

**AUTHORIZATION FOR A NO-DISCHARGE WATER PERMIT UNDER THE
ARKANSAS WATER AND AIR POLLUTION CONTROL ACT**

In accordance with the provisions of the Arkansas Water and Air Pollution Control Act (Ark. Code Ann. § 8-4-101 *et seq.*)


3M Company - 3M College Station

is authorized to land apply industrial waste, as defined in Part IV, on sites listed in Part II Condition 9 in Pulaski County, AR.

Operation shall be in accordance with all conditions set forth in this permit.

Effective Date: March 1, 2024

Expiration Date: February 28, 2029


Digitally signed by Stacie R. Wassell
DN: cn=Stacie R. Wassell, o=Division of
Environmental Quality, ou=Office of Water
Quality,
email=stacie.wassell@adeq.state.ar.us, c=US
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Stacie R. Wassell
Associate Director, Office of Water Quality
Arkansas Department of Energy and Environment
Division of Environmental Quality

February 9, 2024

Issue Date

PART I
PERMIT REQUIREMENTS

LIMITATIONS AND MONITORING REQUIREMENTS:

The following tables detail the constituent limits, monitoring frequencies, and the requirements for reporting results to Division of Environmental Quality (DEQ) for each respective parameter listed in the table heading.

TABLE I			
Waste Analysis, Reporting, and Record Keeping			
Parameter	Cumulative Pollutant Loading Rate (lb/ac) ¹		Monitoring Frequency
Arsenic	37		Annually, prior to 1 st application of the calendar year ³
Cadmium	35		
Copper	1350		
Lead	270		
Mercury	15		
Molybdenum	N/A		
Nickel	378		
Selenium	90		
Zinc	2520		
Parameter	Maximum Limits	Reporting Units	Monitoring Frequency
Total Solids	Report	Percentage (%)	Annually, prior to 1 st application of the calendar year ³
Electrical Conductivity		µmhos/cm	
Nitrate Nitrogen		mg/l	
Nitrite Nitrogen			
Ammonia Nitrogen			
Total Kjeldahl Nitrogen			
Total Phosphorus			
Total Potassium			
Total Suspended Solids			
Total Petroleum Hydrocarbons		100	
pH	6.0 - 10.0		
Sodium Absorption Ratio (SAR)	18.0	Unitless	
Oil & Grease	Report	mg/l	Daily
Total Volume of Waste Applied		gallons/acre/year	
Nitrogen Application Rate	² Depends On Crop	lbs N/acre/year	Calculate, prior to each application

¹ Refer to Part II Condition 8.

² Refer to Part II Condition 6.

³ Annual samples may be collected in December of the previous year prior to the start of the calendar year and then be used to comply with the annual sampling and annual report requirements for the subsequent year.

TABLE II		
Soils Analysis, Reporting, and Record Keeping		
Parameter	Limit (Reporting Units)	Monitoring Frequency
Electrical Conductivity	4.0 (mmhos/cm)	Annually, Prior to the 1 st application of the calendar year per land application site. ^{2, 3}
Cation Exchange Capacity	Report (meq/100g)	
pH ¹	Report (S.U.)	
Sodium Adsorption Ratio (SAR)	12.0 (unitless)	
Nitrate-Nitrogen	Report (mg/kg)	
Phosphorus		
Potassium		
Parameter	Limit (Reporting Units)	Monitoring Frequency
Arsenic	Report (mg/kg)	Once every five (5) years per land application site. ^{2, 3}
Cadmium		
Copper		
Lead		
Mercury		
Molybdenum		
Nickel		
Selenium		
Zinc		

¹ If the resulting pH is 5.7 or lower, lime must be applied in accordance with recommendations from the University of Arkansas Cooperative Extension Service.

² One composite sample must be taken for every 40 acres.

³ Annual samples may be collected in December of the previous year prior to the start of the calendar year and then be used to comply with the annual sampling and annual report requirements for the subsequent year.

Part II
SPECIFIC CONDITIONS

1. This permit is for the land application of treated process wastewater from the following sources: washdown of equipment, miscellaneous non-sanitary wastewater, scrubber blowdown, water treatment system blowdown and stormwater. The wastewater is being land applied for irrigation in the permitted application area.
2. The land application operation shall be managed in accordance with the May 25, 2023, Waste Management Plan (WMP). If the WMP is inconsistent with this permit, the land application operation shall be managed in accordance with the terms of the permit and the WMP shall be revised to conform to the permit conditions.
3. The permittee shall provide annual training to any person that will be responsible for land applying waste or any person that will be overseeing the land application of waste before the permittee can land apply the waste under this permit. The annual training shall consist of, at a minimum, training on all permit conditions and WMP. The permittee shall maintain written certification that any person that will be responsible for land applying waste or any person that will be overseeing the land application of waste is familiar with the permit and WMP requirements. The permittee shall provide DEQ with records of these annual trainings as part of the permittee's annual report. All certifications shall be made available to DEQ personnel on request and maintained for three (3) years.
4. Upon request from DEQ personnel, the permittee shall provide DEQ with a schedule of all planned land application events that are expected to occur within the next five (5) calendar days. The schedule shall be provided immediately (within 24 hours) upon the request from DEQ personnel. At the minimum, the schedule shall include:
 - A. Permit Information (Permit No. and AFIN);
 - B. Anticipated dates of application; and
 - C. Anticipated Field IDs.
5. For each land application event on any permitted site, the permittee shall create a contemporaneous record of that land application event. Note that records of all land application events must be maintained pursuant to Part III Condition 16. Each land application record shall include, at a minimum, the following information:
 - A. Permittee Information (Permit No., AFIN, Permittee);
 - B. Land Application Event Information (including week of the land application event, Field IDs, amount of waste applied, identify when land application ceased due to precipitation); and
 - C. Waste Information (waste generator, specific description of waste).

All land application records shall be made available to DEQ personnel on request and maintained for at least three (3) years.

6. Plant Available Nitrogen (PAN) shall be calculated using the following equations:

PAN Equations	
For Surface applied waste, PAN(ppm)	0.3(TKN - NH ₃) + 0.5NH ₃ + NO ₃ + NO ₂
Conversion from PAN(ppm) to PAN(lbs/1,000 gallons)	0.00834 * PAN (ppm)

The cumulative waste must be applied at a rate (calculated in units of 1,000 gallons/acre) that provides a quantity of PAN (lbs N/acre) that is equal to or less than the nitrogen uptake rate of the cover crop (lbs/acre). See the table below for a list of Nitrogen uptakes for crops authorized for land application under this permit. Any crop not listed in the following table may be added to the permit as a permit modification.

Nitrogen Uptake of Cover Crops			
Crop Name	Uptake (lbs/acre)	Crop Name	Uptake (lbs/acre)
Bermuda	300	Red Clover	100
Fescue	138	Wheat	83

7. Land application sites possessing forage crops shall maintain an adequate vegetation (100% coverage with minimum of 80% density) to ensure the nitrogen uptake rate of the cover crop used to calculate the limit in Part II Condition 6 is accurate.
8. The permittee shall not land apply waste in a manner that would exceed the Cumulative Pollutant Loading Rate in Part I Table I. All records demonstrating compliance with this condition shall remain on site and be made available to Office of Water Quality (OWQ) personnel upon request. Pollutant Loading Rate shall be calculated per application event using the following equation. Cumulative Pollutant Loading Rate is determined by cumulative summation of each application event.

$$\frac{\text{Pounds}}{\text{Acre}} = \text{Concentrations} \left(\frac{\text{mg}}{\text{l}} \right) * 8.34 * \text{Application Rate} \left(\frac{\text{MG}}{\text{acre}} \right)$$

9. Land application sites are as follows:

Land Application Sites							
Owner	New/ Existing	Section	Township	Range	Acreage	Latitude	Longitude
3M Company	Existing	24	1 North	12 West	7	34°42'06"N	92°14'05"W

10. The permittee shall determine if the land application sites are currently permitted or in use by another user. In the event that DEQ or the permittee determines that any land application site under this permit is being used for land application from any other waste source, including

manure and septage, not listed in the permit, the permittee shall cease using those sites immediately. Using a site that is permitted for the land application of other wastes may result in DEQ taking action to void this permit and pursuing a formal enforcement action.

11. 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 runoff to the waters of the State or ponding on the surface of the land. Ponding caused by rainfall/stormwater must not have a visual sheen.
12. Waste shall be surface applied in accordance with Part II Condition 13 and the WMP. Waste must be evenly distributed over the entire application area. If a land application event does not cover the entire permitted field, the next application event for the same field shall cover the remaining area prior to any waste application over the initial application area, unless field conditions prohibit the land application over the entire site.
13. The allowable slope of land application site depends on waste application method. Wastes authorized by Part II Condition 1 shall not be applied to the land application site with slopes greater than allowed by the table below.

Maximum Slope %	Acceptable Application Methods
6	<ul style="list-style-type: none">• Surface application of liquid waste• Injection of liquid waste• Surface application of dewatered waste solids• Surface application of dewatered waste with immediate incorporation
12	<ul style="list-style-type: none">• Injection of liquid waste• Surface application of dewatered waste solids• Surface application of dewatered waste with immediate incorporation

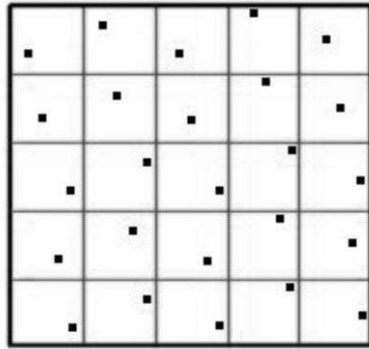
14. Land application of wastes, authorized by Part II Condition 1, shall not be undertaken when the soils are:
 - A. saturated;
 - B. frozen;
 - C. covered with ice or snow;
 - D. during precipitation events; or
 - E. when precipitation is reasonably anticipated (as defined in Part IV) in the next 24-hour period following any planned land application activity.

The permittee shall maintain field logs demonstrating compliance with this condition, including documents demonstrating that precipitation chances were reviewed and precipitation was not reasonably anticipated in the 24-hour period following any planned land application activity. The field logs shall be recorded on forms provided or approved by DEQ. The field

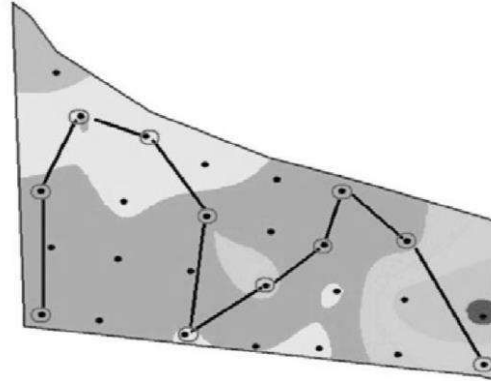
logs shall include documentation that the permittee commenced or suspended the land application activity in compliance with this condition. The records shall be made available to DEQ personnel upon request. The Responsible Official or Cognizant Official shall attest to all field logs in the annual report.

15. Land application of waste in a floodplain shall not result in a washout of waste, so as to pose a hazard to human, wildlife or land and water uses. Land application events are prohibited when a flood event would result in waste entering waters of the state. Compliance shall be demonstrated through records maintained in accordance with Part II Condition 14.
16. Waste shall not be land applied within 100 feet of streams including intermittent streams, ponds, lakes, springs, sinkholes, rock outcrops, wells, and water supplies or within 300 feet of extraordinary resource waters as defined by Arkansas Pollution Control and Ecology Commission (APC&EC) Rule 2. Buffer distances for streams, ponds, and lakes must be measured from the ordinary high water mark.
17. Waste shall not be land applied within 50 feet of property lines or within 500 feet of neighboring occupied buildings existing as of the date of the permit. The restrictions regarding property lines or neighboring buildings may be waived if the adjoining property is also approved as a land application site under a permit issued by the DEQ or if the adjoining property owner consents in writing.
18. All boundaries, cited in Part II Conditions 16 and 17, must be flagged prior to and present during any land application event for all land application sites.
19. The permittee shall not cause or contribute to the taking of any endangered or threatened species of plant, fish, or wildlife. The land application event shall not result in the destruction or adverse modification of the known critical habitat of endangered or threatened species as identified in 50 C.F.R. Part 17.
20. The permittee must not land apply in a manner that may impact groundwater resulting in an exceedance of the Maximum Contaminant Levels promulgated under the Safe Drinking Water Act, as referenced in 40 C.F.R. Part 257, Appendix I. Land application must cease if evidence suggests that the land application event is causing adverse impacts to groundwater.
21. The land application sites shall have the soils tested for the parameters listed in Part I Table II. Soil samples shall be collected according to the following method:
 - A. One composite soil sample shall be representative of \leq 40 acres.
 - B. Identify representative sampling areas/zones that are uniform in soil and previous management history. Soils that are contained within the same soil association according to the USDA Soil Survey are considered uniform for the purposes of this permit. These areas shall be identified on a site map. The areas shall remain the same between each sampling event.

- C. Using a clean soil probe, soil auger, or spade, collect a minimum of 20 individual subsamples to a 4-inch depth per sample area in a random zigzag or grid pattern (see Fig 1 below) in accordance with the sampling locations on the site map. If using a spade, avoid wedge shaped samples. One composite sample must be taken for every land application site identified in Part II Condition 9.
- D. Combine individual subsamples in a clean plastic bucket and mix thoroughly. Place a subsample of the mixed composite in a clean soil box and label with the field ID name, and permittee information. Subsamples shall be representative of each land application site.



Grid Pattern



Zig Zag

Figure 1. Representative Soil Sampling of Land Application Area Patterns

22. Concrete wastewater storage basins shall maintain a minimum of one (1) foot six (6) inch freeboard at all times (as measured in one of the three open and interconnected cells of the basin).
23. The permittee shall keep current records of the sludge from the wastewater treatment plant, which is shipped from the facility. The outgoing waste records must include: volumes of the waste, the name of the entity receiving the waste, type of waste, and shipping date.
24. Annual reports shall be submitted to by DEQ and certified by the responsible official or cognizant official. If no land application occurs on any permitted land application site, the permittee is still required to submit an annual report for all permitted land application sites. Annual reports are due by May 1st of each year for the previous permitted months from January to December (i.e. Annual report is due on May 1st, 2024 for the 2023 calendar year). Annual reports shall be sent to the OWQ and shall include the following:
- A. land application dates;
 - B. land application locations;
 - C. quantities of waste applied in dry tons per acre per year and in gallons per acre per year;
 - D. methods of application;
 - E. cover crop grown on each field;
 - F. annual amount of plant available nitrogen applied on each field;
 - G. maximum, and exceedances, of the ceiling concentrations listed in Part I Table I;

- H. cumulative amount for each parameter identified in Part I Table I (Arsenic, Cadmium, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, and Zinc) in lbs per acre per year;
- I. cumulative amount of each parameter identified in Part I Table I (Arsenic, Cadmium, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, and Zinc) applied to date;
- J. minimum and maximum pH and SAR;
- K. any violations of permit conditions;
- L. copies of the waste analysis and soil analyses;
- M. map of locations of soil subsamples; and
- N. a statement attesting to the field logs recording the site conditions and chance of precipitation records.

The annual reports shall be submitted to the following address:

Division of Environmental Quality
Office of Water Quality, Permits Branch
5301 Northshore Dr.
North Little Rock, Arkansas 72118

Or

Water-permit-application@adeq.state.ar.us

Part III
STANDARD CONDITIONS

1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Arkansas Water and Air Pollution Control Act (Ark. Code Ann. § 8-4-101 et seq.) and is grounds for civil and administrative enforcement action; for permit termination, revocation and reissuance, or modification; or for rejection of a permit renewal application.

2. Penalties for Violations of Permit Conditions

The Arkansas Water and Air Pollution Control Act (Ark. Code Ann. § 8-4-101 et seq.) provides that any person who violates any provisions of a permit issued under the Act shall be guilty of a misdemeanor and upon conviction thereof shall be subject to imprisonment for not more than one (1) year, or a fine of not more than twenty-five thousand dollars (\$25,000) or both for each day of such violation. Any person who violates any provision of a permit issued under the Act may also be subject to a civil penalty not to exceed ten thousand dollars (\$10,000) for each day of such violation. The fact that any such violation may constitute a misdemeanor shall not be a bar to the maintenance of such civil action.

3. Permit Actions

A. This permit may be modified, revoked and reissued, or terminated for cause including, but not limited to the following:

- i. Violation of any terms or conditions of this permit;
- ii. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts;
- iii. A determination that the permitted activity endangers human health or the environment and can only be regulated to acceptable levels by permit modification or termination;
or
- iv. Failure of the permittee to comply with the provisions of Arkansas Pollution Control and Ecology Commission (APC&EC) Rule 9 (Fee Rule).

B. The filing of a request by the permittee for a permit modification, revocation and reissuance, termination, or a notification of planned changes or anticipated noncompliance, does not suspend any permit condition.

4. Civil and Criminal Liability

Nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance. Any false or materially misleading representation or concealment of information required to be reported by the provisions of this permit or applicable state statutes or rules which defeats the regulatory purposes of the permit may subject the permittee

to criminal enforcement pursuant to the Arkansas Water and Air Pollution Control Act (Ark. Code Ann. § 8-4-101 et seq.).

5. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Clean Water Act and Section 106 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

6. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or rule.

7. Property Rights

The issuance of this permit does not convey any property rights of any sort, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or rules.

8. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provisions of this permit to any circumstance is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

9. Permit Fees

The permittee shall comply with all applicable permit fee requirements (i.e., including annual permit fees following the initial permit fee that will be invoiced every year the permit is active) for Non-NPDES permits as described in APC&EC Rule 9 (Fee Rule). Failure to promptly remit all required fees shall be grounds for the Director to initiate action to terminate this permit under the provisions APC&EC Rule 8.

10. Proper Operation and Maintenance

A. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems

which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

- B. The permittee shall provide an adequate and trained operating staff which is duly qualified to carry out operation, maintenance, and testing functions required to insure compliance with the conditions of this permit.

11. Duty to Mitigate

The permittee shall take all reasonable steps to prevent any discharge in violation of this permit that has a reasonable likelihood of adversely affecting human health, the environment, or the water receiving the discharge.

12. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of waste waters shall be discarded in an approved manner such as to prevent any pollutant from such materials from entering the waters of the State.

13. Reporting of Violations and Unauthorized Discharges

- A. Any violations to this permit must be reported to the Enforcement Branch of the Office of Water Quality (OWQ) immediately. Any leaks or seeps shall be reported to the OWQ and appropriately corrected. Any discharge from the fluids storage system such as an overflow, broken pipe, etc., shall be immediately (within 24 hours) reported to the OWQ.
- B. The operator shall visually monitor and report immediately (within 24 hours) to the Enforcement Branch any unauthorized discharge from any facility caused by dike or structural failure, equipment breakdown, human error, etc., and shall follow up with a written report within five (5) days of such occurrence. The written report shall contain the following:
 - i. A description of the permit violation and its cause;
 - ii. The period of the violation, including exact times and dates;
 - iii. If the violation has not been corrected, the anticipated time expected to correct the violation; and
 - iv. Steps taken or planned to reduce, eliminate, and prevent the recurrence of the violation.
- C. Reports shall be submitted to the Enforcement Branch at the following address:

Division of Environmental Quality
Office of Water Quality, Enforcement Branch
5301 Northshore Dr.
North Little Rock, Arkansas 72118

Or

Water-enforcement-report@adeq.state.ar.us

14. Penalties for Tampering

The Arkansas Water and Air Pollution Control Act (Ark. Code Ann. § 8-4-101 et seq.) provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under the Act shall be guilty of a misdemeanor and upon conviction thereof shall be subject to imprisonment for not more than one (1) year or a fine of not more than ten thousand dollars (\$10,000) or by both such fine and imprisonment.

15. Laboratory Analysis

All laboratory analyses submitted to the OWQ shall be completed by a laboratory accredited by the Division under Ark. Code Ann. § 8-2-201 *et seq.* Analyses for the permittee's internal quality control or process control do not need to be performed by a Division accredited laboratory.

16. Retention of Records

The permittee shall retain records of all monitoring information, copies of all reports required by this permit, and records of all data used to complete the application for this permit for a period of at least three (3) years from the date of the sample, measurement, report, or application. This period may be extended by request of the Director at any time.

17. Record Contents

Records and monitoring information shall include:

- A. The date, exact place, time, and methods of sampling or measurements, and preservatives used, if any;
- B. The individuals(s) who performed the sampling or measurements;
- C. The date(s) the analyses were performed;
- D. The individual(s) who performed the analyses;
- E. The analytical techniques or methods used; and
- F. The measurements and results of such analyses.

18. Inspection and Entry

The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

- A. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
- B. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
- C. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
- D. Sample, inspect, or monitor at reasonable times, for the purposes of assuring permit compliance any substances or parameters at any location.

19. Planned Changes

The permittee shall give notice and provide the necessary information to the Director for review and approval prior to any planned physical alterations or additions to the permitted facility.

20. Anticipated Noncompliance

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity that may result in noncompliance with permit requirements.

21. Transfers

The permit is nontransferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Act.

22. Duty to Provide Information

The permittee shall furnish to the Director, within a reasonable time, any information that the Director may request to determine whether cause exists for modifying; revoking and reissuing or terminating this permit; or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit. Information shall be submitted in the form, manner and time frame requested by the Director.

23. Duty to reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. The complete application shall be submitted at least 180 days before the expiration date of this permit. The Director may grant permission to submit an application less than 180 days in advance but no later than the permit expiration date. Conditions of this permit will continue in effect past the expiration date pending issuance of a new permit, if:

- A. The permittee has submitted a timely and complete application; and

- B. The Director, through no fault of the permittee, does not issue a new permit prior to the expiration date of the previous permit.

24. Signatory Requirements

- A. All applications, reports or information submitted to the Director shall be signed and certified. All permit applications shall be signed as follows:

- i. For a corporation: by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

- a. 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; or
- b. The manager of one or more manufacturing, production, or operation facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including: having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and rules; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

- ii. For a partnership or sole proprietorship: by a general partner or proprietor, respectively; or

- iii. For a municipality, State, Federal, or other public agency; by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes:

- a. The chief executive officer of the agency, or
- b. A senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency.

- B. All reports required by the permit and other information requested by the Director shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

- i. The authorization is made in writing by a person described above.
- ii. The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, or position of equivalent responsibility. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and
- iii. The written authorization is submitted to the Director.

- C. Any person signing a document under this section shall make the following certification: “I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.”

25. Availability of Reports

Except for data determined to be confidential under the Arkansas Trade Secrets Act (Ark. Code Ann. § 4-75-601 *et seq.*), all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Division of Environmental Quality and the agency website. The name and address of any permit applicant or permittee, permit applications, and permits shall not be considered confidential.

26. Penalties for Falsification of Reports

The Arkansas Air and Water Pollution Control Act provides that any person who knowingly makes any false statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under this permit shall be subject to civil penalties and/or criminal penalties under the authority of the Arkansas Water and Air Pollution Control Act (Ark. Code Ann. § 8-4-101 *et seq.*).

27. Applicable Federal, State, or Local Requirements

Permittees are responsible for compliance with all applicable terms and conditions of this permit. Receipt of this permit does not relieve any operator of the responsibility to comply with any other applicable Federal, State, or local statute, ordinance, policy, or rule.

Part IV
DEFINITIONS

“**Act**” means the Arkansas Water and Air Pollution Control Act (Ark. Code Ann. § 8-4-101 et seq.).

“**APC&EC**” means the Arkansas Pollution Control and Ecology Commission.

“**Application Site or Land Application Site**” means all contiguous areas of a users’ property intended for sludge application.

“**Available Acreage**” means total acreage minus buffer zones.

“**Cumulative Pollutant Loading Rate**” means the maximum of an inorganic pollutant (dry-weight basis) that is applied to a unit area of land.

“**Department**” means the Department of Energy and Environment.

“**Director**” means the Director of the Division of Environmental Quality.

“**Division or DEQ**” means the Division of Environmental Quality.

“**Dry weight-basis**” means 100 percent solids (i.e., percent moisture).

“**Floodplain**” means the lowland and relatively flat areas adjoining waterbodies, which are inundated by a flood that has a 1 percent or greater chance of recurring in any year or a flood of magnitude equal or exceeded once in 100 years on the average over a significantly long period.

“**Industrial Waste**” means treated process wastewater from the following sources: washdown of equipment, miscellaneous non-sanitary wastewater, scrubber blowdown, water treatment system blowdown and stormwater.

“**Land Application Event**” means an event where the permittee land applies waste to a specific permitted land application site on a calendar day.

“**OWQ**” means the Division of Environmental Quality - Office of Water Quality.

“**Ordinary High Water Mark**” means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a cleat, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

“**Reasonably Anticipated**” means greater than a 50% chance of precipitation of 0.25 inches or more on the zone area forecast for the county that represents the land application site using the National Weather Service station website: www.weather.gov.

“**s.u.**” means standard units.

“**Secretary**” means the Secretary of the Arkansas Department of Energy and Environment.

“**Visual sheen**” means a presence of a film or sheen or a discoloration of the surface of the sample fluids.

“**Annual**” or “**Yearly**” is defined as a fixed calendar year or any portion of the fixed calendar year for a waste characteristic or parameter with a measurement frequency of once/year. A calendar year is January through December, or any portion thereof.

STATEMENT OF BASIS

This Statement of Basis is provided by the Arkansas Department of Energy and Environment – Division of Environmental Quality (DEQ). This document provides information and justification of the permit limits only and is not enforceable. This permit decision is for renewal of a No-Discharge operation under permit number 4584-WR-5 and AFIN 60-00003.

1. Permitting Authority

Division of Environmental Quality (DEQ)
Office of Water Quality (OWQ)
5301 Northshore Dr.
North Little Rock, Arkansas 72118-5317

2. Applicant

3M Company - 3M College Station
P. O. Box 165860
Little Rock, AR 72216-5860

3. Facility Description

The 3M Company – 3M College Station produces roofing granules. The permittee must analyze the waste in accordance with Part I Table I. The annual application rates will be governed by the nitrogen and phosphorus contents of the waste and the nitrogen uptake of the cover crop at the land application site.

4. Consultant for this Facility

Melissa Vaught
FTN Associates, Ltd.
124 W. Sunbridge Drive, Suite 3
Fayetteville, AR 72703

5. Waterbody Evaluation

The land application site is located in Stream Segment 3C of the Arkansas River basin, which is not in the Nutrient Surplus Area. Surrounding areas were evaluated to determine if any Extraordinary Resource Waters (ERWs), Ecologically Sensitive Waterbodies (ESWs), Natural and Scenic Waterways (NSWs), or impaired streams in the 2018 OWQ 303(d) List of Impaired Waterbodies in the State of Arkansas are near the land application site. The waterbody evaluation determined that the land application site is more than ten (10) miles from any waterbody with the above designations. The land application site meets the required setbacks; therefore, no additional permit requirements are necessary.

6. Permit History

- A. Permit No. 4584-W was issued to 3M Industrial Mineral Products Division and effective October 1, 1999, for land application of process water and truck wash sediment.
- B. Permit No. 4584-WR-1 was issued to 3M Industrial Mineral Products Division and effective January 3, 2005, for the land application of industrial wastewater and truck wash sediment.
- C. Permit No. 4584-WR-2 was issued to 3M Company and effective November 1, 2012, for the land application of process water from the wastewater produced from the washdown of equipment, scrubber blowdown, water treatment system blowdown and stormwater.
- D. Permit No. 4584-WR-3 was issued to 3M Company and effective April 1, 2015, for a permit modification.
- E. Permit No. 4584-WR-4 was issued to 3M Company and effective January 1, 2018, for a permit renewal.

7. Permit Activity

Previous Permit No.: 4584-WR-4

Effective Date: January 1, 2018

Expiration Date: December 31, 2023

The permittee submitted a permit renewal application for a No-Discharge permit, which was received on May 30, 2023. It is proposed that the renewed water no-discharge permit be reissued for a 5-year term.

Legal Order Review:

There are currently no active Consent Administrative Orders (CAOs) or Notice of Violations (NOVs) for this facility.

Reports Review

The previous five (5) years of reports were reviewed during the permit renewal process. No land application occurred during the previous permit term.

8. Changes from the Previously Issued Permit

- A. Revised Part Table I and Part II Table II for clarification of reporting units and monitoring frequency.
- B. Added Part II Condition 3. See Statement of Basis No. 12.B.i.
- C. Added Part II Condition 4. See Statement of Basis No. 12.B.ii.
- D. Added Part II Condition 5. See Statement of Basis No. 12.B.iii.
- E. Revised multiple conditions in Part II. See Statement of Basis 12.B.
- F. Revised conditions in Part III to provide clarification.

G. Added a definition in Part IV for floodplain, land application event, and reasonably anticipated.

9. Applicant Activity

Under the standard industrial classification (SIC) code 3295 or North American Industry Classification System (NAICS) code 212399, the applicant activity is preparing roofing granules.

10. Waste Application Method

The 3M Company - College Station produces roofing granules. Nepheline syenite is mined at a different location and is hauled to the plant. The facility produces the granules by crushing the rock, screening the rock to the appropriate sizes, and dyeing the granules. A byproduct of this operation is the wastewater produced from the washdown of equipment, miscellaneous non-sanitary wastewater, scrubber blowdown, water treatment system blowdown and stormwater. All of the wastewater will be stored in a 600,000 gallon (operating capacity) concrete storage basin with a 1-foot, 6-inch freeboard (as measured in one of the three open and interconnected cells of the basin), 10,000-gallon steel mixing tank (T-105), 8,000-gallon clear water tank (T-110), 8,000-gallon sludge holding tank (T-109), or 20,000-gallon portable tanks. The concrete storage basin is equipped with a level sensor to notify high alarm status. Wastewater will be transferred to the concrete storage basin or land applied directly from any storage structure.

The facility will use tanker trucks to transport the waste from either the concrete basin, the portable tanks, or the Clear Water Tank (T-110) to the land application site. The wastewater will be land applied using a truck mounted spray bar or cannon spray. The haul routes for the trucks are located on property owned by 3M.

The solids collected in the storage structures will be placed on the Dewatering Concrete Pad (which drains back into the concrete storage basin). Prior to shipment to a landfill, the solids will be dewatered by passive drainage, evaporation press, belt press, filter press, dry chemical addition, or other dewatering methods. Once the solids are dewatered, the material will be trucked to a permitted landfill.

11. Total Available Acreage

There are 7 acres covered under this permit. The annual application of wastes is limited by the cumulative pollutant loading rate, plant available nitrogen (PAN) equation, and the nitrogen uptake rate of the cover crop, Part II Condition 6.

12. Basis for Permit Conditions

The DEQ-OWQ has made a determination to issue a permit for the No-Discharge facility as described in the application and waste management plan. Permit requirements and conditions

are based on rules pursuant to the Arkansas Water and Air Pollution Control Act (Ark. Code Ann. § 8-4-101 et seq. and Ark. Code Ann. § 8-4-201 et seq.)

Permit conditions, limits, reporting requirements, and justifications are listed as follows:

A. Part I—Permit Requirements

i. Monitoring Frequency

The monitoring frequency of once annually prior to the first land application is to ensure that a representative sample of what is being applied to the land is measured and recorded. In order to ensure over application of the parameters listed in Part I Table I of the permit does not occur, the total volume and application rates for each parameter listed in Part I Table I of the permit must be measured and recorded daily. The loading rates and application rates shall be calculated using each waste analysis and the volume of waste applied. The parameters that must be measured at this frequency can be compared to the soil parameters if a problem arises to determine if the land application is the pollutant source.

Some soil parameters only need to be measured once every five (5) years because annual measurements do not show a significant accumulation.

ii. Waste Limits and Reporting

a. Limits and reporting requirements for arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc in the waste

The associated limits and Cumulative Pollutant Loading Rates (CPLRs) are adapted from EPA's risk assessment Title 40 of the Federal Code of Regulations Part 503 rule that governs the land application of sewage sludge. This assessment considered 14 different pathways of exposure to highly exposed individuals, including humans, animals (including small organisms) and plants. Industrial wastes, as defined in Part IV, have been known to contain trace amounts of these compounds. These limits minimize the potential for the accumulation of metals in soils to concentrations that could have adverse effects on the environment.

b. Reporting requirements for percent total solids in the waste

This parameter is required to convert effluent analysis values between a wet and dry basis.

- c. Reporting requirements for the electrical conductivity of the waste and reporting of the waste volume

The analysis of electrical conductivity is the measurement of the salinity of the waste. Over application of salt could affect plant growth. According to *Wastewater Engineering Treatment and Reuse, 4th Edition*, salts tend to concentrate in the root zone. With an increase in soil salinity in the root zone, plants expend more of their available energy on adjusting the salt concentration within the tissue to obtain needed water from the soil. Consequently, less energy is available for plant growth. While a limit has not been implemented in the permit cycle, the OWQ will review this information along with the electrical conductivity of the soil and may implement limits on electrical conductivity in the future, if deemed necessary.

- d. Reporting requirements for all nitrogen compounds in the waste

These concentrations are required to calculate the plant available nitrogen to comply with Part II Condition 6.

- e. Reporting requirements for total phosphorus and total potassium in the waste

These constituents are required for plant growth and are monitored to ensure crop nutrients are provided.

- f. Limit and reporting requirement for Total Suspended Solids in the waste

These industrial wastewaters are known to contain high levels of Total Suspended Solids that could cause environmental risks if over applied to the land application site. DEQ will require the facility to monitor and report the wastewater on an annual basis. DEQ may require a limit for this parameter in future permits.

- g. Limit and reporting requirement for Total Petroleum Hydrocarbons in the waste

TPH monitoring is required due to the fact that wastewater may come into contact with trace amounts of TPH from the product mixer washdowns and recycle water pumps. This wastewater is also used to clean up roofing granule material spills and the plant basement floor. The TPH concentration in wastewater to be land applied is limited to 100 mg/l, a rate that DEQ has defined as protective of the environment.

- h. Reporting requirements for pH of the waste

APC&EC Rule 2 states that as a result of discharge, the pH in streams or lakes must be in the 6.0-9.0 range. Since the waste will be land applied and treated by the soil, DEQ has set range between 6.0-10.0. This pH range is required of the applied waste

as a protective measure for Waters of the State. The pH of the waste must be reported to ensure that it will not negatively impact the pH of the soil.

i. Reporting requirements for Oil & Grease in the waste

The permitted waste is known to contain levels of Oil & Grease. Excessive application of Oil & Grease has the potential to kill or prevent the growth of crops, as well as become a source of pollutants in groundwater and surface water.

j. Limit for Total Volume of Waste Applied

The total volume of waste applied is required in order to calculate the loading rates of metals and nutrients to the land application site.

k. Limit for Sodium Adsorption Ratio (SAR) in the waste

SAR is a measure of sodicity hazard commonly used to evaluate irrigation water and soils for agricultural use. Because the waste will be land applied, the SAR needs to be evaluated to show the waste is acceptable for use. According to the *Practical Handbook of Disturbed Land Revegetation* (Munshower, 1994), when the SAR rises above 18 in the waste, serious physical soil problems arise and plants have difficulty absorbing water. The OWQ has decided to require the limit of 18 for waste being repeatedly applied to one portion of land.

l. Nitrogen Application Rate

Land application of the waste covered under this permit is restricted by the nitrogen application rate. The nitrogen application rate is the amount of nitrogen applied to the land in pounds/acre/year. Using the nitrogen components of the waste analysis and the volume of waste applied, the nitrogen application rate shall be calculated using the equations provided in Part II Condition 6. In order to ensure the application of waste will not exceed the Plant Available Nitrogen (PAN) limit for the cover crop identified in Part II Condition 6, the nitrogen application rate must be calculated prior to each application.

iii. Soil Limits and Reporting

a. Limit for the electrical conductivity of the soil

The measurement of the electrical conductivity (EC) of the soil is used to determine the salinity or the amount of salts in the soil. In *Soils: an Introduction to Soils and Plant Growth*, an EC of 4.0 mmhos/cm or less is considered normal. Once the EC exceeds 4.0 mmhos/cm, the soil becomes Saline. Saline soils are known to reduce plant growth and affect soil permeability. If results indicate that soil concentrations

have increased, the OWQ may require cessation of land application activities, further testing, or remediation activities.

b. Reporting requirements for pH of the soil

The acidic limit of 5.7 was adapted from the University of Arkansas Cooperative Extension Service (UAEX) Self-study Guide 8: Soil Fertility Management in Pastures Essential Nutrient for Plant Growth to maintain an optimal pH for plant growth. Also when the pH becomes too low, heavy metals are more soluble and therefore more susceptible to leaching to the groundwater. Soil pH must be monitored to ensure compliance with Table II of Part I of the permit.

c. Limit for Sodium Adsorption Ratio (SAR) in the soil

In addition to evaluating SAR in the waste, the SAR should also be monitored in the soils of the application sites. According to the *Practical Handbook of Disturbed Land Revegetation* (Munshower, 1994), when the SAR rises above 12 to 15 in the soil serious physical soil problems arise and plants have difficulty absorbing water. According to the 2009 OWQ Landfarm Study, University of Arkansas soil scientist, Dr. Kristofor Brye, recommends that the SAR in soil be less than 12. SAR values above this range are considered undesirable conditions for plant growth. High sodium content disperses the soil and causes it to crust. Sodium also negatively influences the ability of water to infiltrate the soil. If results indicate that soil concentrations have increased, the OWQ may require cessation of land application activities, further testing, or remediation activities.

d. Reporting requirements for cation exchange capacity, nitrate-nitrogen, phosphorus, and potassium in soils

These parameters are indicators of soil quality. The chemical condition of soil affects soil-plant relations, water quality, buffering capacities, availability of nutrients and water to plants and other organisms, mobility of contaminants, and some physical conditions. (USDA Natural Resources Division "Indicators for Soil Quality Evaluation" April 1996.) Reporting requirements are included to verify that problems from over-application of wastes or other sources are not occurring. If results indicate that soil concentrations have increased, the OWQ may require cessation of land application activities, further testing, or remediation activities.

e. Reporting requirements for arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc in soils

The list of metal cations was adapted from 40 C.F.R. Part 503 for the land application of sewage sludge. Limits were not established due to the variability of analyzing the concentrations of these metals. Reporting requirements are included to verify that metals from land application of waste or other sources are not being

applied at a rate that causes accumulation of metals to levels that could have adverse effects on the environment. If results indicate that soil concentrations have increased, the OWQ may require cessation of land application activities, further testing, or remediation activities.

B. Part II—Specific Conditions

i. Training and Training Certifications

Due to non-compliance issues and documented complaints with land application operations throughout the State, DEQ will require the permittee to conduct annual training for any person that will be responsible for land applying waste or any person that will be overseeing the land application. The permittee shall certify that any person that will be responsible for land applying waste or any person that will be overseeing the land application of waste has knowledge and understanding of the permit conditions and WMP. These personnel shall be adequately trained prior to any person conducting land application operations. The permittee will be required to keep records and certification to document of the annual training. The permittee will be required to maintain the training records for a period of at least three (3) years.

ii. Land application notification

Due to non-compliance issues and documented complaints with land application operations throughout the State and pursuant to Ark. Code Ann. § 8-4-216(a)–(b), DEQ may request all planned land event records at any point in time to review the land application operations under this permit. Pursuant Ark. Code Ann. § 8-1-107(a), DEQ has the authority to conduct inspections of any site.

iii. Contemporaneous records

Due to non-compliance issues and documented complaints with land application operations throughout the State, DEQ will require the permittee to maintain contemporaneous records of all land application events. This will ensure that all land application records are current, complete, and accurate.

iv. Plant Available Nitrogen (PAN) application limit

DEQ has provided the proper Plant Available Nitrogen (PAN) equation in order to ensure the permittee calculates the nitrogen uptake of the cover crop properly. The land application of industrial waste outside of the Nutrient Surplus Area is limited by the nitrogen uptake of the cover crop and the PAN. The application rate is designed to provide the amount of nitrogen needed by the crop or vegetation and reduce the risk of nutrients running off into the waters of the State.

v. Vegetation Cover Requirement

In order to ensure proper uptake of nitrogen, the land application sites containing forage crops shall maintain 100% vegetative coverage with a minimum of 80% density. Furthermore, the vegetative coverage and density is also used for stabilization purposes to reduce the risk of soil erosion and runoff.

vi. Cumulative Loading Rate

DEQ has provided the proper Cumulative Pollutant Loading Rate equation in order to ensure the permittee calculates the metal loading rate properly. Land application of waste is limited by the metal loading on the soils. The application rate is designed to be protective of the environment and has been adapted from 40 C.F.R. Part 503.

vii. Permit termination if the land application site is currently permitted under a previously issued permit

A site covered in more than one permit is at risk of over application of nutrients and metals. This condition encourages the applicant to confirm with the landowner that the site is not currently covered under another active permit before permitting the site.

viii. No runoff or discharge requirement

A discharge from this site may result in pollutants entering the waters of the State in violation of Ark. Code Ann. § 8-4-217. Specific land application method requirements including even surface application or subsoil injection and precipitation and moisture limitations, are to ensure that no runoff containing potential pollutants will enter the waters of the State. These conditions are adaptations of APC&EC Rule 5.406 (A) & (B) and 40 C.F.R. Part 257.

ix. Even Application

In order to avoid over application to one area of the land application site, the waste shall be distributed evenly over the entire land application site. If the waste is over applied to one portion of the application site, there is potential for concentration on that portion of the site and the waste to runoff to the waters of the State.

x. Maximum allowable slope for the land application area

In order to protect waters of the State, additional measures must be taken to ensure contamination via runoff is prevented. Topography of the land application area affects the potential for runoff and erosion. The limits listed in Part II Condition 13 were adapted from the *Wastewater Engineering: Treatment and Reuse, 4th Edition*, Table 14-51 as an acceptable maximum slope for the acceptable application of wastes. DEQ will not allow land application of industrial waste on slopes greater than 12%. Any land

application of industrial waste on slopes greater than 12% increases the chance of the industrial waste runoff the site and discharging to waters of the State.

xi. Land application during precipitation and saturated conditions

In order to protect waters of the State, additional measures must be taken to ensure contamination via runoff is prevented. Therefore, OWQ adapted the associated conditions from APC&EC Rule 5.406(B) that governs the liquid animal waste management systems. Land application of waste is prohibited during a precipitation event or when significant precipitation is reasonably anticipated. When land applying waste there is a critical time to prevent runoff to the waters of the State, which is during land application and right after land application before the waste has had time to absorb into the soil. Pursuant Ark. Code Ann. § 8-4-216(a)–(b), DEQ has the authority to require the permittee to keep records to demonstrate compliance with permit conditions.

xii. Land Application of waste to a floodplain

In order to protect waters of the State, land application of waste to a floodplain shall not cause any waste to reach waters of the State during a flood event. This was adapted from 40 C.F.R. Part 257.3-1.

xiii. Buffer distances

Minimum buffer distances are required between land application areas and areas that may be vulnerable to water pollution in order to minimize the risk of nutrients or pollutants from leaving the field and reaching surface waters. Buffer distances were adapted from APC&EC Rule 5.406(D) and generally accepted scientific knowledge and engineering practices.

xiv. Flagged Boundaries

In order to be protective of surface waters, minimum buffer distances have been established. In order to verify that the permittee will be applying waste within all of the required boundaries of the land application site(s), DEQ will require all boundaries to be flagged prior to and be present during any land application events.

xv. Habitat protection

This condition is adapted from 40 C.F.R. Part 257 and is included to ensure that endangered or threatened species are considered and protected during land application.

xvi. Title 40 C.F.R. Part 257 compliance requirement

OWQ has adapted the maximum contaminant level from 40 C.F.R. Part 257 Appendix I. Complying with these maximum contaminant levels ensures that harmful levels of pollutants will not enter the groundwater through contamination from the land application of industrial waste.

xvii. Soil Sampling

The sampling requirements were included in the permit to ensure the samples of the soils are collected in an appropriate manner and to ensure representative samples are collected.

xviii. Freeboard

Freeboard is required to ensure the wastewater basins have adequate storage available to prevent the wastewater from overflowing during rainfall events.

xix. Record Keeping

In order to maintain complete records of the operation and to ensure that wastes are being properly disposed the permittee shall maintain records of the outgoing waste.

xx. Annual Reports

In order to ensure the permittee is land applying in accordance with all of the requirements of the permit and the annual application rates, the permittee will be required to submit an annual report. In order to ensure the permittee submits the proper information and records, DEQ has provided minimum requirements in Part II Condition 24.

C. Part III—Standard Conditions

Standard Conditions have been included in this permit based on generally accepted scientific knowledge, engineering practices and the authority of the Arkansas Water and Air Pollution Control Act (Ark. Code Ann. § 8-4-101 et seq.).

D. Part IV—Definitions

All definitions in Part IV of the permit are self-explanatory.

13. Point of Contact

The following staff contributed to the preparation of this permit:

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Technical review

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14. Annual Fee

In accordance with APC&EC Rule 9, the annual fee for this permit is \$500.

15. Sources

The following Sources were used to draft the permit:

- A. APC&EC Rule 2, Rule Establishing Water Quality Standards for Surface Waters of the State of Arkansas, as amended.
- B. APC&EC Rule 5, Liquid Animal Waste Management Systems, as amended.
- C. APC&EC Rule 8, Administrative Procedures, as amended.
- D. APC&EC Rule 9, Fee Rule, as amended.
- E. 40 C.F.R. Part 503 for land application of sewage sludge.
- F. 40 C.F.R. Part 257 for solid waste disposal facilities and practices.
- G. Ark. Code Ann. § 8-4-101 et seq., Arkansas Water and Air Pollution Control Act.
- H. Ark. Code Ann. § 4-75-601 et seq., Arkansas Trade Secrets Act.
- I. Department of Health (2014). *Rules and Regulations Pertaining to Onsite Wastewater Systems*.
- J. Integrated Water Quality and Assessment Report (305(b) Report).
- K. 2009 OWQ Landfarm Study.
- L. *Practical Handbook of Disturbed Land Revegetation*, Munshower, 1994.
- M. *Wastewater Engineering: Treatment and Reuse: 4th Edition* Table 14-51.
- N. UAEX Self-Study Guide 8: Soil Fertility Management in Pastures essential Nutrient for Plant Growth
- O. *Soils: An Introduction to Soils and Plant Growth: 4th Edition*; Donahue, Miller, & Shickluna; 1977.

P. USDA Natural Resource Division, *Indicators for Soil Quality Evaluation*, April 1996.

Q. US Army Corps of Engineers Regulatory Guidance Letter No. 05-05.

R. Application for Permit No. 4584-WR-5 was received on May 30, 2023.

16. Public Notice

The draft permit was public noticed on December 31, 2023. No comments were received.

