



A R K A N S A S
Department of Environmental Quality

RESPONSE TO COMMENTS

This document is the Water Division's response to comments received on the subject of draft general permit 00000-WG-LA in accordance with regulations promulgated by the Arkansas Pollution Control and Ecology Commission (APC&EC) pursuant to Arkansas Code Annotated § 8-4-202 et seq.

Permit: 00000-WG-LA, Land Application of Drilling Fluids

Prepared by: Mo Shafii, Assistant Chief, Water Division, ADEQ

Permit Action: Final decision and response to comments received on the draft permits publicly noticed on August 1, 2007

Date Prepared: September 7, 2007

The comments below were received on draft general permit 00000-WG-LA. In cases where the oral statement or letter also included comments on draft general permit 00000-WG-P, only those issues relating to draft general permit 00000-WG-LA are addressed. Those comments relating to draft general permit 00000-WG-P are addressed in a separate document.

Letter from Mr. Larry Bross dated August 14, 2007 (Issue #1)
Letter from Mr. Marcus Devine to Ms. Teresa Marks dated August 15, 2007 (Issue #2)
Written comments from Mr. Eugene Wahl on August 23, 2007 (Issue #3)
Email from Mr. Roger Lewis to Mr. Mo Shafii on August 24, 2007 (Issue #4)
Letter from Mr. Jim Wood to Mr. Mo Shafii on August 27, 2007 (Issue #5)
Letter from Ms. Debbie Wilson, Mr. Danny Grace, Mr. James Saunders, and Ms. Carletta Saunders to Mr. Mo Shafii dated August 28, 2007 (Issue #6)
Letter from Mr. George Holliday to Mr. Mo Shafii dated August 29, 2007 (Issue #7)
Letter from Mr. Luke Bross to the Director's office and ADEQ staff dated August 29, 2007 (Issue #8)
Email from Mr. Roger Lewis to Mr. Mo Shafii on August 30, 2007 (Issue #9)
Letter from Mr. Alan Gates to Mr. Mo Shafii dated August 30, 2007 (Issue #10)
Letter from Mr. G. Alan Perkins on behalf of Mr. Mark Boling of SEECO, Inc. to Mr. Mo Shafii dated August 31, 2007 (Issue #11)
Letter from Ms. Jennifer Goldman to Mr. Mo Shafii dated August 31, 2007 (Issue #12)
Email from Mr. Richard Baxter to Mr. Mo Shafii dated August 31, 2007 (Issue #13)
Letter from Mr. Steven Feisal to Mr. Mo Shafii dated August 31, 2007 (Issue #14)

ISSUE #1

Mr. Larry Bross, President of Location Service, Inc. made the following comments:

- A) The required testing parameters for reserve pit drilling fluids should be reduced to: chlorides, sodium, total dissolved solids, specific conductivity, oil & grease, lead, chromium, and barium.
- B) The required parameters for the soil analysis should be reduced to: pH, exchangeable sodium percent (ESP), cation exchange capacity (CEC), and specific conductivity.

- C) Post application soil testing is unnecessary if the Department loading and application rates are followed. Mr. Bross proposed submitting the total volume applied, number of acres, and an aerial map with specific areas used for disposal be submitted in lieu of post application soil testing.

RESPONSE #1

- A) The Department agrees to remove Total Solids and Volatile Solids from Table 1. Total Dissolved Solids will give the information necessary to evaluate the solids content of the fluids. The Department requires an analysis for the metals listed in Table 1 to ensure that the metals in the soils will not exceed limitations after land application.
- B) In the opinion of the Department, all parameters are required to evaluate the suitability of the soil for land application. Table 2 will remain as drafted.
- C) In the opinion of the Department, the post-application soil testing is necessary to evaluate compliance with the prescribed application rates. The volume to be applied, the available acreage, and a map with the land application areas delineated is required to be submitted with the NOI prior to any land application activity. The requirements for the post-application soil testing will remain as drafted.

ISSUE #2

Mr. Marcus Devine, President of Adevco, Inc., made the following comments:

- A) The allowance of the “one-time” land application of drilling fluids will be difficult to effectively police.
- B) Leaving the decision as to whether the site is appropriate for land application to the operator, without clear rules, will result in damage to the environment.
- C) Fluids generated during the fracturing of shale should be stored on-site, in clay lined pits, and then transported to a commercial disposal facility.

RESPONSE #2

- A) The Department conducts random inspections of permitted pits and land application sites, and responds to all complaints. Also, the civil penalties that may be levied by the Department for non-compliance encourage the permittee to abide by permit conditions.
- B) The decision as to whether the site is appropriate for land application is made by the Department after a complete technical review of the documents and information provided by the operator. In the opinion of the Department, the conditions in the general permit will adequately protect the environment.
- C) Permittees are prohibited from storing fluids generated during the fraccing process in clay-lined pits. These fluids must be disposed at an appropriately permitted disposal facility.

ISSUE #3

Mr. Eugene Wahl offered the following questions and recommendations:

- A) Do you give notice of when the application is complete? When does the 14-day review period begin? How does the applicant know his application is complete? Mr. Wahl recommends that notice should be given to the applicant.
- B) Is there a definition for only one use? Is that one time to empty the pit, one day to empty the pit, or can land application continue as long as it's not stopped? Mr. Wahl recommends that this be defined in the general permits.
- C) Does the landowner have to approve the surface application of solids and cuttings from the pit?
- D) How many and how much did the ADEQ collect in fines and penalties in the last 12 months? Does the ADEQ publish a penalty matrix?

RESPONSE #3

- A) The applicant is notified of any deficiencies in the permit application, either by letter, phone, or email. The Department will make every attempt to review the permit application for completeness within three days. The 14-day review period begins when the completed application is received.
- B) The approved volume of drilling fluids from a reserve pit may be land applied on a site near the well location. This land may not receive additional applications of drilling fluids. This is stated in Part I, Section A.3.
- C) The applicant must submit a surface use agreement or land use agreement, which is signed by the land owner.
- D) This comment is not related to the proposed general permits.

ISSUE #4

Mr. Roger Lewis recommended that the sampling required by the general permit be performed by an independent party who has been certified by the Department. Mr. Lewis also recommended that the sampling procedures be in accordance with the EPA SW-846 document.

RESPONSE #4

In the opinion of the Department, there is no justification for requiring that the sampling be performed by an independent party certified by the Department. The sampling methods listed in EPA SW-846 are not applicable to the sampling required in the general permit. Methods of sampling must be in accordance with the University of Arkansas Cooperative Extension Service guidelines.

ISSUE #5

Mr. Jim Wood, Director of the Yell County Wildlife Federation, made several comments and offered suggestions for language changes. The comments are summarized in several opening and closing paragraphs, and outlined in the body of the letter. The comments and responses below are listed as they appear in the body of the letter, since they cover all the issues raised in the opening and closing paragraphs.

- A) The general permit regulates facilities that operate continuously, and the following items should be required:

- (a) Provide adequate staffing through additional employees or restructuring.
 - (b) Provide staff work schedules that are the same as gas well drilling activities.
 - (c) Some staff should work rotating schedules that include weekends and holidays.
 - (d) Some staff should be assigned to work in counties where gas drilling is occurring.
 - (e) Staff should have unannounced 24-hour access to any permitted site.
- B) Part I.A.5.a. While the discharge of pollutants to State waters is prohibited, eight elements that are toxic to fish, wildlife and public health are allowed to be introduced into their environment. This language is confusing and has the potential to create problems with the enforcement of ADEQ regulations and the regulations of other state and federal agencies.
- C) Part I.A.5.a.. Who pays for toxic cleanup after the general permit expires and operators have left the state? ADEQ claims no legal responsibility, but permitting such actions has the potential for toxic pollution. The ADEQ and EPA are negligent because there is no requirement for a long term bond to secure funds for site remediation.
- D) Part I.A.5.b. Since ADEQ staff works only 40 hours per week, it is unrealistic to assume the operators will comply with the general permit conditions. Compliance and reporting is left up to the permittee, which favors the permittee at the expense of water quality protection and compliance with APC&EC Regulation No. 2.
- E) Part I.A.7.a. It is not clear how a permittee, who chooses to violate general permit conditions, can be authorized to continue operating while applying for an individual permit, which contains the same conditions that the permittee violated while covered under the general permit. This is confusing because both general and individual permits must meet the requirements of APC&EC Regulation No. 2 and other applicable regulations.
- F) Part I.A.7.d. Any commercial facility associated with handling, storing, receiving or disposing of fluids used in or produced during gas and oil well drilling should require an individual permit.
- G) Part I.A.7. A requirement should be added that reads, “Any activity requiring a Permit which is locally controversial with the affected public, or presents potential adverse impacts to public health and safety, Wildlife Management Areas, Wildlife Refuges, Endangered or Threatened Species, wetlands including farmed wetlands, waterfowl habitat use patterns, wildlife forage areas, aquatic food chains and 100 year base floodplains.”
- H) Part I.A.7. A requirement should be included that reads, “Any soil, subsoil, slope, or geological situation likely to support migration of land applied pollutants off the Permit site.”
- I) Part I.B1.b.(5) It is unrealistic to believe that the permittee will be objective when collecting the samples, or that the laboratories that are employed by the permittee will be objective when analyzing the samples. The efforts of the laboratories will be directed towards producing results desired by the party employing the laboratory. To ensure objectivity, laboratory analyses must be conducted by ADEQ staff.
- J) Part I.B.1.b.(5) Requiring the operator to take a minimum of 1 sample per 1,000 barrels produces inaccurate measures of the pollutants listed in Table 1. Why not improve accuracy by requiring 1 sample per 100 barrels or 1 soil test per acre? Sampling appears arbitrary and without scientific basis. An explanation of how ADEQ produced this requirement is required.
- K) Part II.A. ADEQ needs to clarify the rationale used for concluding that introducing the elements

in Table 1 into the environment meets the APC&EC Regulation No. 2 purpose of "enhancing the quality, value and beneficial uses of Arkansas water resources." How does mercury or lead enhance water quality?

- L) Part II.B. Is allowing lead, mercury, and selenium at the rates of 270 lb/ac, 15 lb/ac, and 90 lb/ac, respectively, which are all toxic to people and wildlife, beneficial to water quality?
- M) Part II.B. Any land application permit should be revised to require the landowner to notify appropriate state and federal regulatory agencies before crops, livestock, or other commodities produced on the permitted sites are marketed, for ten years after the permit has expired. The draft conditions are insufficient to track movement of toxins after the general permit has expired.
- N) Part II.C.1. Assuring permit compliance should also be the responsibility of ADEQ staff, not left solely to the permittee.
- O) Part II.C.2. The language should be revised to read "responsible ADEQ personnel should be present at all times during application."
- P) Part II.C.3. Given heavy rain events in Arkansas, it is impossible to apply toxic pollutants to land having a 15% slope and be reasonably sure they will be contained and not migrate offsite, regardless of a berm or levee. The slope of the land application sites should be limited to 5%. While it does not fully guarantee protection from worst case scenario rain events, it is far more realistic than 15%.
- Q) Part II.C.4. The language should be revised to state that drilling fluids shall not be spread within any 100 year base floodplain.
- R) Part II.G.5. Permits should be made available for public inspection on both the ADEQ web site and at the ADEQ.

RESPONSE #5

- A) The Department conducts random inspections of permitted pits and land application sites, and responds to all complaints. Department inspectors are stationed in field offices around the state, including counties where drilling is occurring. In case of an acute emergency, such as a petroleum or hazardous waste spill, the Arkansas Department of Emergency Management is staffed 24 hours a day, 7 days a week, and can be contacted directly. Permittees are required to allow Department access to the facility.
- B) Fluids must be land applied at rates specified by the Department. The land application limits minimize the impact of the elements listed in Table 1 on the environment.
- C) The Permittee is responsible for compliance to permit conditions and any required remediation activity. At this time, the Department does not have the authority to require a financial assurance bond.
- D) See Response #5(A).
- E) An individual permit allows the Department to create permit conditions for a specific situation. These permit conditions may be different from the general permit, but would still meet all applicable rules and regulations.

- F) Any facility that is land applying fluids more than one time at a site is not eligible for coverage under this general permit and must obtain an individual permit. This language will remain as drafted.
- G) The Department does not base permit decisions on perceived controversy or lack thereof. In the opinion of the Department, land application activities taking place in the above locations may be covered under the general permit as long as they meet all other requirements of the general permit.
- H) Runoff or discharge of fluids during land application is prohibited by the general permit, and would also be prohibited in an individual permit.
- I) Laboratories performing testing required by the general permit must be certified by the Department. The Department has the authority to revoke or suspend the certification of a laboratory for reasons listed in Arkansas Code Annotated § 8-2-201, et seq, including falsification of data.
- J) The Department requires samples to be composited from several locations in the pit in order to produce a representative sample. In the opinion of the Department, 1 sample per 1,000 barrels is an adequately representative sample for the capacities of pits covered under this general permit.
- K) The purpose of these limits are to mitigate the potential impact of the elements listed in Table 1 on the environment. It is not suggested that these elements enhance water quality.
- L) See Response #5(K).
- M) These actions are outside the regulatory authority of the Department.
- N) It is the responsibility of the Department to permit and enforce the permit conditions. It is the permittee's responsibility to comply with the permit conditions.
- O) In the opinion of the Department, it is not necessary for Department personnel to be present for all land application events. See Response #5(A).
- P) No justification was provided to demonstrate that a 15% grade is inadequate. It is the opinion of the Department that sites with a 15% gradient are adequate for land application.
- Q) No justification was given for prohibiting land application in the 100-year flood plain. In the opinion of the Department, land application in the 100-year flood plain may take place provided the conditions of the general permit are followed.
- R) It is Department policy to make records available at the Department. No justification was given for requiring additional repositories.

ISSUE #6

Ms. Debbie Wilson, Mr. Danny Grace, Mr. James Saunders, and Ms. Carletta Saunders submitted a letter containing several comments and questions.

- A) With only one water inspector for White County how can the land owner be assured that the fluids will be tested before the fluids are land-applied? Where are the test results available? Is the ADEQ testing each reserve pit?

- B) If the applicants are allowed to collect samples, how can the landowner be assured that the samples submitted came from the reserve pit in question?
- C) When and where are the public notices for land application posted?
- D) Due to the lack of staff at the ADEQ, the general permits will allow the operators to proceed at a faster work pace with less oversight.

RESPONSE #6

- A) There are three inspector positions that cover White County. The applicant must submit the laboratory analysis for the fluids in the reserve pit before coverage under the general permit can be authorized. All records are available for viewing at the Department. Additionally, many records are available on the ADEQ website. The fluids in the reserve pit are only required to be tested by the applicant if the fluids are to be land applied.
- B) See Response #2(A).
- C) All public notices for individual permit applications and draft permits are published in a newspaper of general circulation in the county where the facility or land application site will be located. The public notice for the general permits was published on August 1, 2007. Operators receiving coverage under the general permit are not required to publish a notice prior to land application.
- D) The Department acknowledges this comment.

ISSUE #7

Mr. G.H. Holliday of Holliday Environmental Services, Inc. made the following comments:

- A) Part I.A. The definition of “drilling fluids” needs to be modified to recognize the various layers present in the pit: hydrocarbon, water, and solids.
- B) Part I.A. The definition of “flow-back water” should be modified to include Class II well water, which are in the disposal well at elevated pressure and will need to be relieved to a pit during an emergency.
- C) Part I.A. The definition of “reserve pit” will lead to confusion and the construction of additional pits because the definition is not true for all reserve pits. Mr. Holliday states that “many pits are used during top-hole drilling as shaker pits because of the fast drilling experienced” and “when saline muds are used, the reserve pit is used to collect the crystalline salt during drilling.”
- D) Part I.A.5.b. The prohibition of oil-based drilling fluid from land application is inappropriate because bioremediation can be completed within six months if the TPH concentration is reduced to five percent oil by mixing with soil. Water-based and oil-based fluids should be mixed together to allow calcium to counteract the effects of sodium for faster remediation.
- E) Part I.B.1.i.(5) SW-846 is an analytical protocol for water analysis.
- F) Part I.B.1.i.(5) The analysis of barium based on SW-846 produces results which are not repeatable nor accurate. “True Total Barium” should be required instead.

- G) Part I.B.1.i.(5) For land application, a composite analysis of the drilling fluids and solids is necessary. The pit sampling procedure should be revised to require the pit be divided into 4-6 sections and 6-10 samples from each section be taken with a 2-inch pipe.
- H) Part I.B.1.i. The Department should allow soil scientists to prepare site management plans instead of a professional engineer.
- I) Part I.B.1.i.(5), Table 1. The analyses for the pit solids should be allowed to be reported in mg/kg.
- J) Part I.B.1.i.(5), Table 1. Conductivity, instead of chlorides concentration, provides the information necessary to determine whether the fluid can be used for remediation moisture. Liquids having an electrical conductivity of less than 2.4 mmhos/cm (2400 μ mhos/cm) are suitable as a one-time irrigation source for use in production agriculture or for enhanced bioremediation of oil-based pit solids.
- K) Part I.B.1.i.(5), Table 1. The metals analysis is unnecessary because metals attach to the drilling fluid clay particles.
- L) Part I.B.1.i.(5), Table 1. Total dissolved solids can be calculated from the conductivity. Volatile organic compounds evaporate quickly from the pit liquid surface.
- M) Part I.B.1.i.(8), Table 2. Sodium Adsorption Ratio (SAR) should be added to the table.
- N) Part I.B.1.i.(8), Table 2. Saturated Paste Electrical Conductivity (SPEC) should replace conductance. Conductance has no meaning since electrical conductance can be measured using any one of three methods, which will yield three different results.
- O) Part I.B.1.i.(8), Table 2. Total Petroleum Hydrocarbon – Diesel Range Organic is of little value since the diesel range organics evaporate quickly. TPH analysis using gas chromatography with flame ionization detection provides accurate analysis of the hydrocarbons with time. TPH analysis using IR spectroscopy falsely reads humus as TPH.
- P) Part I.B.1.i.(5), Table 1 and Part I.B.1.i.(8), Table 2. Tables 1 and 2 need to include the acceptable ranges of the parameters of concern so the operator knows the end-point values for proper remediation.
- Q) Part I.B.4.a. The unit for conductivity should read “ μ mho/cm” instead of “ μ mho/com.”
- R) Part I.B.4.a. It is doubtful that many areas in Arkansas have a native background electrical conductivity of less than 1000 μ mho/cm. The conductivity of waters in Arkansas have an electrical conductivity of greater than 1000 μ mho/cm and expecting soil in contact with Arkansas waters to have a conductivity of less than that is questionable. A saturated paste electrical conductivity of 4-8 mmhos would better fit the conditions in Arkansas.
- S) Part I.B.4.a. The equation used to determine A_{EC} suggests that the Department is not anticipating tillage of the land application area after waste application. Providing contact between the microorganisms and calcium in the soil by tilling the soil and waste together enhances remediation of the waste. The addition of nitrogen, potassium, and phosphorous to TPH-containing waste, or the addition of calcium amendment to sodium-containing waste will transform the waste into useable soil.

- T) Part I.B.4.a.(ii) This section does not state whether the ESP applies to the soil or the waste. The only criteria should be an ESP of 15% for the remediated soil and waste at the time of closure.
- U) Part I.B.4.a.(ii) Rather than limit the loading rate for each metal, the anticipated metals concentration using a mass balance technique, followed by an analysis of the soil for metals, should be required.
- V) Part I.B.4.a.(ii) There is no need to control iron because iron is ubiquitous in soil and drilling waste.
- W) Part I.B.4.c. Limiting the height of the waste to 4 inches and tilling the waste into the soil results in remediation areas free of run-off. The slope of the terrain where the waste is applied should be limited to 3-5% so that the waste remains in place until it is tilled.
- X) Part II.B.1. It is more important to consider the concentration of the metals in the soil after the remediation is complete. The requirements for the metal loading rates should be eliminated because the metals are “almost never a controlling concern during drilling waste remediation.”
- Y) Part II.B.2 Chlorides are associated with calcium, potassium, and sodium. Since calcium and potassium are beneficial to soil, limiting these elements by controlling chlorides is technically incorrect. Chloride is not a harmful element.
- Z) Part II.B.3. A more appropriate pH range for waste applied to soil is 5.5 to 8.5.
- AA) Part II.B.4. There is no technical reason to limit chloride in drilling waste. The concern should be sodium.
- BB) Part II.D.1. No reduction in components of the applied material will occur without amendments and tillage. The general permit requires rewriting so as to apply the principles of soil science developed by the farming industry and to include concentration limits for the soil associated with the drilling waste remediation.

RESPONSE #7

- A) While the Department agrees that there are multiple layers in reserve pits, it is not necessary to identify these layers in the definition of “drilling fluids.” To help clarify, a definition of “water-based drilling fluids” has been added.
- B) The general permit does not apply to UIC Class II disposal wells.
- C) In the opinion of the Department, this definition adequately defines the term “reserve pit.” Operators may contact the Department if clarification is needed as to the type of fluid that may be placed in a reserve pit.
- D) The land application of oil-based fluids are not currently allowed and will not be covered under this general permit. This permit is strictly for the land application of water-based drilling fluids, not the remediation of waste or soil. The purpose of the land application is to provide the soil with agronomic improvement.
- E) SW-846 includes test methods for soil analysis.

- F) The test methods in SW-846 have been approved by the U.S. Environmental Protection Agency and adopted by the Department. EPA-approved methods assure that data generated at one laboratory is comparable to data generated at another laboratory.
- G) Because the reserve pit solids and the reserve pit fluids will be land applied separately, it follows that the solid sample and the fluid sample should not be composited, but analyzed separately. In the opinion of the Department, the sampling requirements as drafted produce an adequately representative sample.
- H) A professionally licensed engineer is prohibited from stamping work outside his area of expertise. Engineers that do not have training or experience in land application would not stamp the site management plan. The Department requires that any waste management plan involving land application to be stamped by a Professional Engineer (P.E.).
- I) The Department agrees and the following language has been added to this subsection:

If solids are to be land applied, the analytical results are to be expressed in mg/kg unless otherwise indicated.
- J) The purpose of the general permit is not remediation of drilling fluids. See Response #7(A).
- K) The purpose of the metals analysis is to determine whether the concentration of the metals exceed the limit of the amount of a metal that can be applied to an area of land.
- L) Total dissolved solids can only be *estimated* from the conductivity. The Department has removed volatile solids from Table 1. See Response #1(A).
- M) The Department sees no need to include SAR in the table because SAR is approximately equal to the ESP.
- N) The general permit specifies that the conductivity be measured according to SW-846. The test methods in SW-846 have been approved by the U.S. Environmental Protection Agency and adopted by the Department. EPA-approved methods assure that data generated at one laboratory is comparable to data generated at another laboratory.
- O) Since this general permit is for land application, and not waste remediation, the TPH analysis using IR spectroscopy is adequate.
- P) Since this is not a waste or soil remediation, the Department sees no need to include this information.
- Q) The Department agrees and has corrected this typo.
- R) Most of the conductivity values on lab analyses submitted with land application requests and individual permit applications have been less than 1000 $\mu\text{mhos/cm}$. The general permit does not include a testing requirement for saturated paste electrical conductivity. See Response #7(K).
- S) The Department does not anticipate tillage after land application. Much of the land where application of drilling fluids will take place is pastureland, or vegetated with crops or trees. Tillage would not be desirable in many of these cases. The general permit does not prohibit tillage, which allows permittees to till the soil, if desired. Requiring nitrogen, potassium, phosphorous, or calcium to better remediate the soil is not necessary since soil remediation will

not be necessary if the permittee adheres to the conditions of this general permit.

- T) This section states that “ESP is the exchangeable sodium percent of the soil, expressed as a decimal.” The purpose of the general permit is not remediation of drilling fluids. See Response #7(A).
- U) The Department bases the loading rate for each metal on limitations described in the EPA biosolids rule contained in 40 CFR Part 503. In the opinion of the Department, it is necessary to limit metals being applied to the soil to ensure that metals do not exceed limitations contained in 40 CFR Part 503.
- V) The Department agrees that there is no need to add limits to control iron and has not provided limits to control iron in this general permit.
- W) The height of waste is determined using the analysis described in Part I, Section B.4.d. Arbitrarily selecting a height of 4 inches for all land application events could result in over-application of the drilling fluids. Waste has previously been applied to slopes up to 15% without runoff. This subsection will remain as drafted.
- X) The purpose of the general permit is not remediation of soil. See Response #7(A). While metals are not normally the controlling factor, the Department must ensure that the loading rates for the metals are not exceeded.
- Y) The Department partially agrees. Calcium and potassium are beneficial to soil. The intention of this permit is not to limit application of beneficial elements to the soil. Chloride, by itself, is not harmful. However, chloride in soil solution has been associated with higher plant uptake of cadmium and higher mobility of nickel.
- Z) No explanation as to why a pH range of 5.5 to 8.5 is better was provided. Fluids with a pH of 6.0 to 9.0 do not harm vegetation. The requirement will remain as drafted.
- AA) High levels of salts in irrigation water are known to cause foliar damage to plants. Chloride is a common anion associated with many cations present in groundwater and drilling fluids. Limiting chloride allows control of water to protect foliage. In addition, chloride in soil has been shown to mobilize heavy metals. Sodium in soil will be limited by calculations done to limit sodium (among other parameters) in the soil.
- BB) The Department is concerned with sodium. The equation in Part I., Section B.4.a.(ii) determines the acreage requirements based on exchangeable sodium percent.

ITEM #8

Mr. Luke Bross of Location Services, Inc. submitted the following comments:

- A) Because the chemical composition of the drilling fluids differ from that of the solids at the bottom of the pit, the analysis for the fluids should not be used to determine land application rates of the solids. Also, the Department should review the analyses for solids before issuing a permit that allows the land application of solids.
- B) The procedures and testing requirements for land application of the solids should be different from that of the fluids for the following reasons:

- 1) Viscosity gives a better indication of the type of material being spread. Drilling mud may hold pockets of salt or other additives that are not accounted for during sampling.
 - 2) “Also the unique terrain of the state of Arkansas does not facilitate the incorporation of mud like other more agrarian states.”
- C) Land application of the solids should either be removed from the general permit and covered under an individual permit, or allowed only at facilities that are permitted for multiple applications of drilling fluids.
- D) The requirements for sites that receive a single application of fluids should be different than the requirements for sites that received multiple applications of fluids.
- E) “Since one time application is based on a per acre loading rate, one would assume that 3,000 mg/L chlorides spread over one acre would be the equivalent of 6,000 mg/L chlorides being spread over 2 acres.” More acreage should be required for land application and the chloride limit should be increased to 10,000 mg/L. Chloride limits and heavy metal testing requirements are only needed for facilities that are permitted to receive multiple applications of drilling fluids.
- F) The maximum gradient of a slope where solids are allowed to be land applied should be reduced to 4% in order to prevent pollution.
- G) The permit should specify the exact source of the drilling fluids, i.e., a reserve pit, frac tank, closed system mud tank, etc.
- H) The post application reporting requirements should be limited to reporting the volume that was applied and the application area delineated on a map. Soil samples should only be required in the case of a complaint of damage to the land application area.

RESPONSE #8

- A) Part I.B.1.b.5. of the draft general permit states that when solids are to be land applied, a separate analysis for the solids must be submitted. Any solids that will be land applied must meet the same criteria as the fluids.
- B) All material that is land applied is required to meet the same minimum criteria.
- 1) Viscosity is a measure of a fluid’s resistance to shear stress. Viscosity data would not provide the fluid properties required to evaluate the suitability of the fluid for land application. The applicant is required to take samples that are representative of the material being land applied.
 - 2) Solid soil amendments have previously been successfully incorporated into soils in Arkansas. The Department is not aware of any soil property unique to Arkansas that would prevent all areas of the state from receiving soil amendments in the solid form.
- C) In the opinion of the Department, the drafted requirements for the land application of solids are adequate.
- D) Proposed land application activities of all types must meet specific minimum criteria.

- E) The chloride limit is measured in mg/L, which is a unit of concentration. The chloride concentration of the fluid remains constant regardless of the size of the land application area. A chloride concentration of 10,000 mg/L exceeds the tolerance of many native grasses and crops. In the opinion of the Department, chloride concentration limitations and heavy metal testing is necessary prior to land application of drilling fluids at any facility.
- F) In the opinion of the Department, a slope with a gradient of 15% is adequate for land application of all materials.
- G) The Department sees no justification for specifying the type of storage vessel. Fluids must meet the required minimum criteria regardless of the type of storage vessel.
- H) See Response # 1(B).

ISSUE #9

Mr. Roger Lewis made the following comments on draft general permit 00000-WG-LA:

- A) The draft general permit does not specify where the sample(s) of fluid should be taken. It is suggested that it should be either in the area of greatest depth or in the area of the point of effluence.
- B) The draft general permit does not specify the location or depth of the required soil sample(s). It is suggested that a core sample of a specified diameter, depth, and location be specified.

RESPONSE #9

- A) The draft general permit specifies that the samples taken must be representative of the fluid being analyzed. Given the large variety of the shapes and depths of reserve pits, the Department believes it would be impossible to prescribe exact sampling locations that would apply to every reserve pit.
- B) The Department agrees and the following language has been added to Part I.B.1.b.i.(6):

Methods of sampling must be in accordance with the University of Arkansas Cooperative Extension Service guidelines.

ISSUE #10

Mr. Alan Gates made comments on behalf on behalf of Anna Whorton, Eugene Johnson, Willis Stowers, Jr., John Rankin, Milton Howell, John Kroencke, Susie Kroencke, Donald Ray, Chris Barber, Johnny Wooten, Troy Wooten, Robert Gosnell, Greg Gosnell, Bob Taylor, Kim Taylor, Scott Griffin, Doug Griffin, John Van Horn, Wayne Jones, Eddie Browner, Oretta Holland, Kyle Wills, Matt Duffy, Doug Tyler, and Gordon Blackwell. These commenters oppose the general permit to the extent, if any, that it would provide a mechanism for S&W Environmental Solutions, LLC, or its principals to land apply any drilling fluids or other fluids associated with oil and gas well exploration and production on the property owned by S&W Environmental Solutions.

- A) The land application area is located in the flood plain.
- B) The draft permit would violate APC&EC Regulation No. 1.

- C) Construction and operation of the land application area will violate Condition No. 23 of draft permit 4961-W.
- D) The land application area is unsound and contrary to environmental norms because the waste management facilities are in a flood plain.
- E) The Department failed to consider the ecologically sensitive character of the proposed location of the facility.
- F) The Disclosure Statement submitted by S&W Environmental Solutions is deficient.
- G) The wastes involved are hazardous and present a significant risk of harm if mismanaged.
- H) The only route for reaching the facility has a traffic hazard that poses an unreasonable risk of a catastrophic spill.
- I) The Department failed to give adequate consideration to the deficiencies enumerated above.

RESPONSE #10

The only way the general permit would apply to this facility and site, is in the event that the proposed permit was not issued, a well was drilled at the site, and the operator planned to land apply drilling fluids at the site. Therefore the comments will be addressed as they would relate to the draft general permit in that situation.

- A) The draft general permit does not prohibit fluids from being land applied in the 100-year flood plain. Fluids are not allowed to be applied when rain is imminent or when soil is saturated.
- B) APC&EC Regulation No. 1 does not apply to land application of reserve pit drilling fluids. This reference has been removed from the general permit.
- C) Draft permit no. 4961-W is not related to the draft general permit.
- D) See Response #10(C).
- E) See Response #10(C).
- F) See Response #10(C).
- G) See Response #10(C).
- H) See Response #10(C).
- I) See Response #10(C).

ISSUE #11

Mr. G. Alan Perkins of Perkins & Trotter, PLLC submitted the following comments on behalf of Mr. Mark Boling, Vice President and General counsel of SEECO, Inc.:

- A) The provisions sought to be imposed in the draft permits would be better suited to rulemaking

rather than enumeration in the form of general permits.

- B) There has not been a sufficient showing of scientific or technical justification for many of the proposed permit restrictions. The Department is required by ACA § 8-4-203(c)(2)(B)(ii) to provide justification with appropriate references when issuing permits that are not identical to regulations.
- C) The proposed permit fees have not been justified. The fees are higher than other similar permits fees.
- D) It would be unfairly disruptive if a new permit requirement was applied to sites previously prepared in compliance with existing rules. Southwestern Energy would like to phase-in any new permit requirements so as to not be unduly disruptive to ongoing operations.
- E) Part I.A.4.c. The 21-day time frame is excessive. Oklahoma requires 2 days for fluid sampling and 5 days for the permit review. With proper streamlining, the review process should not require this length of time.
- F) Part I.A.4.d. The \$500 permit fee is excessive. The fee is based on the assumption that it will be necessary to review laboratory data and calculations. This level of review and analysis is unnecessary for a one-time application.
- G) Part I.A.5.b. The paragraph should be revised to omit frac water and flow-back water. There is insufficient scientific and technical justification for prohibiting land application of frac and flow-back water. These fluids should be allowed if they meet the requirements.
- H) Part I.A.5.c. The permit should not be construed to create a liability on behalf of the operator for damage to persons or property by reason of the permit requirements.
- I) Part I.A.6.a. This requirement should be rewritten to require appropriate response action to minimize adverse effects of any unpermitted release. In some instances, the process of removal can be more damaging than the initial release if left alone. There should be flexibility in the appropriate response action required.
- J) Part I.A.7.b. This provision is vague and lacks any definable standard.
- K) Part I.A.7.c. This is completely arbitrary, lacking any standard other than the Director's opinion.
- L) Part I.A.7.d. This is specifically not allowed under the permit and is unnecessary and duplicative.
- M) Part I.A.8.b. A 5-day time frame would be more appropriate.
- N) Part I.A.10. Given that the pit closure and land application activities occur in such a short period of time, it would be more efficient to allow an operator to proceed under an approved permit until the activity is completed, so long as operations have been commenced prior to expiration of the general permit.
- O) Part I.B.1.a.ix. This requirement should be revised to allow filing a completed Disclosure Statement once annually unless there is a change in the information, since some companies may frequently apply for land application permits.
- P) Part I.B.1.b. The level of detail and amount of laboratory testing and sampling requirements in

this section go far beyond what is necessary. This is a one-time land application, but the standards proposed are more in line with a commercial land application site. If fluids meet basic requirements and are applied in a manner as to prevent any runoff, there is no perceptible risk of environmental injury or risk of accumulation from a one-time application. The Department has not presented any technical or scientific justification demonstrating that his level of control is necessary or beneficial in this context.

- Q) Part I.B.1.b.i. It is unnecessary to require a PE stamp for this activity. Other trained and experienced professionals often conduct this type of activity.
- R) Part I.B.1.b.i.(6) This requirement should be limited to the USGS topographic map, which includes all necessary information. There is not scientific or technical justification for the need to research every water well within a mile of the proposed location.
- S) Part I.B.1.b.i.(7) It should be limited only to application in a manner to prevent all runoff.
- T) Part I.B.1.b.i.(8) This is unnecessary for a one-time land application.
- U) Part I.B.1.b.i.(8).ii. The method of application should not matter if it is conducted so that no runoff occurs.
- V) Part I.B.3.c. It is unnecessary for the operator to provide duplicative information the ADH or the County Judge because neither the ADH nor the County Quorum Courts have any direct authority over land application of oil and gas drilling operations. ADEQ lacks authority to require regulated entities to provide information to other agencies.
- W) Part I.B.4. There is not scientific or technical justification for this level of sampling and calculation. The Department, in consultation with knowledgeable professionals, should determine the allowable levels of ESP, EC, and oil and grease, and then provide a generic formula to determine the acceptable area necessary for land application.
- X) Part II.E.2. It is not clear that a permit noncompliance would necessarily be a violation of the Act. This would constitute rulemaking and is beyond the authority of the ADEQ.
- Y) Part II.G.2. Permits should be transferable in the event that the operator sells or assigns the operation to another operator. So long as the successor operator complies with the same permit, and submits a disclosure statement, there is not justification for restricting an operator's ability to transfer a permit.
- Z) Part II.G.4. This requirement should be limited to any relevant information which the Department may request.
- AA) Part II.G.7.a.i. What about LLCs, Limited Partnerships, and other business forms?
- BB) Part II.G.7.a.i.(2) This requirement should be revised to allow the person with authority over the drilling and/or site construction activity to sign. Suggested alternative language: "the manager of one or more manufacturing, construction, production, or operating facilities or functions, who has authority to sign on behalf of the corporation in the normal course of their duties, and who has been designated by a responsible officer to perform this function."
- CC) Part II.G.7.b. and Part II.G.7.c. If the paragraph in a. above is revised as indicated above, the requirements in b. and c. above are unnecessary and should be deleted.

RESPONSE #11

- A) In the opinion of the Department, the conditions in the general permit adequately protect the environment, and new rules or new regulations are unnecessary.
- B) According to A.C.A. § 8-4-203(a), the Department is given and charged with the duty and power to issue permits under such conditions as it may prescribe, to prevent, control, or abate pollution, for the discharge of sewage, industrial waste, or other wastes into the waters of the state.

The limiting factors in determining the minimum required acreage of the land application site are the conductivity of the soil, conductivity of the drilling fluids, exchangeable sodium percent of the soil, sodium concentration of the drilling fluids, chloride concentration of the soil, and chloride concentration of the drilling fluids. The Department staff, using engineering judgment, technical reports, and information from other states, has developed relationships between these factors and the minimum required acreage.

To prevent over-application of metals, the metals loading rate is calculated prior to land application. Maximum soil limits of selected metals are adopted from the EPA biosolids rule contained in 40 CFR Part 503.

Also, Department staff met with Dr. Marty Matlock at the University of Arkansas to review the proposed technical criteria. Dr. Matlock is considered an expert in the land application of drilling fluids and approved of the method used by the Department.

- C) In the opinion of the Department, the proposed \$500 permit fee is justified. The Department disagrees that the fee is higher than fees for similar permits. For example, the permit fee for general permit 0000-WG-WR, Land Application of Water Treatment Plant Residuals, is also \$500.
- D) In the opinion of the Department, very little disruption should occur with the introduction of this general permit since the requirements are similar to those of the individual permit. If the operator does not wish to be covered under the general permit, the operator may continue to apply for individual permits.
- E) In the opinion of the Department, the timeframe is not excessive. The Department will make every effort to review the NOIs and accompanying documents as quickly as possible.
- F) See Response #11(C).
- G) Frac water and flowback water typically have chloride concentrations that exceed 3000 ppm. The Department prohibits these fluids from being land applied to ensure that the chloride concentration of the material being land applied is below 3000 ppm.
- H) The Department agrees. The language in the subsection has been revised as follows:

The provisions of this general permit do not relieve the operator from or create any obligations or liabilities under any other applicable state and federal laws or regulations.
- I) The Department agrees. The language in the subsection has been revised as follows:

Immediate corrective action shall be taken in all cases where pollution has occurred. An operator responsible for the facility from which the pollution resulted shall immediately take all necessary steps to abate the source of pollution. Such response actions will be at the expense of the operator. The operator shall report such pollution in accordance with the requirements of Part II of this permit.

- J) The Department acknowledges this comment.
- K) According to A.C.A. § 8-4-202, et seq, the Director's duties include the administration of permitting to protect the environmental integrity of the state.
- L) The purpose of this statement is to clarify the intent of the general permit.
- M) See Response #11(E).
- N) The permittee will have 60 days to comply with the new general permit. In the opinion of the Department, it seems reasonable to expect that land application will be completed within this timeframe if it had commenced before the general permit expired.
- O) A. C. A. § 8-1-106 requires that all applicants for the issuance, or transfer of any permit, license, certification or operational authority issued by the Department file a disclosure statement with their application. The filing of a disclosure statement is mandatory. No application can be considered complete without one.
- P) See Responses #1(A), #1(B), and #11(B).
- Q) See Response #7(B).
- R) The USGS topographic map does not include the road locations that are required. The Department requires 300-foot buffer zones around all water wells and requires the locations of these wells be identified on the maps to ensure that proper buffer zones have been properly buffered. The Department will revise this requirement to reduce this buffer zone to 500 feet.
- S) See Response #11(B).
- T) Without a laboratory analysis, it would be impossible to determine if the soil is suitable for land application.
- U) The Department must ensure that the equipment is capable of applying the fluids so that no runoff will occur.
- V) The Department has the authority to submit or require that the applicant submit information to other agencies as a part of the permitting process.
- W) See Response #11(B).
- X) According to A.C.A. § 8-4-217(a)(3), et seq, it is unlawful to violate any provision of a permit.
- Y) The Department agrees. This subsection has been revised as follows:

In the event of any change in control or ownership of facilities covered

by this general permit, the permittee shall immediately notify the succeeding owner or controller of the existence of this permit. The operational authority is nontransferable to any person except after written notice to the Director (submittal of a new NOI or application for an individual permit, and a disclosure statement).

Z) The Department agrees and the language in this subsection has been revised as follows:

The operator shall furnish to the Department, within a reasonable time, any relevant information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating the facility's coverage under this permit, or to determine compliance with this permit. The operator shall also furnish to the Director, upon request, copies of records required to be maintained pursuant to this permit.

AA) Companies operating as LLCs may use the signatory requirements for a corporation, and those operating as a Limited Partnership may use the requirements for a Partnership. Companies operating under other business structures that are unsure as to who has signatory authority may contact the Department.

BB) The Department agrees to revise this section. The revised language for subsection a.(1) and a.(2) is as follows:

(1) a president, secretary, treasurer, or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation

(2) the general or local or branch manager of one or more manufacturing, production, or operating facilities employing more than 250 persons

CC) Subsection b. has been deleted and subsection c. remains as drafted.

ISSUE #12

Ms. Jennifer Goldman of the Oil and Gas Accountability Project located in Bozeman, Montana offered the following comments and questions:

A) Are the chloride concentration limitations of 1000 ppm in the soil and 3000 ppm in the drilling fluids protective of the vegetation? Are these standards based upon any scientific literature specific to Arkansas? A lower chloride concentration standard is justified because plant growth is impacted with chloride concentrations between 500 and 1000 ppm.

B) The draft general permit should include a closure standard because the permittees may not apply the drilling fluids at the required rates.

RESPONSE #12

A) The chloride concentrations for the soil and drilling fluids are protective of the vegetation. While the growth and production for most plants is slowed as the chloride concentration is increased, the plants are not harmed by these chloride concentrations.

- B) No suggestions for closure standards were provided. In the opinion of the Department, the prescribed post-application requirements are adequately protective.

ISSUE #13

Mr. Richard Baxter of Fluids Management stated that language should be incorporated into the draft general permits to allow the treatment of “the cuttings generated utilizing biodegradable, non-polluting, substantially non-aromatic, substantially chlorides free, non-aqueous (paraffinic) drilling fluids in the same manner as cuttings generated with water-based drilling fluids.”

RESPONSE #13

Due to the lack of experience with this type of drilling fluid in the state of Arkansas, the general permit will not be revised to include these type of fluids. Fluids as described above may be allowed under the general permit in the future. Currently, these types of fluids could only be considered under an individual permit.

ISSUE #14

Mr. Steven Feisal, Regulatory Legal Analyst of Chesapeake Energy Corporation made the following comments:

- A) Part I. “Test well” should be clearly defined.
- B) Part I.A.2. Irrigation systems and drainage systems, especially those which are artificial, as well as waters that are private, should be removed from the definition of “waters of the State”. At a minimum, bodies that are to be considered a “water of the State” should be specifically defined.
- C) Part I.A.3. The term “site” should be defined as “only the area or acreage contracted for with the surface owner.”
- D) Part I.A.3. The general permit should allow application of water-based fluids from multiple pits so long as such application does not render the land useless based on a reasonable standard as determined by the AOGC or other appropriate agency.
- E) Part I.A.4.c. The 21-day review period be changed to 7 business days. The 21-day requirement would drastically delay efficient, prudent operations.
- F) Part I.A.5. Only those substances as listed by Federal regulations should be prohibited so that duplicative, conflicting requirements do not exist.
- G) Part I.A.7.b. This subsection should be omitted, or at a minimum, restricted to a definable standard to ensure that the requirement will not be exercised without discretion.
- H) Part I.A.8.b. The 21-day time frame should be changed to 7 business days. The 21-day requirement would drastically delay efficient, prudent operations.
- I) Part I.A.9. The duration and expiration of the general permit should be clearly stated.
- J) Part I.A.10. This subsection is convoluted and duplicative because there is no indication as to when the general permit expires and there is no timeframe for reapplication. Also, the requirement that the certification of no changes or NOI be filed with the reissued general permit

is duplicative because such information is included in the reapplication for the general permit.

- K) Part I.A.12. The information in sections 2 and 3 of the NOT is duplicative and both sections should be omitted from the form.
- L) Part I.B.1.a.viii. The 21-day review period be changed to 7 business days. The 21-day requirement would drastically delay efficient, prudent operations.
- M) Part I.B.1.b.i. The requirement that the site management plan be signed by a professional engineer registered in the State of Arkansas should be removed because it is impractical and causes delays and burdens.
- N) Part I.B.1.b.3. The provisions should be changed to specify that the vegetation be that which is agreed to by the contractor performing the land application and the landowner.
- O) Part I.B.1.b.5. Electrical conductivity (EC) and Oil & Grease should be the only analytical performed since many of the required parameters are not found in or added to water-based drilling fluids.
- P) Part I.B.1.b.8. The list of required parameters for soil analysis be reduced to the following: EC and exchangeable sodium percent. The maximum allowable EC should be increased to 4000 μ ohms/cm.
- Q) Part 1.B.1.b.8.ii. This section should be removed because the required information could change and is detailed and burdensome.
- R) Part II.A. "Only that such regulation be per the surface use agreement" should be added.
- S) Part II.B.2. The sentence "land application will be prohibited in an individual application area when the concentration of chlorides in the soil exceeds 1000.0 parts per million" should be omitted.

RESPONSE #14

- A) In the opinion of the Department, the term "test well" is adequately defined. Applicants and permittees needing additional clarification should contact the Department.
- B) Drainage and irrigation systems are included in the definition of "waters of the State" promulgated under Arkansas Code Annotated § 8-4-202. The definition of "waters of the State" will remain as drafted.
- C) The Department sees no justification for defining the term "site." The applicant will submit the proposed site for land application and the Department will evaluate the suitability of this site.
- D) The general permit covers a single land application event. Multiple land application events on one site may be covered under an individual permit.
- E) See Response #11(E).
- F) Since the State is allowed to set standards that are more restrictive from Federal standards, the State regulations do not conflict with Federal standards. The subsection will remain as drafted.

- G) See Response #11(J).
- H) See Response #11(E).
- I) The duration and expiration date of the general permit is stated on the cover of the general permit. The duration is 5 years and the expiration date is November 30, 2012.
- J) The expiration Date for the general permit is November 30, 2012. The permittee will have 60 days to comply with the new general permit. At the time of reapplication, the permittee must file a Certification of No Changes form or an NOI.
- K) These sections are not duplicative. Section 2 of the NOT contains a description of the fluids that have been land applied and Section 3 is the Certification.
- L) See Response #11(E).
- M) Site management plans for all types of land application are required to be reviewed by a Professional Engineer registered in the State of Arkansas.
- N) The site management plan only need to state the type of vegetation used for the cover on the site. The Department will determine the suitability of the vegetation for land application. It is assumed that the land owner agrees with the land application arrangements, including the type of vegetation, when the signed land use contract is submitted.
- O) According to laboratory analyses of drilling fluids submitted to the Department, these components are found in the drilling fluids. Table 1 has been revised. See Response #1(A).
- P) See Response #1(B). No justification was provided for increasing the maximum allowable conductivity of the fluids.
- Q) This information is needed to determine if the application equipment is capable of applying the fluids at the required rates without runoff. If this information changes prior to land application, the new information can be resubmitted to the Department for evaluation and coverage under the general permit may be reauthorized.
- R) See Response #14(C).
- S) No justification for removing the limit on the chloride concentration of the soil was provided. The requirement will remain as drafted.