-yr 24-hr design storm without discharging. The design meets the requirements of the CAFO permit and ADEQ, but does not consider the special nature of the Buffalo River. Because the waste pond design assumes there will be no discharge, the second pond in the series has no stabilized, emergency outlet. If the pond were to overtop the embankment due to a very large storm (much greater than the design storm) or a prolonged period of wet weather, or a
combination of wet weather and extreme storm, there would be a danger of catastrophic failure of the embankment. Such failure could release as much as 2 million gallons of waste into the Buffalo River, a disaster not unlike the recent mine waste disaster in Colorado. In high risk areas, it is standard practice to include a stabilized outlet to allow discharge without failure of the embankment.”

“In addition, the waste system design assumes that overtopping can be avoided by pumping wastes from the waste storage ponds to a designated area, specifically Field 7. This plan is unrealistic, however, for two reasons. First, the farm does not appear to have a pumping system with sufficient capacity to pump down the waste storage ponds in an emergency (this is indicated by their request to use vacu-tankers for pumping down waste storage pond 2 in the Permit Modification Request), and second because the designated field, Field 7, is one of the worst places to use for emergency waste disposal because of its location directly adjacent to Big Creek and its high soil test P. Vacu-tankers or other wheel vehicles would not be suitable for waste application in extremely wet weather, and Field 7 is very likely to flood during such a period.”

Smolen again mentions the overtopping risk in comments in 2017:

“Considering the lack of an emergency spillway and the experience of unusually high rainfall in the Ozarks, the operator should be encouraged to maintain more than the minimum storage at all times. A picture from the ADEQ inspection report from 12/30/2015, shows that WSP2 is operated close to the maximum level with about three months to go before a significant pumpdown is expected.”

The far side is the top of the 10% slope mentioned that has no stabilized emergency outlet.

Assumptions that overtopping will never occur is an example of how the engineering of the storage ponds was not proportional to the risks as discussed in Part A.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other
subsequently available and relevant data and information, the Department denies issuance of the permit.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

Comment 408: This permit should be denied because geologic karst is clearly identified beneath the facility in the Harbor Environmental single drill hole study

The Water Resources Management Plan for the Buffalo National River prepared by David Mott and Jessica Laurans for the National Park Service in 2004, says the following about the presence and behavior of karst in the Buffalo watershed:

“Discrete recharge is a concentrated, rapid movement of water to the subsurface drainage network, most common in areas dominated by karst, which is typical in the Ozarks. Sinkholes and losing streams are examples of discrete recharge. Most sinkholes and losing streams (where a portion of the reach goes dry) are found to be underlain by the Boone formation in northwest Arkansas and most springs emerge in the Boone, as shown in Figure 19 (Aley, 1999). Groundwater pollution is most common in limestone and dolomite areas such as the Boone formation because discrete recharge does not allow for the effective filtration and absorption of pollutants. Faster travel rates provide less time for bacterial and viral die off as well. This is important for water quality management of the Buffalo River since almost 32% of the watershed is underlain by the Boone formation (Aley, 1982).”

At the C & H facility, Harbor Environmental drilled a single bore hole to a depth of 120 ft as a result of an electronic resistivity study (ERI) performed by Dr. Todd Halihan of Oklahoma State University published 2016. The slides (Appendix C11) that resulted from Dr. Halihan's study suggested conductive zones consistent with high moisture content. The mixture of conductive and resistive zones suggests karst typical of the Boone formation. Bore holes were suggested by Dr. Halihan to “ground truth” the results of the ERI transects.

The Harbor Environmental report unfortunately does not speak directly to the ERI transects, but it does strongly detail karst features. Here is their overview of the geology:

2.2.3 Geology
“The uppermost geologic formation below the site is the Mississippian-age Boone Formation (Haley, et al., 1993). The Boone formation consists of gray, fine- to coarse-grained fossiliferous limestone interbedded with chert. Some sections may be predominantly limestone or chert. The cherts are dark in color in the lower part of the sequence and light in the upper part. The quantity of chert varies considerably both vertically and horizontally. The sequence includes an oolite (Short Creek) member near the top of the Boone Formation in western exposures and the generally chert-free St. Joe Member at its base. The Boone Formation is well known for dissolutional features, such as sinkholes, caves, and enlarged fissures. Thickness of the Boone Formation ranges from approximately 300 to 350 feet in most of northern Arkansas (MCFarland, 2004).”

Note in the following passage in the Harbor report that water used in the drilling process as a lubricant was lost in the 20 to 28.5 ft zone indicating the open space of a fracture or void. Note the terms “weathered and fractured and increased fracturing”. These are all indicative of karst.

Subsurface Conditions Encountered
“Yellowish red silty clay (CL) with chert and limestone fragments was encountered from the surface to a depth of 8 feet bgs. This material appeared to be fill soil placed during construction of the hog farm and adjacent waste ponds. Yellowish red fat clay (CH) was encountered from 8 feet to 13.5 feet bgs. Fine-grained, fossiliferous, gray limestone was encountered from 13.5 feet to 20 feet with a six-inch seam of fat clay as above occurring from approximately 18 feet to 18.5 feet bgs. Weathered and fractured, fossiliferous gray to buff limestone was encountered from 20 to 28.5 feet. The driller reported potable drilling water loss in this zone. Competent, fossiliferous gray limestone (consistent with the Boone Formation), with some minor fracturing and bedding planes was encountered at 28.5 feet bgs, which generally extended to the TD of 120 feet bgs. Zones of increased fracturing were encountered around 70 feet and 90 feet bags…”

The boring log selected entries are indicative of karst throughout:

-At 20 ft: “LIMESTONE, fine grained, weathered and fractured, gray (5Y 5/1) to buff, fossiliferous.”
-At 28 ft: “LIMESTONE, competent w/ some fracturing and bedding planes, gray (5Y 5/1) to buff, fossiliferous.”
-At 60 ft: “LIMESTONE, competent w/ some fracturing and bedding planes, gray (5Y 5/1) to buff, fossiliferous.”
-At 65 ft: “Fractured”
-At 85 ft: “Increased fractures”
-At 100 ft: “LIMESTONE; competent, interbedded with thin to medium bes of shaley limestone, gray (5Y 5/1) fossiliferous.”
The on-site geologist, Tai Hubbard, made this notation:

“The highly weathered limestone bedrock and unconsolidated clay intervals observed between 13.8 and 28.0 ft.bgs. appeared to have the characteristics of epikarst. With the understanding that epikarst is the weathered zone found at the interface of unconsolidated soils and bedrock, the Site setting would support this characterization.”

The indication of epikarst at 13.8 to 28 ft below ground level confirms porous weathered rock at a depth that is above the floor of the ponds with the pond #2 invert at 20 ft below the surface of where the bore hole was drilled (See Appendix C12 for elevations). The AWMFH table 10-D in Appendix 10D (Appendix C-10 of this document) notes the following regarding karst in the Vulnerability to Risk matrix when siting a facility: “large voids e.g. karst, lava tubes, mine shafts) as a very high vulnerability suggesting that the engineer “Evaluate other storage alternatives”. No such alternatives were considered. As a result, this permit does not comply with AWMFH guidance.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst.

The Department acknowledges the comment about the drilling study. This issue was previously covered during the final report comment period for the Harbor Environmental Drilling Study.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department acknowledges that C&H Hog Farms, Inc. is located in the Boone Formation, an area known to have karst. While APC&EC Regulation 5 does not prohibit liquid animal waste management systems or associated land application from being located in karst, it does require the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex
geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. Additionally, ground penetrating radar studies demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.

Comment 409: This permit should be denied because the pond seepage limit in original NOI design is incorrect

In the original NOI for C & H, pond seepage was estimated for each pond (see chart below).

M.D. Smolen, PH.D. who has 35 years of experience in water quality management as affected by agricultural waste and other aspects of watershed management, had this to say regarding the calculated seepage rate in a report dated Jan 2nd, 2014:

“The standard used by DHG for design of the waste storage pond clay liners at C&H was a seepage rate of 5,000 gal/acre/day, based on recommendation in the NRCS FOTG and AWMFH. As indicated earlier, these NRCS documents do not actually set standards but defer to state requirements. The NRCS AWMFH recommends, “In the absence of a more restrictive State regulation, assume an acceptable specific discharge of 5,000 gallons per acre per day.”

AWMFH states in Appendix 10-D under Detailed Design Steps for Clay Liners, page 10D-15:

“If no regulations exist, a value of 5,000 gallons per acre per day may be used. If a designer feels that more conservative limiting Agricultural Waste Management Field Handbook seepage is advisable, that rate should be used in computations.”

Seepage levels calculated in the original NOI (above) are somewhat lower than 5,000 per acre per day. Unfortunately, the figures are based on a hydraulic conductivity test using one grab sample which is hardly representative of liner materials whose PI ranged from 22 to 55 and calcium levels that are likely variable but were not tested for (see comments C4, C5).

M.D. Smolen PH.D. describes his concern in a report dated 8/28/2015:
“The ADEQ permit provides minimal protection from storage pond leakage, allowing as much as 5,000 gal/acre per day to leak through the clay liner. C&H’s clay liner was designed based on analysis of only one soil sample and there was no testing of the permeability of the final liner construction. The high shrink-swell potential of the liner materials have a tendency to crack when allowed to dry, increasing the potential for leakage during the cycle of filling and emptying the ponds. An EPA inspection conducted April 15-17, 2014 found that the upper edge of the clay liner were protected by erosion control fabric, but did not indicate any effort to prevent liner cracking.”

An important factor that allows seepage up to 5,000 gal per acre per day is the manure sealing credit. Construction Guidelines for Impoundments Lined with Clay or Amendment-treated Soil, page 10-D2 discuss the manure sealing credit:

“When credit for a reduction of seepage from manure sealing (described later in the document) is allowed, NRCS guidance considers an acceptable initial seepage rate to be 5,000 gallons per acre per day. This higher value used for design assumes that manure sealing will result in at least a half order of magnitude reduction in the initial seepage. If State or local regulations are more restrictive, those requirements should be followed.”

“If State or local regulations prohibit designs from taking credit for future reductions in seepage from manure sealing, then NRCS recommends the initial design for the site be based on a seepage rate of 1,000 gallons per acre per day. Applying an additional safety factor to this value is not recommended because it conservatively ignores the potential benefits of manure sealing.”

Dr. Smolen comments on the manure sealing credit on 1/2/2014:

“NRCS recommendations allow up to one order of magnitude reduction in permeability due to clogging of liner material by solids from the manure. Credit for manure sealing is not recommended by NRCS in the most vulnerable situations, such as areas with karst geology or high seasonal water tables (see Appendix.)

Smolen refers to the vulnerability to risk matrix table 10-4 which can be found in Appendix C10 of this document. Below are the vulnerabilities we have identified in earlier comments that are listed in the above referenced table 10-4 which provides guidance for use of the manure sealing credit. Comment references are noted in parentheses on the right:

Very High Vulnerability
1. Voids (C12)
2. Karst (C11)
3. Highest groundwater within 5 ft of invert (C13)
4. <600 ft from improperly abandoned well (C10)

The recommendation for all risk options for very high vulnerability doesn’t mention the *manure sealing credit* but simply states *Evaluate other storage alternatives.*

**High Vulnerability**
1. Bedrock (assumed fractured) within 2 ft of invert (C11,C12).
2. Highest anticipated groundwater elevation is between 5 and 20 ft of invert (C13).
3. 600 to 1,000 ft of an improperly abandoned well (C10)

The recommendation for all risk options for high vulnerability is *No manure sealing credit*

**Moderate Vulnerability**
1. Flocculated or blocky clays (typically associated with high Ca) (C5)
2. Highest anticipated groundwater elevation is between 21 and 50 ft of invert (C13).
3. 600 to 1,000 ft of an improperly abandoned well (C10).

The “Moderate Risk” selection applies here as the ponds are within 600 to 1,000 ft of an abandoned well. Recommendation is *No manure sealing credit*

Table 10-4 *vulnerability to risk* is clear that for this facility, the *manure sealing credit* should never have been used. That being the case “NRCS recommends the initial design for the site be based on a seepage rate of 1,000 gallons per acre per day”.

Smolen also noted on 8/28/2015:

*“The EA indicates that C & H intends to install a HDPE plastic liner in the existing waste storage ponds. The original concerns for leakage could be alleviated by installation of such a liner, but retrofitting it to the C&H facility is not a simple matter. All seams must be carefully welded and tested, and there must be no organic matter decomposing under the liner as a gas bubble would cause the liner to float. Until I can be assured this liner is installed properly, my concern for leakage from the ponds remains.”*

See Comment E1 on synthetic membranes - special risk factors.

Original Commenter: Buffalo River Watershed Alliance

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management
Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The prior permit issued under APC&EC Regulation 6 General Permit ARG590000 and the coverage under that permit tracking number ARG590001 are outside the scope of the current permitting decision. The initial Notice of Intent and the corresponding NMP for coverage under the prior APC&EC Regulation 6 permit tracking number ARG590001 were available for public comment during the 30-day public comment period beginning on June 25, 2012.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 410:** This permit should be denied because of the failure to adequately evaluate the impact of breach or accidental release or to provide an emergency action plan.

AWMFH Section 651.0204(a) states:

“A substantive evaluation of the impact of sudden breach or accidental release from waste impoundments should be made on all waste impoundments.”

No such evaluation has been provided. Pond 2 lacks an emergency spillway or reinforced embankment and should the pond overtop due to excessive rain, rapid erosion of the pond bank could occur leading to catastrophic failure (Comment C9). This contingency should have been addressed as part of a substantive evaluation of the waste impoundments.

AWMFH Section 651.0204(a) further states:

“Development of an emergency action plan should be considered for waste impoundments where there is potential for significant impact from breach or accidental release.”

Smolen (2017) notes that in a situation where the ponds need to be pumped down quickly: “In an emergency it would be very difficult to operate tank sprayer equipment”, in that the pump-down process would be slow, and the vacu-tanker would be impractical for disposing it into saturated fields.

Due to the proximity of Big Creek, and the corresponding risk to the Buffalo National River, there clearly is the potential for significant impact should a breach or accidental release occur. Such an emergency action plan was not provided suggesting a low level of due diligence not proportional to the risks described in Part A.
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5.406(B) prohibits land application when soil is saturated, e.g. during a precipitation event, or when significant precipitation is reasonably anticipated in the next 24 hours.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

A facility located in a sensitive geologic area must have an Emergency Response Plan to address any failure of the waste containment system. Section 651.0204(a) of the AWMFH requires facilities with waste impoundments with embankments to consider the risk to life, property, and the environment should the embankment fail. Pursuant to Section 651.0204(b) of the AWMFH, a thorough geologic investigation is essential as a prerequisite to planning seepage control for a waste impoundment. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH.

Comment 411: This permit should be denied because Big Creek Research & Extension Team (BCRET) testing of Big Creek immediately downstream of the facility shows degradation for nitrates.

Nitrates are being measured by the Big Creek Research and Extension Team (BCRET) of the University of Arkansas Division of Agriculture both upstream and downstream of the facility and nearby spreading fields Figure 1.

Regarding this data illustration, Burkholder (2017) states:

“The data clearly indicate that the C&H CAFO is contributing swine waste pollution to adjacent public trust waters. The nitrate levels downstream from this CAFO commonly are levels that have been shown in other research to be toxic to sensitive aquatic life (Camargo et al. 2005, Guillette et al. 2005). The nitrate signal is stronger than the E. coli signal because nitrate does not adsorb to sediment particles and settle out (Stumm and Morgan 1996); instead, nitrate is highly soluble and is transported rapidly from swine CAFOs to receiving surface and groundwaters (Evans et al. 1984, Stone et al. 1998, Ham and
DeSutter 2000, Mallin 2000, Krapac et al. 2002), the latter problem being exacerbated in underlying karst geology (Mellander et al. 2012, Knierim et al. 2015) which is characteristic of the region that includes the C&H CAFO (Hudson et al. 2001, 2011).”

Reg. 2.202 on anti-degradation of high quality waters reads as follows:

“Where the quality of the waters exceeds levels necessary to support propagation of fish, shellfish and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State of Arkansas’ Continuing Planning Process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located.”

There has been no such finding of economic or social development “accommodation” published by ADEQ or APC&EC. The statute does not specify a minimum level of acceptable degradation, so technically the above data which reports a periodic and consistent finding of increased nitrates downstream of the facility indicates a violation of the statute. See also Mott, 2016 regarding further interpretation of BCRET data showing elevated nitrates. Burkholder (2017) goes on to say:

"Nitrate concentrations at the downstream site have been consistently higher than at the upstream site on nearly all BCRET sampling dates since swine waste applications from the C&H CAFO began (BCRET 2014a-d, 2015a-d, 2016a-d) (Figure 1). During January – November 2016, for example, paired upstream/downstream data showed that nitrate was substantially lower at the upstream station than at the downstream station on 40 of 41 sampling dates; concentrations were comparable on the remaining one date. Elevated nitrate levels near swine CAFOs are commonly used as an indicator of swine waste discharge; the wastes initially are high in ammonia, but over short distances during transport the ammonia is oxidized to nitrate (Dewi et al. 1994). Nitrate levels at the downstream site typically have been two- to three-fold higher than at the upstream site; sometimes the difference has been as high as 25-fold”

As elevated nitrates are very likely due in whole or in part to discharge from C & H, this permit should be denied.

Original Commenter: Buffalo River Watershed Alliance

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public
comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

BCRET data analyzed by Mott (2016) indicates the following: nitrates increased from a median value of 0.10 mg/L to 0.23 mg/L from upstream to downstream, respectively. Nitrate values upstream and downstream are comparable to the Boston Mountain median values. Both upstream and downstream nitrate values are well below most groundwater and source water intake nitrate values. For example, the Arkansas Department of Health reports in the 2016 Annual Drinking Water Quality Report for the City of Jasper a mean nitrate value of 0.36 mg/L, with a range from 0.12 mg/L to 0.59 mg/L. The source water intake for the City of Jasper is located in Bull Shoals Lake.

The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2 Chapter 2. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to dictate regulatory authority over private land within the watershed, other than what exists under local, state, or federal law.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The Department is actively engaged in developing an antidegradation implementation procedure to address the revision of 40 CFR § 131.12. The Department implemented 40 CFR § 131.12 in APC&EC Regulation 2 Chapter 2. As stated in APC&EC Regulation 2.203, it is not the intent of the regulation to dictate regulatory authority over private land within the watershed, other than what exists under local, state, or federal law.

BCRET data document that nitrate-N is variable; however, Figure 12 of the April 1 to June 30, 2018 BCRET Quarterly Report demonstrates that nitrate-N is higher downstream (BC7) than upstream (BC6). Chlorides and nitrates follow similar seasonal fluctuations in that they are higher during summer and autumn months when stream discharge is most influenced by groundwater. ADEQ reviewed Jim Petersen’s May 31, 2018 expert report, which presents an analysis of temporal trends among nitrate-N and E. coli from January 2014–December 2017 at BC6 and BC7. Mr. Petersen’s analysis presents decreasing trends of ammonia and chlorides and increasing concentrations of E. coli at BC6. Yet, increasing concentrations of nitrate-N were observed downstream at BC7. The conflicting temporal analysis prompted Mr. Petersen to further review trends upstream to downstream. By analyzing paired concentration data (collected same day) at BC6 and BC7 from January 2014 through December 2017, Mr. Petersen reports significant increases in total nitrogen, ortho-phosphorus, and chlorides, but non-
significant changes in *E. coli* and nitrate-N. The significant increase of nitrate-N in the house well and ephemeral stream does correspond to increases of total nitrogen at BC7. Mr. Petersen’s analysis illustrates the complexities of evaluating water chemistry in karst systems.

**Comment 412:** This permit should be denied because synthetic flexible membranes for ponds can no longer be safely installed and they present a special set of risks for the circumstances of this particular permit.

On June 5th, 2014, ADEQ approved a modification to permit the retrofit of a synthetic membrane liner which the operation owners hoped would assuage public concerns. That modification for a retrofit, yet to be implemented, carries a unique set of risks. They are as follows:

1. Once the liquid is removed, fecal sludge must also be removed from the pond floors before liners can be installed. Sludge removal will inevitably disturb the existing clay liners and likely the underlying soil and groundwater increasing the possibility of subsurface contamination.
2. When the liners are installed over the clay which contains embedded residual organic waste, decomposition can produce methane and other gasses. This gas accumulation beneath the liner can cause it to displace and float to the surface. This can result in rupture, seam failure, or leakage.
3. Seam failure, punctures, and mechanical damage have caused liners to fail and leak. Once liners are in place there is no way to tell if they have been compromised and leaks could occur for years without detection.
4. Retrofitting liners over actively used ponds is an entirely different and more complex challenge than installing them in a newly constructed pond. This has never been attempted in the state of Arkansas and it is likely there are few qualified personnel that could ensure a successful result. Tom Aley, a licensed Arkansas geologist and karst expert states that: “inadequate preparation of the ponds for liners will compromise the leakage integrity of the synthetic liners even if they are well installed”.
5. There is evidence of epikarst close to the ponds above the pond inverts, and fractures and/or voids with evidence of perched groundwater within a depth of five ft of the inverts.

The points illustrate clear technical differences between installing a liner on a freshly constructed impoundment, as opposed to a retrofit which has never been done in the state of Arkansas. The *Technical Field Guide for Arkansas* as identified in Reg 5.402 identifies under the *USDA-Natural Resources Conservation Service, Practice 521A - Pond Sealing or Lining, Flexible Membrane* identifies the estimated costs and needed skills for installing a synthetic membrane, but the standardized nature of these estimates imply that they are applicable to newly constructed pits. Retrofitting a synthetic membrane over fecal saturated clay liners presents an entirely different set of technical
challenges not to mention additional costs. There are no known installers in Arkansas that have performed this uncommon operation, and there is no identified best practice in the Technical Field Guide for Arkansas references for performing this kind of retrofit.

The approved pond liner retrofit is of notable concern as it is possible that ADEQ will view this as a solution to the comments in Part C regarding geological issues, and also Part D regarding degradation. Unfortunately, not only does a synthetic liner at this stage present unique risks, it would not satisfy the very serious vulnerabilities identified by comments: C10, C11, C12, and C13. It has been subsequent to the pond liner modification approval that indications of subsurface karst, epikarst, voids, fractures, and perched groundwater have been revealed by Dr. Halihan’s ERI transects and validated by the Harbor Environmental drilling exercise. These risks were unknown at the time ADEQ approved the synthetic liner permit modification in June of 2014. When the circumstances of each of these four comments (C10 thru 13) are applied to the AWMFH Appendix 10D vulnerability to risk matrix (Appendix C10 of this document) the vulnerability is identified as “very high” and the recommendation is: -“Evaluate other storage alternatives”. The 10D vulnerability to risk matrix is not suggesting mitigation of the impoundment, but that it never should have been constructed at that location based on the risk factors present.

The take-away is that ADEQ’s approved synthetic liner modification is now outdated because of what has come to light in recent studies. The approval of the pond liner modification should be rescinded.

If this was a new facility in a different location, BRWA would contend that synthetic membranes should be a required term of the permit, not merely an allowed modification. However, given what is now known about the location, a synthetic membrane will not address the risk factors identified, not to mention that the technology presents its own unique risks in regard to the challenges of a retrofit. Synthetic liners are not appropriate at this stage when considering the risk in Part A. For this reason alone, the permit should be denied.

Original Commenter: Buffalo River Watershed Alliance

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other
subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 413:** Condition #27 page 4 of part 2, states minor modification with Reg 5.306 can incorporate all fields that are permitted to receive waste from the permittee. Does this mean that the EC Farm fields that are in appeal are allowed to be a minor modification? Does it mean the missing field numbers are permitted and going to be allowed as minor modification? What exactly does this mean? We saw that EC Farms added 600 plus acres stating they were being proactive with the environment and sidestepping all the requirements of a new permit and now we see the language built into C&H’s permit. This doesn’t take into account the public’s point of view and shows ADEQ to be capricious and arbitrary presuming the outcome of the appeal or another plan unbeknownst to the public.

Original Commenter: Carol Bitting

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The permit for EC Farms is outside the scope of this permit decision.

**Comment 414:** Condition # 27. Could you elaborate? How can ADEQ submit a minor modification proposing to add fields to this permit? Wouldn’t it be more proactive to do that now? Why would a permit already be requesting modification? Is there a known problem already? Are you considering EC Fields or are they the missing numbers 25-31? This condition should be struck from the permit. Regulation 5.302, Regulation 5.305 and Regulation 5.306 should be cited here not a predetermined minor modification. I object to any approval of unknown modifications.

Original Commenter: Carol Bitting

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 415: I am shocked to see that ADEQ engineers are already writing in modifications to the C&H permit to allow them to absorb EC Farms spreading fields. What is the point of having a new permit, if they don’t go ahead and put in all their fields now? This makes no sense and points to a lack of honesty on the part of ADEQ and C&H as both have long averred that EC Farms and C&H were not related operations beyond the fact that EC Farms would receive C&H waste. Even a blind man can see that EC Farms is just a subsidiary of C&H. I have to ask, if your agency was dishonest about that, what else have you cooked up with C&H and not told us?

Original Commenter: Charles Bitting

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

The permit for EC Farms is outside the scope of this permit decision.
Comment 416: Part I Table II – The Monitoring Frequency language in Table II should be revised to say: “Soils where liquid animal waste has been applied shall be sampled and analyzed at least once every five (5) years” The revised language is consistent with the requirements in Regulation 5.407(C).

Original Commenter: C&H Hog Farms, Inc.

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 417: Part I Table III, Part II Condition 26, and Statement of Basis Section 12 Part II Condition No. 26 – The draft permit requires C&H Hog Farms to monitor the interceptor trenches on the lower slope of the waste storage ponds; however, neither the condition nor the Statement of Basis of the draft permit reference an applicable regulation. In addition, the Department failed to provide its justification with appropriate reference to scientific and engineering literature or written studies; therefore, C&H Hog Farms request the monitoring requirements for the interceptor trenches to be removed from the permit.

In the event Department maintains the requirements to monitor the interceptor trenches, CH Hog Farms offers the following additional comments:

Part II Condition 26 states “[t]he permittee may request in writing a monitoring frequency reduction from quarterly to annual after three years of monitoring”; however, it is unclear if the written request will be handled as a minor modification or a major modification. For simplicity, C&H Hog Farms asks the Department to include a schedule of compliance instead of requiring a written request. If a schedule of compliance is provided to C&H Hog Farms, the monitoring frequency stated in Part I Table III of the permit should be added to Part I requiring C&H Hog Farms to compile a minimum of three (3) years of quarterly monitoring data for the parameters listed in Table III. Any time prior to the conclusion of the schedule of compliance, C&H Hog Farms shall provide a report prepared by a third party signed and stamped by a professional engineer or geologist, demonstrating there has been no statistically significant change in the monitoring results for all parameters listed Part I Table III of the permit. In addition, if it can be demonstrated that no statistically significant change in
monitoring results has occurred over five (5) years using the procedures state above, the monitoring of the trenches should cease.

Original Commenter: C&H Hog Farms, Inc.

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit. The geologic investigation of the waste storage ponds and berms does not comply with AWMFH Chapter 7. The compaction test and permeability analysis does not comply with the AWMFH Chapter 10.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

**Comment 418:** Part II Condition 2 – Please strike “ponding or” from Condition 2 of the permit. The Department failed to provide its justification with appropriate reference to scientific and engineering literature or written studies; therefore, C&H Hog Farms requests the monitoring requirement restricting ponding be removed from the permit. Regulation 5.303 only limits “point source discharge from any part of the liquid animal waste management system” and ponding from the application of waste on the field is not a point discharge to waters of the state.

Original Commenter: C&H Hog Farms, Inc.

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems.
Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 419: Part II Condition 5 – The condition states “In the event that the Department determines that any land application site under this permit is permitted for land application under another Office of Water Quality Permit, the Department may void this permit or enforcement action may be taken.” C&H Hog Farms request clarification from the Department on this requirement. Most of the land being used for land application is under contract through a land use agreement. These properties are not owned or controlled by C&H Hog Farms. In the event that C&H Hog Farms becomes aware that any property is permitted under another permit or that any property has received litter from another source, C&H Hog Farms will cease all land application activities for that property until such time the issue is resolved. C&H Hog Farms hopes that by following these steps, the Department does not find it necessary to void the permit or seek enforcement action.

Original Commenter: C&H Hog Farms, Inc.

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Ground penetrating radar studies at Fields 1, 5, and 12 demonstrate the necessity of full geotechnical investigations at all land application sites in accordance with AWMFH 651.0504 (a)–(n) and Table 5-3. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to the degradation of Big Creek and the Buffalo National River. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed investigations.
Comment 420: Part II Condition 8(b) – The condition states “This rate must also not exceed the recommended nitrogen application rate.” It is unclear which source is to be used to determine the recommended nitrogen application rate, i.e., the phosphorus index or the soil test recommendations.

Original Commenter: C&H Hog Farms, Inc.

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 421: Part II Conditions 11 and 13 – Both conditions reference Regulation 5.402 as the basis for being required in the permit; however, Regulation 5.402 establishes design requirements for the facility. Condition 11 sets out requirements for animal mortality management, and Condition 13 establishes liner maintenance requirements. Neither condition limits design requirements for the facility. Conditions 11 and 13 should be either removed from the permit or updated to reference the correct Regulation citation.

Original Commenter: C&H Hog Farms, Inc.

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 422: Part II Condition 16 – Condition 16 of the permit uses “Waste/wastewater”, which is used throughout Regulation 5, including regulation 5.406(C). However, other conditions contained in the draft permit only use the term “waste”. In order to maintain consistency throughout the permit, C&H Hog Farms requests that either the Department strike “/wastewater” from Condition 16 or revise all other conditions throughout the permit to include “/wastewater”.

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.
Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 423: Part II Condition 18 – C&H Hog Farms requests the second sentence be revised to say “The restrictions regarding property lines or neighboring occupied building shall not apply…” in order to be consistent with Regulation 5.406(E).

Original Commenter: C&H Hog Farms, Inc.

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 424: Part II Condition 25 and Statement of Basis Section 12 Part II Condition No 25 – the draft permit requires C&H Hog Farms to “…report the condition [of the levees] as well as any repairs completed with the Annual Report…”; however, neither the Condition nor the Statement of Basis of the draft permit reference an applicable regulation for reporting this data annually to the Department. Additionally, the Department failed to provide justification with appropriate reference to scientific and engineering literature or written studies regarding this reporting requirement. Therefore, C&H Hog Farms request the reporting requirement be removed from Part II Condition 25 and from Condition No 25 in the Statement of Basis.

In the event the Department does not remove the levee reporting requirement from the permit, C&H Hog Farms requests clarification on the Condition. Does
the Department plan to update the annual report to include a section for levee inspection and repairs?

Original Commenter: C&H Hog Farms, Inc.

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit. The geologic investigation of the berms does not comply with AWMFH Chapter 7.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies. Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

**Comment 425:** Part II Condition 29 – Grammatical Correction. C&H Hog Farms request that Condition 29 be updated as follows: “...operation of the storage ponds, certification by a professional engineer licensed in the state of Arkansas, that in the installation…”

Original Commenter: C&H Hog Farms, Inc.

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 426: Statement of Basis Section 12 Part II Condition No. 27 – C&H Hog Farms requests that the last sentence be removed. Although C&H Hog Farms understands the Statement of Basis is not an enforceable document, the language may be misleading or confusing.

Original Commenter: C&H Hog Farms, Inc.

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 427: RE: Part I Monitoring Requirements: Table I details the monitoring frequencies and the reporting results to ADEQ for each respective parameter listed in the table heading (Waste Analysis, Soils, and Interceptor Trenches). Groundwater/underground water is considered "Waters of the State" susceptible to contamination from this facility. However, multiple levels of perched groundwater beneath the soil layer in addition to the regional water table are potentially impacted by a release from leakage of the waste lagoons. Monitoring of shallow perched groundwater in soils using the interceptor trenches is insufficient to identify a release to the several potentially discrete groundwater occurrences/flow pathways beneath the soil layer from this facility (e.g. in the epikarst, at the top of competent bedrock) or deeper groundwater (water table) in the competent bedrock. A Table IV should be added and include monitoring from at least one down gradient borehole with nested monitoring wells isolating the epikarst interval and the regional water table interval. Monitoring of springs down-gradient of the waste storage ponds is also highly recommended. Springs integrate some of the heterogenous flow paths of shallow groundwater and the water table portion of the groundwater, and are therefore an excellent sampling location for pollutants.

The potential for leakage to occur beneath the shallow soil interval targeted through the monitoring of downslope soils with interceptor trenches is apparent from geophysical studies and the possibility of perched water intervals given the
heterogeneities of site stratigraphy observed in the Drilling Study conducted near the waste ponds. Furthermore, the depth reached by the ponds indicates the epikarst interval was likely reached should leakage occur out the bottom of the ponds. Monitoring wells should include the same parameters as the Interceptor Trenches and their sampling frequency should be yearly. Additionally, further justification of monitoring variables and frequencies is needed in Tables I-III.

In Table I, addressing waste concentrations, it is unclear why soluble nitrogen variables or indicator bacteria are not considered as they are in Table III, addressing interceptor trenches. Both of these variables have implications for land application decisions. Regarding sampling frequency, monitoring waste once per year seems insufficient to account for seasonal variability and nutrient cycling within the waste ponds, making it difficult to estimate P and N application rates and effectively plan land applications. Similarly, monitoring soils once per five years seems insufficient, as fields will be undergoing land applications and assimilating N and P over that period. Permit language associated with monitoring should also stipulate appropriate Quality Assurance/Quality Control methods and ensure that analytical and sampling approaches are compatible over time so as to be able to track changes over time. Overall, the monitoring requirements seem insufficient to adequately plan land applications, assess soil nutrient conditions and permit compliance, or address potential leakage. It is imperative that ADEQ establish appropriate monitoring to address potential pathways of exposure and ensure that if monitoring results exceed a stipulated trigger, series of stipulated actions are implemented that would safeguard the watershed. Thus, permit language should include triggers for action on behalf of the permittee and ADEQ. Water quality criteria would seem an appropriate trigger for action and at no time should a no discharge permit result in violations to water quality.

Original Commenter: National Park Service

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.” APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other
subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5.407 sets forth monitoring frequencies for land application of waste and for soils of each field where liquid animal waste has been applied.

A groundwater flow study has not been submitted to the Department for review. The Department has no knowledge of any groundwater studies that may have informed the placement of the manure holding pond interceptor trenches. The information on the interceptor trenches provided in the BCRET Quarterly Report for July 1 to September 30, 2014 is not sufficient to determine the appropriateness of the placement of the interceptor trenches for the purpose of monitoring leakage from the waste storage ponds. At this time, the Department does not have sufficient information to comment on the placement of the trenches or on the trenches as a monitoring system for the waste storage ponds.

**Comment 428:** Condition #2, states that "Waste shall not be discharged from this operation to the Waters of the State or onto the land in any manner that may result in ponding or runoff to the Water of the State." Waste will be applied during spring for most years while being stored overwinter; this also corresponds with spring rain events which will cause overland flow in the application fields. The permit should stipulate what measures will be put in place to ensure that waste will not reach Waters of the State in an unpredictable environment. According to Condition #15, waste cannot be applied when the soil is saturated; frozen or covered in ice or snow; when significant precipitation (this is subjective and needs clarification, see Part II Condition #15 below) is reasonably anticipated in the next 24 hours; or during a precipitation event (also needs to be defined, see Part II Condition #15 below). These conditions, in conjunction with Condition #14, greatly reduce the effectiveness of application (increased need to apply waste on fields that dry faster during peak periods of application need), especially during wet seasons, since most application fields are located near streams (i.e. Waters of the State).

Original Commenter: National Park Service

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

APC&EC Regulation 5.102 states, “[t]his regulation provides management, operational and maintenance procedures necessary to prevent point source pollution and minimize nonpoint source pollution to the waters of the state.”
APC&EC Regulation 5.303 prohibits point source discharges from any part of the liquid animal waste management system.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 429:** Condition #4, which states that the existing Nutrient Management Plan (NMP) is hereby incorporated into the new permit, seems unnecessarily vague and rushed, as it also includes language suggesting the NMP may be inconsistent with the new permit and require future revision. It would seem that thorough review of the existing NMP is essential prior to issuance of the new permit. For example, the permittee should establish that past compliance with the Nutrient Management Plan and its June 2016 Addendum in the 3 years of the facilities operation, has not led to conditions in the application fields which exceed the new requirements under Regulation #5 for application fields to meet Low to Medium nutrient classes (phosphorous levels in accordance with the Arkansas Phosphorus Index). If existing spreading fields after 3 years of application no longer meet the Low to Medium phosphorous API requirement, then it would appear that the new fields would likely not meet that requirement in the future and the current field management practices are set up to fail the enforceable conditions of this permit.

Original Commenter: National Park Service

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 430:** Additionally, Condition #8 states that waste applications "must not exceed the recommended nitrogen application rate," but does not provide this rate or a reference. Please stipulate this rate within the permit. Further, it is not clear how the proposed monitoring (TN in the waste ponds versus nitrates in the soils) would enable the permittee to comply with this condition. More attention to nitrogen is warranted given recent changes in nitrogen concentrations and nuisance algal growth within the Buffalo River. Additionally, this condition seems to contradict Condition #14, which states that waste should be evenly distributed over application sites. As fields are removed due to high API values,
remaining fields will be utilized to apply waste. This will further exacerbate the problem noted at the end of first paragraph in Condition #4 above. Please provide a contingency for addressing waste application as API values prohibit use on some fields so as to avoid exceedances or result in undue pressure on specific areas. This type of contingency would best be described within the revised NMP.

The table in Condition #7, showing proposed land application fields, should be updated to include API class and nitrogen status based on up-to-date soil monitoring data. Any fields not meeting these conditions should be removed from consideration prior to permit issuance and the application acreage recalculated accordingly.

Original Commenter: National Park Service

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

The API is used to develop loading rates for land application based on phosphorus. There are many factors taken into account to determine whether land application on a specific field is allowable. The Department only permits land application when the API value is a low or medium class.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 431: Part II Specific Conditions- Specific Condition #21: This condition states that waste can be "shipped" to other locations" "Shipping” does not seem to have the correct meaning in this context. Consider changing word to hauling or trucking waste” Given this option, a spill response plan should be in place prior to initiating this type of action so as to have appropriate procedures in place in case of accident and spillage of waste into Waters of the State.

Original Commenter: National Park Service

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.
**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 432:** Part II Specific Conditions- Specific Condition #24: This condition notes that the NMP "shall be reviewed annually by the operator." Given the high profile of this operation, the potential for changes in soil nutrient status at application fields over time, and the potential for impacts to high quality waters of the state, it would seem appropriate for both the operator and ADEQ to review the NMP annually.

Original Commenter: National Park Service

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 433:** Part II Specific Conditions- Specific Condition #25: This specific condition should specify what levees are being referred to. Although the assumption may be the levees surrounding the waste lagoons (not mentioned previously in the permit), levee is a general term associated with a number of features on the landscape that may be either natural (e.g. stream) or manmade. Annual inspections seem too infrequent given the potential for severe weather and dependent on the construction of the levees themselves. Please provide a more detailed inspection plan for incorporation within this permit that addresses frequencies, and intensity of inspection (i.e. by a structural engineer).

Original Commenter: National Park Service

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other
subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 434: Part II Specific Conditions - Specific Condition #26: As noted above, monitoring frequency for all variables in Tables I-III seems insufficient. The provision in Condition #26 for reducing monitoring frequency in the interceptor trenches from quarterly to once per year is similarly concerning, particularly since conditions may change during replacement of the pond liners. This reduction in monitoring stipulated within Condition 26 should be removed. It is incumbent on the permittee to ensure they do not violate water quality standards and limiting or removing monitoring reduces ADEQ's ability to detect a violation and remedy any issues.

Additionally, monitoring for chronic loading requires decades of sampling to adequately characterize the issue. It is not reasonable to believe that a fixed (5 year) time frame will assess the effects of long-term, continued application of liquid waste.

Original Commenter: National Park Service

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Pursuant to the Memorandum of Agreement between the Board of Trustees of the University of Arkansas System for and on behalf of the University of Arkansas System-Division of Agriculture and the Arkansas Department of Environmental Quality, the study performed by BCRET is being carried out for the use and benefit of ADEQ; however, the study shall be funded and conducted independently of ADEQ and shall meet the requirements of an independent study conducted by professionals in the field of water quality.

Comment 435: Part III Standard Conditions - Standard Condition #11: The condition language needs to be revised to show that any discharge will be a violation given this is a no discharge permit. Given the title of this Condition, it would seem appropriate to include a narrative of mitigations that would be expected of the applicant should an inadvertent discharge occur.
Original Commenter: National Park Service

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 436:** Part III Standard Conditions- Standard Condition #12: Solids removed from the ponds do not have any requirements for testing for phosphorus or nitrogen. Solids typically have high levels of these nutrients and before being applied on application fields, samples should be collected to determine their impact on applied fields. This process would seem appropriate to incorporate within the larger revised NMP. It would also seem prudent to define how wastes may be discarded in compliance with Arkansas law and regulation.

Original Commenter: National Park Service

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 437:** Part III Standard Conditions- Standard Condition #13 Reporting of Violations and Unauthorized Discharges, Paragraph A and B

**Paragraph A**

It is difficult to determine what would constitute a violation of this permit. The permit lacks performance criteria (such as monitoring triggers for action in violating water quality; definitions defining application conditions; and limits for holding waste). The permit needs these guidelines to provide sufficient direction to the applicant to safeguard water quality and protect human health.
Please state what constitutes a reportable discharge volume. If it is of any amount, then stipulate it as such.

Paragraph B

Because levee has been used previously in previous sections discussing specific conditions under this permit, presumably in referring to the structures around the ponds to increase freeboard and limit risk of waste overlfow of the lagoons, "levee" should be added here along with "dike" to properly identify this structure related to some potential structural failure associated with the lagoons that require reporting. It also appears that the monitoring requirements for this site (Part I) ignore groundwater flow paths via the epi-karst (perched groundwater beneath the shallow soil layer or at the top of bedrock) and at the depth of the regional groundwater table (80 or more feet below surface in fractured competent bedrock) based on the Drilling Study performed at the site. A single downgradient borehole located near the base of slope with nested monitoring intervals (wells) in these intervals (within any epi-karst potential water bearing zones and at the regional water table) would go a long way in ensuring the risk of impacts to waters of the state from this facility arc minimized with minimal added expense. This should be a contingency of this permit issuance.

Original Commenter: National Park Service

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

APC&EC Regulation 5 requires the designs and waste management plans for liquid animal waste management systems to be in accordance with the AWMFH. The AWMFH requires a detailed geologic investigation for complex geologies, i.e. karst, that includes, but is not limited to, groundwater flow direction studies, borings in the pool areas, berm integrity assessment, pond construction quality assurance, and assessment of high-risk areas of land application sites. The necessary geotechnical investigations have not been performed at this facility in accordance with the AWMFH Section 651.0704(b)(4), Section 651 Table 10-4, and Appendix 10D. The proposed listing of Big Creek and the Buffalo National River as impaired further illustrates the need for these detailed studies.
Geotechnical investigations are necessary to demonstrate that this facility is not contributing to water quality impairments of Big Creek and the Buffalo National River.

Comment 438: Part III Standard Conditions- Standard condition #16 Retention of Records: Given the sensitivity of this site and the need to ensure baseline conditions for groundwater are retained for reference should future questions of groundwater contamination arise, and given the highly variable rate of flow of groundwater in certain situations (vertically and horizontally via porous media or fracture flow), the 3 year record retention requirement seems inadequate to ensure historically significant data is not lost. Including more specific records retention requirements in Specific Conditions #20-22 would help clarify this.

Original Commenter: National Park Service

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

Comment 439: Part IV Definitions- "Waters of the State": Unless the "Waters of the State" definition is taken directly from statute that did not include the term "groundwater," it is recommended the more commonly used term "groundwater" would best cover the all-encompassing occurrence of water below the land surface that the State appears to want to regulate under Regulation 5 to achieve a "no discharge" condition. This would add clarity and better ensure the protection of both surface and groundwater resources of the State if incorporated in this definition.

Original Commenter: National Park Service

Response: The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other
subsequently available and relevant data and information, the Department denies issuance of the permit.

Waters of the State is defined in in Ark. Code Ann. § 8-4-102(10). This definition is reiterated in APC&EC Regulation 5.201.

Comment 440: Statement of Basis, Part 5. Waterbody Evaluation: The use of the 2008 ADEQ 303(d) does not consider or include the best available data for evaluation of waterbodies surrounding the permit location. While we understand this is the most recent EPA approved list, many changes have occurred since its approval nine years ago. It would seem reasonable to consider the recent 2016 assessment. NPS has provided ADEQ information on two sections of Big Creek where E. coli exceedances and low dissolved oxygen levels have been observed. Dissolved oxygen data collected by USGS recently also noted issues within that reach of the stream and should be considered.

Original Commenter: National Park Service

Response: The EPA did not include Big Creek on the approved 2016 303(d) list. The 2016 Assessment Methodology did not include data quality considerations or exceedance frequencies for continuously collected data. The Department did not have an approved methodology to allow assessment of the referenced data. The Department considered all relevant scientific data submitted during this permitting process.

Response: The Department amends its previous response. ADEQ considers all readily available data to determine the status of water quality in Arkansas and to identify waterbodies that fail to meet standards defined in APC&EC Regulation 2. ADEQ recently completed water quality assessments for the development of a proposed 2018 303(d) List and 305(b) Integrated Report as required by the Clean Water Act. In the Buffalo River Watershed, four Assessment Units (two sections of Big Creek and two sections of the Buffalo National River) have been identified as impaired: three for bacteria, and one for dissolved oxygen. Based on data for submitted by USGS for the 2018 303(d) list, ADEQ proposes listing Big Creek (AR_11010005_022) as impaired for dissolved oxygen.

Comment 441: Statement of Basis, Part 7: The original general permit called for a maximum of around 6,500 hogs to be housed on site. This section indicated the total number of animals at 3,428. We are just confirming that this number is correct and that it is or is not inclusive of pigs that are post-weaned.

Original Commenter: National Park Service

Response: According to the permit application, the maximum number of swine present is 6 boars, 2252 gestating sows, and 420 lactating sows due to pen
space and herd movement. The average nursery pig population is 750 nursery pigs.

**Comment 442:** Statement of Basis, Part 9: It is not clear how an irrigation system would be able to target specific fields and be compartmentalized to avoid applying to fields that are no longer viable or avoid sensitive resources. Irrigation systems would also require additional monitoring to ensure appropriate uptake by liquids to avoid runoff. We suggest not permitting this element of field application without additional language to safeguard resources and stipulate limitation of use.

Original Commenter: National Park Service

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

**Response:** The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.

**Comment 443:** Statement of Basis. Part 11. Total Available Acreage: We suggest that the total acreage available for land application be recalculated once fields having high or very high API values are removed. Additionally, this section does not look any farther than the date of this document to account for fields being removed or added over time. Adequate acreage exists to land apply today; however, after a few years will all current fields meet the API requirements? As fields become saturated, what will be the course of action to ensure protection of resources? Again this seems an appropriate topic to address within the NMP revisions. The NMP revisions should be incorporated as a primary requirement of this permit before it is issued.

Original Commenter: National Park Service

**Response:** The Department made this permitting decision in accordance with state laws and APC&EC Regulation 5, Liquid Animal Waste Management Systems. Upon consideration of the completed permit application, the public comments on the record, and additional data and information submitted during the permitting process, the Department denies issuance of the permit.

According to the API calculations in the permit application, no fields were removed as all API values for the fields were low or medium class.
Response: The Department amends its previous response. Upon consideration of the submitted permit application, the public comments on the record, and other subsequently available and relevant data and information, the Department denies issuance of the permit.