Permit No. 0010-UR-4
AFIN 70-00037

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.*) and Arkansas Pollution Control and Ecology Commission (APC&EC) Regulation No. 17:

LANXESS Corporation
2226 Haynesville Highway
El Dorado, AR 71730

is authorized to operate and maintain two UIC Class I non-hazardous injection wells and to construct one Class I non-hazardous injection well at the Great Lakes Chemical Corporation South Plant at the following locations in Union County, AR.

Well	Location
WDW-6S	Section 32, Township 18 South, Range 15 West, Latitude 33° 06’ 31” North and Longitude 92° 40’ 33” West
WDW-7S	Section 5, Township 19 South, Range 15 West, Latitude 33° 06’ 11” North and Longitude 92° 40’ 31” West
WDW-8S (proposed)	Section 32, Township 18 South, Range 15 West Latitude 33° 06’ 45” North and Longitude 92° 40’ 59” West

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

Effective Date: April 1, 2018

Minor Modification Effective Date: November 1, 2020

Expiration Date: March 31, 2028

10/27/2020
Issue Date

Robert E. Blanz Ph.D., P.E.
Associate Director, Office of Water Quality
Arkansas Department of Energy and Environment
Division of Environmental Quality

SPECIFIC CONDITIONS

1. This permit is for the operation of the Underground Injection Control (UIC) Class I non-hazardous waste injection wells WDW-6S and WDW-7S and for the construction of WDW-8S. [40 CFR § 144.31]

2. 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. [40 CFR §§ 144.12 and 144.35]

3. The waste disposal system shall be operated and maintained in accordance with the final plans and specifications as approved by the Department. [40 CFR § 144.31]

4. No extension or major modification of the system facilities may be made without the issuance of a new permit or permit modification. The Department shall be notified upon any modification of the system which may require permit modification. [40 CFR § 144.36]

5. This permit is issued in reliance upon the statements and representations made in the application and associated documents. The Department has no responsibility for the proper functioning of the UIC wells. [40 CFR § 144.31]

6. The permittee shall at all times ensure there is no-discharge of fluids to the ground surface or to the waters of the State from the UIC wells or from any related structures at this facility. The discharge of any fluids from this system is strictly prohibited. The permittee shall notify the Department immediately, within 24 hours in the event of the release of any fluids to the ground surface or into the waters of the State. This is a violation of the permit. [40 CFR §§ 144.12 and 144.35]

CONSTRUCTION REQUIREMENTS-WDW-8S

7. Approved Plans and Specifications

A. WDW-8S shall be constructed and completed to prevent the movement of fluids into or between USDWs or into any unauthorized zones or intervals, in accordance with 40 CFR § 144.12.

B. Except as specifically required in the terms of this permit, drilling and completion of the well shall be done in accordance with the plans and specifications submitted with the permit application. Any proposed changes to the plans and specifications must be submitted in writing and be approved by the Department prior to implementation. These changes must be equivalent to the original design criteria in providing adequate protection standards. A work plan describing in detail the drilling and completion activities shall be submitted to the Department at least thirty (30) days prior to the commencement of construction. [40 CFR §§ 144.12 and 146.12]

8. Commencement of Construction

The construction of WDW-8S may not commence until a permit has been issued containing construction requirements.

9. Requirements Prior to Commencing Injection

The Permittee shall not commence injection of waste into WDW-8S until the Department has evaluated the Completion Report to establish optimal operational requirements and has provided the Permittee with written authorization to commence injection. [40 CFR § 146.14]

10. Cores of the Injection Interval and Confining Zone

During the drilling of WDW-8S, whole cores shall be obtained from the proposed primary and secondary injection intervals and selected portions of the confining zone. Core analysis shall include a determination of formation properties including, but not limited to, permeability, porosity, density, and for compatibility tests with the formation fluid proposed in the permit application. The results will be submitted to the Department as part of the Completion Report, as specified. [40 CFR § 146.12(a), (e)]

11. Compatibility Testing

Compatibility testing shall be performed by subjecting the core samples to a typical waste stream at representative downhole formation temperature and pressure conditions for an adequate period of time to determine if any geochemical reactions are generated that might adversely impact the proposed injection interval formation or well operations. Samples of formation fluid shall be obtained and mixed with the waste stream fluid under conditions as close to downhole conditions as possible. All results must be submitted with the Completion Report as specified in Part I. 17. of this permit. [40 CFR § 146.12(a)(5)]

12. Well Construction Materials

A. The cement and casing to be used in WDW-8S will be designed for the life expectancy and closure period of the well. The casing and cementing program shall be designed to prevent the movement of fluid into or between USDWs and to prevent potential fluid leakage from the well. [40 CFR § 146.12(b)]

B. All casings and connections shall have sufficient structural strength to withstand burst and collapse pressures and the maximum tensile stress that may be experienced during well construction, operation, and closure. [40 CFR § 146.12(b)]

A. A minimum of one surface casing string will be set at from the surface to a depth of at least 250' into the confining formation below the base of the lowermost USDW. [40 CFR § 146.12]

B. A minimum of one long string casing will be set from the surface with a packer set immediately above the injection zone. [40 CFR § 146.12(b)]

C. WDW-8S will be constructed with the following casing materials listed below, of at least the minimum strength, and as described in the permit application (40 CFR § 146.12(b))

	Surface	Longstring	Tubing	Packer
Type	API standard grade carbon steel	API standard grade carbon steel	Carbon steel	Arrowset (or equivalent)
Size	10 ¾ in.	7 in.	5 ½ in.	7 in. x 5 ½ in.
Grade	K-55	N-80	N-80	N/A
Weight	45.5 lb/ft	26 lb/ft	17 lb/ft	N/A
Setting depth:	2,280 ft bgl	5,580 ft bgl	4,580 ft bgl	4,580-4,587 ft bgl

Bgl=below ground level

D. Waste fluids shall be injected through tubing with a packer set immediately above the injection interval. The tubing and packer shall be designed for the expected service of the well. [40 CFR § 146.12(c)]. The annular fluid will consist of corrosion-inhibited brine.

E. The surface and long string casing will be cemented from the base to the surface by circulating cement back to the surface using a minimum of 120% of the calculated volume necessary to fill the space. (40 CFR § 146.12)

F. The required volume to fill the annular space must be calculated from the open-hole caliper logs plus 20% excess. 50% excess will be required where the caliper log does not indicate wall contact. Additional cement may be required if geologic conditions or other circumstances require additional volume. It is anticipated that approximately 1,300 sacks of 50/50 Pozmix® cement will be required. [40 CFR § 146.12(b)]

G. The cement properties must be of sufficient minimum weight or compressive strength for well construction and integrity. [40 CFR § 146.12(b)] The cement properties described in the permit application are as follows:

Surface Casing	
Lead Slurry:	Tail Slurry:
50/50 Pozmix® A (or equivalent) with 10 lb/sk gilsonite and 2% $CaCl_2$. Slurry wt. of 13.3 lb/gal yielding 1.50 ft^3/sx with designed coverage from 1300 ft. to surface	Class A Standard. Slurry wt. of 15.6 lb/gal., yielding 1.18 ft^3/sx with designed coverage from 1600 to 1300 ft kb
Longstring Casing	
First Stage:	Second Stage:
Standard cement with 2% KCL and 0.4% Halad® 322. Slurry wt. of 16.2 lb/gal yielding 1.09 ft^3/sx with designed coverage from 5,580 ft bgl to top of stage tool at 3,337 ft bgl	Lead:50/50 Pozmix® (or equivalent) standard. Slurry wt. of 16.2 lb/gal yielding 1.09 ft^3/sx with designed coverage from 2800 ft kb to surface Tail:Premium cement. Slurry wt. 16.2 lb/gal yielding 1.26 ft3/sx with designed coverage from 3357 ft kb to 2800 ft kb

kb=kelly bushing elevation; bgl=below ground level elevation

13. Testing Requirements

Casing pressure tests must be conducted on both the surface and longstring casing at a minimum of 1000 psi for a minimum of 60 minutes with +/- 3% deviation. These results must be submitted with the Completion Report as described in Part I. 17.of this permit. A demonstration of mechanical integrity must also be completed prior to commencing injection in accordance with Part I, No. 14 of this permit. [40 CFR § 146.12(d)]

14. Logging Requirements

At a minimum, the following logs must be completed during drilling activities in accordance with 40 CFR § 146.66:

Surface:	**14 3/4-Inch Open Hole**	**10 3/4-Inch Cased Hole**
	S.P., High Resolution Induction, Gamma Ray, Caliper, Directional	Cement Bond Log/ Temperature Log/ Caliper, Radioactive Tracer, Bottomhole Pressure
Long String:	**9 1/2-Inch Open Hole**	**7-Inch Cased Hole**
	S.P., High Resolution Induction, Spectral Density, Dual Spaced Neutron, Fracture Finder, Gamma Ray, Caliper, Micro Imager and Directional	Cement Bond Log/ Temperature Log/ Caliper, Radioactive Tracer, Bottomhole Pressure

15. Static Water Level Measurement

A. A fluid level or static water level measurement shall be obtained upon completion of the well and prior to injectivity testing to obtain a fluid gradient profile in accordance with 40 CFR § 146.129(e).

B. Static bottom hole pressure and temperature readings shall be obtained following perforation of the injection interval and prior to injectivity testing in accordance with 40 CFR § 146.12(e).

16. Wellbore Deviation

Deviation of the wellbore will not be in excess of three (3) degrees from the vertical. Deviation checks on the hole will be performed at sufficiently frequent intervals to assure that deviation of more than three (3) degrees does not occur and that pathways for fluid migration do not occur. [40 CFR § 146.12 (d)(1)]

COMPLETION REPORT

17. Within ninety (90) days after the new well completion, the Permittee shall submit a Completion Report, signed by a registered professional engineer and/or geologist to the Department, which will include the drilling and completion history of the well and the following: [40 CFR §§ 146.12) and 144.51 (m)]

A. All casing and cementing records, copies of the logs run on the well, complete and accurate record of the depth, thickness and lithology of the penetrated formations and cross sections of the disposal area;

B. Adjusted pressure calculations and fluid front calculations;

C. Results of injectivity tests, formation fluid compatibility tests, core analysis information including porosities, permeabilities, Poisson Ratios, and other formation properties necessary to obtain a detailed analysis of the injection interval, including a discussion of the results;

D. Lithologic descriptions of the whole cores of the proposed injection intervals; and

E. Discussion and analysis of the logs and tests.

F. The Completion Report, upon submittal and approval by the Director, will be considered as a condition of this permit and subject to all provisions of this permit. **Injection shall not commence until written approval of the Completion Report is issued by the Department.** [40 CFR § 144.51 (m)]

OPERATIONAL REQUIREMENTS

18. Reconstruction, Recompletion,or Modification

Any reconstruction, recompletion or modification of the injection facilities shall be done in accordance with the plans and specifications submitted with the permit application and the well completion report. **Any proposed changes to the construction and operation of the wells, prior to implementation, must be submitted in writing to, and approved by, the Department as providing protection equivalent to or greater than the existing construction and operation.**

19. Formations Permitted For Injection

Injection shall be into a formation that is beneath the lowermost formation containing, within ¼ mile of the wellbores of WDW-6S, WDW-7S, and proposed well WDW-8S, an Underground Source of Drinking Water (USDW). Permitted injection shall be confined to the injection interval noted below and as described in Section 4.6.3 of the permit application:

Well	Formation	Depth/Injection Interval
WDW-6S	Hosston	+/- 3850-5400 ft bgl
WDW-7S	Hosston	3863-5400 ft kb
WDW-8S (proposed)	Hosston	3,840-5,400 ft bgl (proposed)

kb=kelly bushing elevation; bgl=below ground level elevation

The actual injection interval depths for WDW-8S will be provided to the Permittee upon submission of the Completion Report as described in Part I, No. 17 and will be incorporated into this permit.

20. Authorization of Specific Injection Intervals

The Permittee shall receive authorization from the Department to inject fluids into the specific injection interval as described in Part I, No. 19 of this permit. **Fluid disposal into permitted injection intervals other than those authorized by the Department in Part IV.C of this permit shall be considered unauthorized injection, a violation under 40 CFR § 144.11 and shall subject the Permittee to possible enforcement action.** Specific intervals for WDW-8S will be approved after the Completion Report is submitted and approved by the Department.

21. Casing and Cementing

The well shall be cased and cemented as necessary to prevent the movement of fluids into or between USDWs, in accordance with 40 CFR § 144.12(a) . The cement and casing used in WDW-6S, WDW-7S, and proposed well WDW-8S shall be designed for the life expectancy and closure period of the well.

22. Waste Stream

A. The Permittee is authorized to inject the waste stream with parameters as described in the permit application and with typical analysis as listed in Part I, No. 33. B.

B. The waste stream shall consist of process wastewater derived from a variety of product manufacturing, handling, waste management and storage operations as a result of bromine and organic and inorganic chemicals production. The sources of the waste streams include the following:

i. Wastes generated during closure of the well and associated facilities that are compatible with permitted wastes, reservoir and the well. This waste stream will occur as a one-time-only waste and the volume of waste generated will be minuscule in comparison to the other wastes injected.

ii. Wastewater having a pH of not less than 3.0 or not greater than 10.0, from the following waste streams (volume of no more than 157,680,000 per year (based on maximum injection rate of 300 gpm) from the following areas/facilities:

a. Bromine/Utilities Area - tail brine and wastewater from utilities operations,
b. FF-680 Facility - process wastewater from production of a brominated organic intermediate and a brominated organic flame retardant,
c. PHT4/PHT4 Diol and NaBr Facility - process wastewater from production of PHT4 and PHT4 Diol (brominated organic flame retardants) and NaBr (an inorganic salt solution),
d. Semi Works Facility - process wastewater from production of a brominated organic flame retardant,
e. FCU Facility - process wastewater from production of FM-200, TFP, and a variety of “low ozone depleting potential” products,
f. BRU-II & III Facility - wastewater from recovery of elemental bromine from on-site brominated byproduct and residue streams and from stormwater,
g. DBS/PDBS Facility - process wastewater from production of a brominated styrene compound,
h. PCU Unit - production of pharmaceuticals or FM200HP, and
i. Groundwater Monitoring Collection System.

iii. Other associated wastes such as groundwater and rainfall contaminated by the above authorized wastes, spills of the above authorized wastes, wash waters, and solutions used in cleaning and servicing the waste disposal well system equipment which are compatible with the permitted waste streams, reservoir and well materials. This waste stream is non-continuous. The volume of waste generated by this part of the waste stream will be minuscule in comparison to the other wastes injected.

C. The waste stream shall be filtered to at least 40 microns.

D. EPA Publication SW-846 shall be used as guidance in order to accurately obtain an analysis of the waste stream, with acceptable Detection Limits (DL) or Practical Quantitation Limits (PQLs).

E. Wastes not authorized to be stored, processed, disposed, or otherwise handled as stipulated in this permit are not authorized for injection.

23. Operational Requirements

In accordance with 40 CFR § 146.13(a), operating requirements shall specify that the injection pressure at the wellhead shall not exceed a maximum which shall be calculated so as to assure that the pressure in the injection interval during injection does not initiate new fractures or propagate existing fractures within the injection interval.

A. Injection shall be through tubing with packer. Injection between the casing and the wellbore is prohibited.

B. The Permittee shall maintain a fluid-filled annulus. The fluid shall be noncorrosive, or contain a corrosion inhibitor. If nitrogen is used to pressurize the annulus on a routine basis, the permittee shall bleed off the gas in the annulus when appropriate to keep the annulus at a full, fluid-filled volume. **The annulus pressure shall be constantly maintained at a differential of at least 100 psi above the injection pressure unless the well is being worked over or in the process of mechanical integrity testing.** [40 CFR § 146.13 (a)(3)]

C. The Permittee shall operate WDW-6S, WDW-7S, and WDW-8S according to the following projected parameters.

WDW-6S	
Maximum Surface Injection Pressure	1250 psi
Maximum Rate of Injection	300 gpm
pH range	3.0 s.u. to 10.0 s.u
Maximum Daily Disposal Volume	432,000 gpd
Maximum Monthly Disposal Volume	12,960,000 gal/30-day-month
Maximum Monthly Disposal Volume	13,392,000 gal/31-day-month
Maximum Annual Disposal Volume	157,680,000 gallons/year

WDW-7S	
Maximum Surface Injection Pressure	1250 psi
Maximum Rate of Injection	300 gpm
pH range	3.0 s.u. to 10.0 s.u
Maximum Daily Disposal Volume	432,000 gpd
Maximum Monthly Disposal Volume	12,960,000 gal/30-day-month
Maximum Monthly Disposal Volume	13,392,000 gal/31-day-month
Maximum Annual Disposal Volume	157,680,000 gallons/year

WDW-8S (proposed)*	
ProposedMaximum Surface Injection Pressure	1250 psi
Proposed Maximum Rate of Injection	300 gpm
pH range	3.0 s.u. to 10.0 s.u
Proposed Maximum Daily Disposal Volume	432,000 gpd
Proposed Maximum Monthly Disposal Volume	12,960,000 gal/30-day-month
Proposed Maximum Monthly Disposal Volume	13,392,000/31 day-month
Proposed Maximum Annual Disposal Volume	157,680,000 gallons/year

*(WDW-8S parameters are subject to revision contingent upon information in the Completion Report)

24. Instrumentation

In accordance with 40 CFR § 146.13(b)(2), the Permittee shall install and use continuous monitoring devices, and shall install and use automatic alarm systems. Automatic alarm systems shall be designed to sound and shut-in the well when pressures or flow rates exceed permitted operating conditions. The Permittee shall ensure that the wellhead monitoring instrumentation is properly installed and maintained at all times.

25. Measured Parameters

The following parameters shall be measured with the appropriate continuous recording device(s) housed in a weatherproof enclosure at or near the wellhead: [40 CFR § 146.13(b)(2)]

A. Injection tubing pressure, annulus pressure, flow rate, injection volume, temperature of the injected fluids, pH; and

B. Any other parameters as requested by the Department or as specified by this permit.

TESTING REQUIREMENTS

26. Mechanical Integrity Testing

The Permittee shall maintain mechanical integrity of the injection well at all times in accordance with 40 CFR §§ 146.8 and 146.13(b)(3). An injection well has mechanical integrity if there is no leak in the casing, tubing or packer and there is no fluid movement upward out of the injection interval into the designated confining zone or USDWs through any vertical channels adjacent to the well bore.

27. Mechanical Integrity Requirements

Mechanical integrity shall be demonstrated annually and shall follow the requirements for demonstration of mechanical integrity for Class I non-hazardous UIC wells as listed in 40 CFR §§ 146.8 and 146.13(b)(3). The anniversary date of testing shall coincide with the initial date from drilling of the well or an ADEQ-approved date. The annual test requirement may be extended upon approval by the Department for a maximum of 90 days past the anniversary date. All tests shall be completed prior to September 30 of the concurrent federal fiscal year. At any time after the well is shut in for more than 30 continuous days, an annulus test must be performed prior to resumption of injection. The following requirements are necessary to demonstrate mechanical integrity:

A. Annulus Pressure Test:

A yearly annulus pressure test (APT) to be witnessed by the Department or an authorized representative of the Department. An APT shall be conducted after each workover involving tubing removal and/or packer placement, and after each well shut-down in excess of thirty (30) days. [40 CFR § 146.8(a)(1)]

B. Pressure Falloff Test:

A yearly measurement of the pressure buildup in the injection interval, which includes shutting-in the well for a time sufficient to allow the pressure in the injection interval to reach equilibrium; [40 CFR § 146.13(d)]

C. Radioactive Tracer Test:

A radioactive tracer test (RAT) or other mechanical integrity test pursuant to 40 CFR 40 CFR §§ 146.8 and 146.13(b)(3) shall be conducted once every five years for Class I UIC non-hazardous wells to determine the presence or absence of fluid movement behind the well casing.

D. Temperature Log or other test for fluid movement:

The Department reserves the right to require additional logs to be run at least once every five years to test for movement of fluid along the borehole if information becomes available that indicates the need for such a test(s). [40 CFR § 146.8(c)(i)]

E. Casing Inspection Logs:

Casing inspection logs shall be run whenever a workover is conducted in which the injection string is pulled. The Department may require that a casing inspection log be run every five years, if information exists that the integrity of the long string casing of the well may be adversely affected by naturally-occurring or man-made events. [40 CFR § 146.13(c)(iii)]

F. Any other appropriate test, after approval by the Department, may be used by the Permittee to evaluate mechanical integrity. [40 CFR § 146.13(c)(ii)]

The Department may require tests (a), (b), (c), or (e) above whenever the wells are worked over, the tubing is removed, the packer is replaced, or if any information received by the Department indicates such tests may be warranted. The Permittee shall notify the Department and obtain approval prior to conducting any workover. [40 CFR § 146.13(c)(iii)]

The Permittee shall submit results of any of the above tests, including an interpretive analysis of each test, to the Department within sixty (60) days of the date of completion of the tests. [40 CFR § 146.54]

The Department reserves the right to require changes or adjustments in testing parameters if deemed necessary in order to demonstrate mechanical integrity. [40 CFR § 146.12(c)(i)]

28. Loss of Mechanical Integrity

A. If a loss of mechanical integrity occurs, during testing or during well operations, the Permittee shall do the following:[40 CFR §§ 144.55 (b) and 146.7]

i. Cease injection immediately;
ii. Take all steps necessary to determine if a release of waste into any unauthorized zones occurred;
iii. Notify the Department within 24 hours after the loss of integrity was discovered and when injection is expected to resume;
iv. Restore and demonstrate mechanical integrity to the satisfaction of the Director prior to resuming injection, and
v. Obtain approval from the Department prior to any workover.

B. In accordance with Part I, 30. C. of this permit, if there is evidence of a release of waste into an unauthorized zone, the Permittee shall:

i. Immediately cease injection of fluids;
ii. Notify the Department within 24 hours after discovery;
iii. Take all necessary steps to characterize the extent of the release;
iv. Comply with and implement the remediation plan required by the Department;
v. Where such a release is into a USDW, serving as a water supply, publish a notice into a newspaper of general circulation; and
vi. Where such a release is into a USDW, conduct ground water monitoring, as described in Part I.34. [40 CFR § 146.13 (d)]

The Department may allow the Permittee to resume injection prior to completing the remediation action, provided that the Permittee is able to demonstrate that the injection operation will not endanger any USDWs. [40 CFR § 146.13]

MONITORING AND REPORTING

29. Monthly Reporting Requirements

The Permittee shall compile Monthly Reports containing the following information:

A. Results of continuous monitoring, including:

i. The monthly maximum, minimum, and average injection pressure;
ii. The monthly maximum, minimum, and average injection flow rate;
iii. The total injection volume for the month;
iv. The maximum, minimum, and average annulus pressure for the month;
v. The maximum, minimum, and average pH of the injected waste stream for the month;
vi. The maximum, minimum, and average temperatures of the injected waste stream for the month; and
vii. The maximum, minimum, and average daily specific gravity measurements.

B. The Monthly Reports shall be submitted as part of the quarterly reports to the Department. [40 CFR § 146.13 (c)]

30. Quarterly Reporting Requirements

A. The Permittee shall submit Quarterly Reports to the Department, within 20 days after the end of each quarter, as described in 40 CFR §§ 146.13(c) and 146.69. These Quarterly Reports shall contain the following information:

i. The Monthly Reports specified in Part I. 29. of this permit;
ii. Documentation of all noncompliance incidents or exceedances of operating parameters, violations, excursions, equipment malfunctions or events triggering an alarm or shut-down device, workovers, well testing, well stimulations and any other pertinent information concerning well operations during the quarter; and,
iii. The Permittee shall analyze the injected waste stream at a frequency approved by the Department and submit the results with a report of the same frequency, i.e. quarterly analyses will be reported in quarterly reports. This analysis shall include the physical, chemical and other relevant characteristics of the injection fluids in accordance with the Waste Analysis Plan (WAP) as described in Part I. 33. of this permit. The Department reserves the right, at its discretion, to require the permittee to implement more frequent testing in the event information indicates changes in the waste stream.

B. These reports may be submitted in a hard copy, electronically via e-mail, or on a CD or similar recording media. With any of these methods, the cover letter and signature pages with original signatures and professional seals shall be scanned for compliance with the signatory requirements of Part II. 24. of this permit.

C. Any noncompliance incident, exceedance, or other violation as described in Part II. 13. of the permit shall be reported within twenty-four (24) hours and include the information required in Part II 13. B. of this permit.

31. Annual Reporting Requirements

The Permittee shall submit an Annual Report, due by March 1st of the following calendar year, to the Department that contains the following information [40 CFR §§ 144.54 (c), 146.13(c), and 146.69]:

A. Results of continuous monitoring, including:

i. The maximum, minimum, and yearly average of the injection pressure;
ii. The maximum, minimum, and yearly average of the injection flow rate;
iii. The maximum, minimum, and yearly average annulus pressure;
iv. The maximum, minimum, and yearly average for the pH of the injected waste stream; and
v. The total injection volume for the year and for the total lifetime injection volume for each well.

B. Documentation of all noncompliance incidents, violations, excursions, equipment malfunctions, and/or any other pertinent information concerning well operations;

C. A narrative covering all aspects of well operations for the year, including discussions of, and reasons for, any excursions from permitted operational parameters, any violations, and actions taken to correct the violations;

D. Discussion of any tests done to ensure the mechanical integrity of the well during the year, including the dates and times of those tests and certification by the Permittee that the wells have demonstrated mechanical integrity;

E. The results and dates of any other tests performed on the well such as workovers or acid stimulations;

F. A direct measurement of bottom-hole pressure or a calculation of bottom-hole pressure using the specific gravity of the fluid in the well and the static fluid level, discussion of pressure effects of disposal operations upon the injection intervals and specific injection intervals, and a calculation of pressure build-up within the injection intervals;

G. An estimation of the distance from the well to the front of the injected fluids;

H. To the extent such information is reasonably available, the report shall also include:

i. Locations of newly constructed and discovered wells within the zone of endangering influence or cone of influence;
ii. Data for all newly constructed and discovered wells that penetrate, or penetrate to within, 300 feet of the top of the injection intervals that are located within a one-half (½) mile radius of WDW-6S, WDW-7S, and WDW-8S (once constructed and operating);

I. Results of corrosion monitoring, as specified in Part I. 32 of this permit (if applicable);

J. Results of the waste stream analysis as described in Part I. 33. of this permit; and

K. Monitoring data as described in Part I. 34. of this permit.

L. These reports may be submitted in a hard copy, electronically via e-mail, or on a CD or similar recording media. With any of these methods, the cover letter and signature pages with original signatures and professional seals shall be scanned for compliance with the signatory requirements of Part II. 24. of this permit.

32. Corrosion Monitoring

Upon wellhead leak, annulus failure, casing leak, or other mechanical integrity failure that causes or has the potential to cause the well construction materials to fail, the Permittee shall prepare and submit to the Department a plan for corrosion monitoring of the well materials. The monitoring program shall consist of the following:

A. The Permittee shall demonstrate that the waste stream will be compatible with the well materials in which it will be in contact and shall submit the methodology used in making that determination to the Department in accordance with 40 CFR §146.68(c)(2). For purposes of this requirement, compatibility is established if contact with the waste fluids will not cause the well materials to fail to satisfy any design requirement imposed under 40 CFR §146.65(b).

B. The Permittee shall be required to initiate continuous corrosion monitoring of the construction materials used in the wells. Such a test may include the following:

i. Placing coupons of well construction materials in contact with the waste stream;
ii. Routing the waste stream through a loop of well construction materials; or
iii. Using an alternative method approved by the Department.

C. The Permittee shall monitor the materials for loss of mass and thickness, cracking, pitting or any other signs of corrosion on a quarterly basis to ensure the well components meet the minimum standards set forth in 40 CFR § 146.65(b). Results of corrosion monitoring shall be submitted to the Department with the Annual Reports, as described in Part I. Condition 34. of this permit.

33. Waste Fluid Analysis

Records of monitoring information shall include the location, time of sampling or measurements, the individual(s) who performed the sampling or measurements, the date(s) analyses were performed, the analytical techniques or methods used, the results of such analyses, and any other information required by the Department, in accordance with the approved Waste Analysis Plan (WAP) and 40 CFR § 146.13(b)(1).

A. Waste Analysis Plan

The Permittee shall monitor the injected waste stream on a annual basis, in accordance with a Plan that describes the procedures and methods used to obtain a representative result of the waste stream. The Plan shall be submitted to the Department for approval prior to implementation. The plan should include, at a minimum:

i. The parameters used to analyze the waste and reason for selecting these parameters; and
ii. The test methods used for these parameters;
iii. The sampling method used to obtain a representative sample; and
iv. The location where the sample is to be taken.
v. A waiver of quarterly analysis may be submitted to and approved by the Department. In order to obtain this waiver, the Permittee must demonstrate a consistent waste stream for two (2) years. At the end of one year and based upon the analytical results and facility processes, the permittee may request a revision of quarterly sampling to annual sampling.
vi. The Permittee shall conduct sampling on the waste stream when a process change occurs at the plant that could result in the waste stream being altered. The Permittee shall ensure that the WAP remains current and accurate, and shall make updates or changes when the Department requires modification to keep the analysis representative of the waste stream.

B. The following table is a description of the physical and chemical characteristics of the waste stream.

Constituent	**Concentration in weight %**
Water	99.58
Amine Organics	0.009
Sodium Chloride	0.394
Sodium Fluoride	0.003
Calcium Chloride	0.002
Magnesium Chloride	0.002
Silicon	0.006
Sodium Sulfate	0.002
Sodium Phosphate	0.007
Ethylenediaminetetraacetic Acid (EDTA)	Trace

Characteristics Of The Final Effluent	
Temperature	0 °F to 104 °F
Color	None
Turbidity	>10 JCU (Jackson Candle Units)
Taste and Odor	None
Solids, Floating Material, and Deposits	Trace
Oil and Grease	None
pH	6-9 s.u.
Dissolved Oxygen	>2 mg/L
Radioactivity	None
Bacteria	None
Toxic Substances	None
Mineral Quality (Chloride, Sulfate, Total Dissolved Solids)	3,987 mg/L
Nutrients	Trace
Biological Oxygen Demand (BOD)	120 mg/L
Theoretical Oxygen Demand (OD)	238 mg/L
Total Organic Carbon (TOC)	68 mg/L

Source: GLCC, 1991

INJECTION FLUID ANALYSES (continued)			
Parameters	**Lab Method**	**December 2015 Analysis (mg/L)***	**December 2016 Analysis (mg/L)***
Ammonia as N	SM 4500	470	320
Barium	3010A, 6010C	0.046	0.023
Chromium	3010A, 6010C	0.045	0.036
Zinc	3010A, 6010C	0.18	0.25
Bromide	9056A	2,900	940
Chloride	9056A	2,700	450
Sulfate	9056A	3,000	2,200
Methanol	8015C	9.0	<0.50
n-Butyl Alcohol	8015C	<0.50	<0.50
tert-Butyl Alcohol	8015C	<0.50	<0.50
Triethylamine	8015C	<10	<10
Volatile Organics			
1,2-Dibromoethane	5030C, 8260C	0.0098	ND
1,2-Dichloroethane	5030C, 8260C	ND	0.051
1,1-Dichloroethene	5030C, 8260C	ND	ND
Benzene	5030C, 8260C	ND	ND
Bromoform	5030C, 8260C	0.048	0.034
Bromomethane	5030C, 8260C	ND	ND
Dibromomethane	5030C, 8260C	0.0061	0.0094
Chlorobenzene	5030C, 8260C	ND	ND
Chloroform	5030C, 8260C	ND	ND
Methylene Chloride	5030C, 8260C	0.0097	0.023
Styrene	5030C, 8260C	0.120	ND
Toluene	5030C, 8260C	0.038	0.019
Tetrachloroethene	5030C, 8260C	ND	ND
Trichloroethene	5030C, 8260C	ND	ND
Base/Neutral and Acid Compounds			
Benzoic Acid	3510C, 8270D	3.000	0.110
Benzyl Alcohol	3510C, 8270D	0.0076	ND
1,4-Dichlorobenzene	3510C, 8270D	ND	ND
2,4-Dinitrotoluene	3510C, 8270D	ND	ND
Hexachlorethane	3510C, 8270D	ND	ND
Hexachlorobenzene	3510C, 8270D	ND	ND
Hexachlorobutadiene	3510C, 8270D	ND	ND
Nitrobenzene	3510C, 8270D	ND	ND
Pentachlorophenol	3510C, 8270D	ND	ND
Phenol	3510C, 8270D	0.0039	0.0093
2,4,5-Trichlorophenol	3510C, 8270D	ND	ND
2,4,6-Trichlorophenol	3510C, 8270D	ND	ND

Note: ND = not detected

34. Ground Water Monitoring Program

Upon annulus failure, casing leak, or other mechanical integrity failure that causes or may have caused a release into or between a USDW, the Permittee shall immediately cease injection and shall not resume injection until approved in writing by the Department. Prior to the resumption of injection, the Permittee shall prepare a plan for monitoring of the ground water quality in the USDW. Ground water monitoring shall be required in order to assure that injected fluids are not moving into or between any USDWs as described in 40 CFR § 146.13(b)(4). The monitoring program shall consist of the following:

A. Appropriate sampling frequency, as determined by the Department;

B. Monitoring parameters shall consist of the same program for waste stream analysis as described in the Waste Analysis Plan in Part I.33. A. of this permit;

C. Newly installed monitor wells or nearby water supply wells constructed at appropriate depths may be used for this purpose; and

D. Other conditions as may be required by the Department.

CLOSURE

WDW-6S, WDW-7S, and WDW-8S shall be plugged in a manner which shall prohibit the movement of fluids into or between USDWs in accordance with 40 CFR §§ 144.51(o) and 146.10. The Permittee shall prepare, maintain and comply with the Closure Plan (plugging and abandonment plan) as submitted with the permit application. The Closure Plan shall be a condition of this permit. The obligation to implement the Closure Plan survives the termination of the permit or cessation of injection activities.

35. Final Abandonment

Upon final abandonment, the Permittee shall ensure that WDW-6S, WDW-7S and WDW-8S are plugged in accordance with the approved Closure Plan submitted with the permit application and approved by the Department. [40 CFR § 146.10]

36. Changes to the Plugging and Abandonment Plan

The Permittee shall submit to the Department any modifications to the Closure Plan and must demonstrate that the changes will provide protection equivalent to or greater than the original design criteria and standards. Any change to a Closure Plan shall be treated as a minor modification of the permit in accordance with 40 CFR § 144.41(g) and must be approved by the Department.

37. Closure Plan

The Closure Plan shall include the following [40 CFR § 146.10]:

A. Cementing plan, including stages of cement circulation and methods;

B. Elevations of cement plugs;

C. Type and quantity of cement and other materials to be used for plugging;

D. Proposed tests or other measures;

E. Amount, size and location of casing to remain in the well;

F. Procedure to be used to meet the requirements of Part I. 40.of this permit;

G. Estimated cost of closure; and

H. Other information as required by the Department.

38. Temporary Halt of Injection

A. The Permittee may temporarily cease injection into WDW-6S, WDW-7S, and/or WDW-8S provided the Permittee has received authorization from the Department and has described the actions or procedures taken to ensure that WDW-6S, WDW-7S, and/or WDW-8S 7 will not endanger USDWs during the temporary period of disuse. The Permittee shall also comply with the terms and conditions of this permit during that period of disuse.

B. An APT shall be conducted after each well shut-down in excess of thirty (30) days.

C. If WDW-6S, WDW-7S or WDW-8S has ceased operations for more than two (2) years, the Permittee shall notify the Department prior to resuming injection activities and shall be required to perform a demonstration of mechanical integrity as described in Part I.27. of this permit. The Permittee shall be required to implement the Closure Plan as described in Part I. 37. of this permit at the end of the two (2) years unless granted approval by the Department to postpone the well closure. [40 CFR § 144.52 (a)(6a)]

39. Notice of Intent to Close

The Permittee shall notify the Department sixty (60) days prior to commencement of closure. The Permittee shall give notification of the intent to plug at least seventy-two (72) hours prior to the commencement of actual plugging operations. [40 CFR §§ 144.51 (n) and 146.10]

40. Standards for Well Closure

A. The mechanical integrity of the well shall be verified prior to plugging according the methods described in Part I. 37. of this permit and must be approved by the Department prior to commencing closure activities.

B. The pressure decay shall be observed and recorded for a time approved by the Department.

C. The well shall be flushed with a buffer fluid as approved by the Department.

D. The well shall be plugged with cement in a manner that will not allow the movement of fluids into or between USDWs by circulating from total depth to surface. The cement must be tagged and pressure tested in a manner approved by the Department before closure is finalized. [40 CFR § 146.10 (a)]

41. Closure Report

Within 60 days after closure, the Permittee shall submit a Closure Report detailing the plugging and abandonment procedures. The report shall be signed and stamped or sealed and certified as accurate by the Arkansas Registered Professional Engineer in good standing and/or the Arkansas Registered Professional Geologist in good standing who supervised the work performed for the closure operation and must consist of a statement that the well was closed in accordance with the plugging and abandonment plan previously submitted and approved, or when the actual closure differed from the plan, a statement specifying the differences between the plan and the actual closure activities. [40 CFR § 146.10] The report shall include the following, at a minimum:

A. Pressure in the injection interval prior to injection activities;

B. Measured bottom hole pressure in the injection interval at the time of closure;

C. Predicted position of the waste fluid front at the time of closure;

D. Discussion of the verification of mechanical integrity; and

E. Other information as required by the Department.

42. Post-Closure Care

The Permittee shall prepare, maintain and comply with a plan for post-closure care if corrective action as described in Part I. 28. of this permit is required. The obligation to implement the post-closure plan survives the termination, or cessation of injection activities. The plan shall be submitted to the Department with the Notice of Intent to Close, and shall become a condition of this permit upon approval by the Department. Any revision or modification to the post-closure care plan must be submitted to and approved by the Department prior to the submission of the closure report as specified in Part I. 41. of this permit. The Permittee shall also assure financial responsibility in accordance with Part I. 46. of this permit. The plan shall include the following:

A. Status of any corrective action required in accordance with Part I.46. of this permit;

B. Estimated cost of the proposed post-closure care;

C. Submission of a survey plat to the local zoning authority and the Department which indicates the location of WDW-6S, WDW-7S, and WDW-8S relative to permanently surveyed benchmarks;

D. Notification to the Arkansas Oil and Gas Commission or other agencies that have authority over other drilling activities to enable such agency or agencies to impose conditions over such drilling activities that may penetrate WDW-6S, WDW-7S, or WDW-8S injection or confining zones;

E. Retain all records in perpetuity following closure;

F. Record a deed notation or some other instrument that will provide any potential purchaser the information that the location has been used to manage non-hazardous waste fluids; and

G. Other information as required by the Department.

FINANCIAL ASSURANCE

The Permittee shall establish financial assurance for the plugging and abandonment of WDW-6S, WDW-7S, and WDW-8S through the mechanisms described in 40 CFR § 144.52(a)(7).

44. Cost Estimate

A. The Permittee must prepare a written cost estimate, in current dollars, of the cost of plugging and abandoning WDW-6S, WDW-7S, and WDW-8S in accordance with the plugging and abandonment plan as specified in Part I. 17. of this permit. The plugging and abandonment cost estimate must equal the cost of plugging and abandonment at the point in the facility's operating life when the extent and manner of its operation would make plugging and abandonment the most expensive, as indicated by the plugging and abandonment plan.

B. The Permittee must adjust the plugging and abandonment cost estimate for inflation within 30 days after each anniversary date on which the first plugging and abandonment cost estimate was prepared. The adjustment must be made in accordance with the requirements of 40 CFR § 144.62(b). The Permittee must also revise the plugging and abandonment cost estimate whenever a change in the plugging and abandonment plan increases the cost of the plugging and abandonment activities.

45. Options for Financial Assurance

The Permittee must establish financial assurance through the mechanisms described in 40 CFR §§ 144.63(c), 144.63(d) and 144.63(f).

A. Surety Bond

The Permittee shall submit a surety bond guaranteeing performance of plugging and abandonment to the Department Director in accordance with 40 CFR § 144.63(c)(1). Three (3) original signed copies shall be submitted. The bond shall be effective prior to the Department Director granting written approval for injection to commence. The surety company must be among those listed as acceptable sureties on the Federal bonds in Circular 570 of the U.S. Department of Treasury. The Department will supply the necessary copies to the Permittee for signature that follows the wording described in 40 CFR § 144.70(c).

B. Plugging and Abandonment Letter of Credit

The Permittee shall submit a letter of credit guaranteeing an amount at least equal to the current plugging and abandonment cost estimate as described in 40 CFR § 144.63(d) and follows the wording described in 40 CFR § 144.70(d). A standby trust fund shall also be established, in accordance with 40 CFR 144.63(d)(3).

C. Financial Test and Corporate Guarantee

The Permittee shall pass a financial test and meet the criteria of 40 CFR §§ 144.63(f)(1)(i) or (f)(1)(ii). If the Permittee meets these criteria, the Permittee shall submit a letter to the Department Director which is signed by the Permittee's chief financial operator and worded as specified in 40 CFR § 144.70(f) and to include the items required by 40 CFR § 144.63(f). The Permittee shall submit updated information within 90 days after the close of each succeeding fiscal year.

D. The Permittee shall secure and maintain in full force and effect at all times a financial assurance mechanism, in a form acceptable to the Department, to provide for the proper closure, plugging and abandonment of WDW-6S, WDW-7S, and WDW-8S in the amounts set forth below. This permit does not authorize underground injection of fluids unless the Permittee has in effect an acceptable financial assurance mechanism acceptable to the Department.

E. The Permittee submitted Irrevocable Letters of Credit/Standby Trusts (letter of credit number 608936041) dated March 31, 2006 in accordance with Part I. 44. of this permit for the following amounts: An updated Closure cost estimate was submitted to the Department on July 31, 2017, which listed the following amounts for the UIC Financial Assurance:

Well	Financial Assurance Amount
WDW-6S	$229,300.00
WDW-7S	$213,400.00
WDW-8S (proposed)	To be determined

F. The Permittee shall secure and maintain in full force and effect at all times a financial assurance mechanism, in a form acceptable to the Department, to provide for the proper closure, plugging and abandonment of WDW-8S, once it has been constructed. This permit does not authorize any injection of fluids into WDW-8S unless the Permittee has submitted an in effect acceptable financial assurance mechanism acceptable to the Department. [40 CFR § 144.63 (d)]

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. [40 CFR § 144.51 (a)]

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: [40 CFR §§ 144.51, 144.39, 144.40, 144.41]

   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) Regulation No. 9 (Permit fees).

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 regulations 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 regulation. [40 CFR § 144.51(g)]

7. Property Rights

The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any exclusive privileges, 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 regulations.

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 no-discharge permits as described in APC&EC Regulation No. 9 (Regulation for the Fee System for Environmental Permits). Failure to promptly remit all required fees shall be grounds for the Director to initiate action to terminate this permit the provisions of APCEC Regulation No. 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) which 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 which 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 disposed of in a 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 Department immediately. Any leaks or seeps shall be reported to the Department and appropriately corrected. Any discharge from the fluids storage system such as an overflow, a broken pipe, etc., shall be immediately reported to the Department.

B. The operator shall visually monitor and report immediately (within twenty-four (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:

Arkansas Department of Environmental Quality
Water Division, Enforcement Branch
5301 Northshore Dr.
North Little Rock, Arkansas 72118
Fax (501) 682-0910

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 Department shall be completed by a laboratory certified by ADEQ 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 an ADEQ certified 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. [40 CFR § 144.17]

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 which may result in noncompliance with permit requirements. [40 CFR § 144.51 (k)(2)]

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. [40 CFR § 144.51 (k)(3)]

22. Duty to Provide Information

The permittee shall furnish to the Director, within a reasonable time, any information which 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. [40 CFR § 144.27]

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. [40 CFR § 144.51 (b)]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. [40 CFR §§ 144.32 and 144.51(k)] 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 regulations; 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 Department of Environmental Quality. The name and address of any permit applicant or permittee, permit applications, permits, and waste data 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 regulation.

DEFINITIONS

"ADEQ" means the Department of Environmental Quality.

"Act" means the Arkansas Water and Air Pollution Control Act, as amended, Ark. Code Ann. § 8-4-101 *et seq*.) as amended.

"Applicable water quality standards" means all water quality standards to which a discharge is subject under the federal Clean Water Act and which has been (a) approved or permitted to remain in effect by the Administrator following submission to the Administrator pursuant to Section 303 (a) of the Act, or (b) promulgated by the Director pursuant to Section 303(b) or 303(c) of the Act, and standards promulgated under APC&EC Regulation No. 2, as amended, (Regulation Establishing Water Quality Standards for Surface Waters of the State of Arkansas).

"core" means a cylindrical sample taken from a formation for geological analysis.

"Department" means the Arkansas Department of Environmental Quality (ADEQ).

"Director" means the Director of the Arkansas Department of Environmental Quality.

"APC&EC" means the Arkansas Pollution Control and Ecology Commission.

"**APT**" means Annulus Pressure Test.

"bgs" means below ground surface.

"**bkb**" means below kelly bushing.

"Brine" means salt brines of the Smackover Formation (Oxfordian, Upper Jurassic) in south-central Arkansas. Bromine is present in extremely high concentrations in this brine.

"Debrominated brine" means salt brines that have had the bromine extracted from them. This is also commonly called tail brine.

"casing" means a pipe or tubing of appropriate material, of varying diameter and weight, lowered into a borehole during or after drilling in order to support the sides of the hole and prevent the walls from caving, to prevent loss of drilling mud or fluids into porous ground or to prevent water, gas, or other fluid from entering or leaving the hole.

"cement" means a powder consisting of alumina, silica, lime, and other substances that hardens when mixed with water. Extensively used in the oil industry to bond casing to the walls of the wellbore.

"**CFR**" means Code of Federal Regulations.

"confining" means a geological formation, group of formations, or part of a formation that is capable of limiting fluid movement above an injection interval.

"**DL**" means Detection Limits.

"gpm" means gallons per minute.

"Ground water" means water below the land surface in an aquifer's zone of saturation.

"Halad®-322" is a fluid-loss additive to cement to provide a better cement/casing bond.

"Injection interval" means a geological formation, group of formations, or part of formation receiving fluids through a well. It is part of the injection interval.

"Injection well" means a well into which fluids are being injected.

"Injection zone" means a geological formation, group of formations, or part of formation including the injection interval.

"log" means noun: a systematic recording of data, such as a driller's log, mud log, electrical well log, or radioactivity log. Many different logs are run in wells to discern various characteristics of downhole formation. Also, verb: to record data.

"long string casing" means the string of casing that is set in the injection interval.

"Mechanical integrity" means a condition of injection wells which exists if there is no leakage in the well's casing, tubing, or packer and if there is no fluid movement into an underground source of drinking water through vertical channels adjacent to the well bore.

"**MIT**" means Mechanical Integrity Test.

"packer" means a piece of downhole equipment that consists of a sealing device, a holding or setting device, and an inside passage for fluids.

"perforation" means a hole made in the casing, cement, and formation through which formation fluids enter a wellbore.

"Plugging" means the act or process of stopping the flow of water, oil, or gas into or out of a formation through a borehole or well penetrating that formation by the placement of cement plugs in the wellbore.

"Pozmix®" is a cement additive used in wells to help promote the cement bond.

"**PQL"** means Practical Quantitation Limits.

"**psi**" means pounds per square inch.

"**RAT**" means Radioactive Tracer Test.

"SDWA" means the Safe Drinking Water Act.

"Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in products.

"sk" means sack.

"**s.u.**" means standard units.

"surface casing" means the outer casing cemented in the upper portion of the well bore to protect fresh water formations from contamination.

"sx" means sacks.

"TDS" means total dissolved solids.

"tubing" means a relatively small-diameter pipe that is run into a well to serve as a conduit for the passage of fluids.

"**UIC**" means Underground Injection Control.

"**USDW**" means Underground Source of Drinking Water having less than ten thousand ppm total dissolved solids (TDS).

"**WDW**" means Waste Disposal Well.

"Well" means a borehole drilled, or proposed to be drilled, for the purpose of injecting or removing fluid(s).

MONTHLY: is defined as a calendar month or any portion of a calendar month for monitoring requirement frequency of once/month or more frequently.

QUARTERLY: (1) is defined as a fixed calendar quarter or any part of the fixed calendar quarter for a non-seasonal effluent characteristic with a measurement frequency of once/quarter. Fixed calendar quarters are: January through March, April through June, July through September, and October through December; or (2) is defined as a fixed three (3) month period (or any part of the fixed three month period) of or dependent upon the seasons specified in the permit for a seasonal effluent characteristic with a monitoring requirement frequency of once/quarter that does not does not coincide with the fixed calendar quarter. Seasonal calendar quarters are: May through July, August through October, November through January, and February through April.

SEMI-ANNUAL: is defined as the fixed time periods January through June, and July through December (or any portion thereof) for an effluent characteristic with a measurement frequency of once/six (6) months or twice/year.

ANNUAL or YEARLY: is defined as a fixed calendar year or any portion of the fixed calendar year for an effluent 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 for 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 0010-UR-4 and AFIN (file) number 70-00037.

1. Permitting Authority

Arkansas Department of Environmental Quality
Office of Water Quality, Permits Branch
5301 Northshore Drive
North Little Rock, Arkansas 72118-5317

2. Applicant

Great Lakes Chemical Corporation
2226 Haynesville Highway
P.O. Box 7020
El Dorado, AR 71730

3. Facility Location

The Great Lakes Chemical Corporation South Plant facility is located as follows: approximately 7 miles south of El Dorado on Highway 167, in Union County, at 324 Southfield Cutoff, Union County, Arkansas. The facilities are located at the following coordinates:

WDW-6S	Latitude: 33.1086 North	Longitude: 92.6758° West
WDW-7S	Latitude: 33.1000 North	Longitude: 92.6800° West
WDW-8S (*proposed*)	Latitude: 33.1000 North	Longitude: 92.6800° West

4. Receiving Stream Location

The wells locations are as follows: WDW-6S, 1,452 feet; WDW-7S, 1833 feet; and proposed WDW-8S, 667 feet each from Walker Branch in Stream Segment 2E of the Ouachita River basin which is not listed in the latest ADEQ 303(d) list of impaired waters.

5. Consultants for this Facility

Terry Moody, AR P.G. 1945
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P. O. Box 786
Liberty Hill, TX 78642-0786
Telephone: (512) 795-8183

6. Permit History

A. Permit 0003-U was issued to Great Lakes Chemical Corporation as a No-Discharge UIC permit on April 4, 1985 with an effective date of May 6, 1985 and with an expiration date of May 5, 1995 for the operation and maintenance of three Class I non-hazardous waste disposal wells (WDW-3X, WDW-4, and WDW-5).

B. Permit No. 0010-U was issued to Great Lakes Chemical Corporation as a No-Discharge UIC disposal permit on March 19, 1993 with an expiration date of March 19, 2003 for the operation of three Class I non-hazardous waste disposal wells (WDW-3X, WDW-4, and WDW-5) and for the operation and modification of two Class I non-hazardous waste disposal wells (WDW-4 and WDW-5).

C. Permit No. 0010-UR-1 was issued to Great Lakes Chemical Corporation June 30, 1997 with an expiration date of March 19, 2003 and was a modification to Permit No. 0010-U to authorize the disposal of boiler blowdown from the newly constructed Bromine Recovery Unit III at the South Plant into the existing Class I UIC disposal wells.

D. Permit No. 0010-UR-2 was issued to Great Lakes Chemical Corporation October 17, 1997 with an expiration date of March 19, 2003 and was a modification to authorize disposal of wastewater from the newly constructed 333-Trifluoropropene II Unit at the South Plant.

E. Permit No. 0010-UR-3 was a renewal issued to the Great Lakes Chemical Corporation and was effective September 1, 2007 with an expiration date of August 31, 2017.

7. Permit Activity

Previous Permit No.: 0010-UR-3
Previous AFIN: 70-00037
Effective Date: September 1, 2007
Expiration Date: August 31, 2017

The permittee submitted a permit renewal and modification application on March 1, 2017, with additional informtion submitted May 9, 2017. It is proposed that the current water No-Discharge permit be reissued for a ten-year term. The modifications in this permit are as follows:

A. Great Lakes Chemical Corporation was acquired by LanXESS on May 1, 2017.

B. The inclusion of information to drill a non-hazardous Class I UIC disposal well (WDW-8S).

C. Changes in the Waste Analysis Plan to reflect changes in the chemical composition of the injectate due to changes in the plant processing units. The previous pH range was 5.4 s.u. to 9.1 s.u. The new pH range is 3.0 s.u. to 10.0 s.u. The updated Waste Analysis Plan was approved by the Department on June 13, 2017.

D. The inclusion of information pertaining to active Class I UIC non-hazardous disposal well WDW-6S, which was installed in 2010 and began injection on August 19, 2010.

E. The removal of conditions pertaining to previously permitted Class I UIC non-hazardous disposal well WDW-5, which was plugged and abandoned on April 4, 2014.

F. The change of previous permit 0010-UR-3 Condition III.C.5.(c) regarding a possible waiver of quarterly analysis of the waste stream after demonstrating consistent waste stream chemistry to reflect condition 40 CFR §144.28 (g) (1)(i) to require the permittee to analyze the nature of the injected fluids with sufficient frequency to yield data representative of their characteristics. The permittee was given permission to submit waste stream analysis results annually unless information becomes available to indicate a more frequent sampling and analysis protocol is required.

G. The change of previous permit 0010-UR-3 Condition III. A. 6. (b) from requiring the annulus pressure to be maintained at a minimum of 100 psi to requiring the annulus pressure to be maintained at positive annulus pressure of at least a 100 psi differential above the injection pressure unless the well is being tested or worked over.

H. The change of previous permit 0010-UR-3 Condition III. B. 1. (d) from requiring a temperature, noise, or other approved log being required every five years unless waived by ADEQ to requiring a Differential Temperature Survey at the discretion of the ADEQ.

I. The Financial Assurance dated March, 2006 was Irrevocable Letter of Credit No. 608936041 and Associated Standby Trust for the amount of $946,000.00. The 2006 Letter of Credit was cashed in March 31, 2006 and placed in an ADEQ-controlled trust fund. Information regarding the Financial Assurance for Plugging and Abandoning the UIC wells submitted in the application was updated from 2006 closure estimates to reflect updated projected closure costs in 2017 dollars July 31,

2017. The amount needed for closure of WDW-6S and WDW-7S is $442,700.00. Currently the value of the Trust Fund (including Corrective Action Financial Assurance for Hazardous Waste permitted facilities) is $12,901,265.73.

Legal Order Review:

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

Site Visits/Inspections:

An inspection for this facility was conducted on October 10, 2017. No violations were noted at the time of inspection.

8. Applicant Activity

Under the standard industrial classification (SIC) codes 2819 and 2869, Industrial Organic Chemicals, Not Elsewhere Classified, the applicant activities are the operation of UIC Class I non-hazardous disposal wells associated with a bromine recovery and brine management and pretreatment system.

9. Basis For Permit Conditions

The Arkansas Department of Environmental Quality has made a tentative 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 regulations pursuant to the Arkansas Water and Air Pollution Control Act (Ark. Code Ann. 8-4-101 *et seq.* and A.C.A. Sec. 8-4-201 *et seq*.) Standard Conditions have been included in this permit based on the sources listed below and 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*.).

10. Point of Contact

The following staff contributed to the preparation of this permit:

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Technical review:

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11. Sources

The following Sources were used to draft the permit:

A. Code of Federal Regulation, Title 40, §§ 144, 145, 146, 147, and 148.

B. The Safe Drinking Water Act, 1974

C. Arkansas Water and Air Pollution Control Act. (Ark. Code Ann. 8-4-101 *et seq.).*

D. APC&EC Regulation 1, Regulation for the Prevention of Pollution by Salt Water and other Oil Field Wastes Produced by Wells in All Fields or Pools, as amended.

E. APC&EC Regulation No. 2, Water Quality Standards for Surface Waters of the State of Arkansas, as amended.

F. APC&EC Regulation No. 8, Administrative Procedures, as amended.

G. APC&EC Regulation No. 9, Fee System for Environmental Permits, as amended.

H. APC&EC Regulation No. 17, Arkansas Underground Injection Control Code, as amended.

I. US EPA Region 5-UIC Section Regional Guidance 5: Determination of the Mechanical Integrity of Injection Wells, February 2008. https://www.epa.gov/sites/production/files/2015-09/documents/r5-deepwell-guidance5-determation-mechanical-integrity-200802.pdf

J. US EPA Region 5-UIC Section Regional Guidance 8: Preparing a Waste Analysis Plan at Class I Injection Well Facilities, January 21, 1994. https://www.epa.gov/sites/production/files/2015-09/documents/r5-deepwell-guidance8-preparing-waste-analysis-plan-class2-19940121-8pp.pdf

K. US EPA Region 5-UIC Section Regional Guidance 7: Determination of Maximum Injection Pressure for Class I Wells, January 1994. https://www.epa.gov/sites/production/files/2015-09/documents/r5-deepwell-guidance7-determination-maximum-injection-pressure-class1-199401-9pp.pdf

L. ADEQ 303(d) list of impaired waters.

M. USEPA Region 6 Approval of reissuance for an exemption to land disposal restrictions of the Hazardous and Solid Waste Amendments of 1984 to the Resource Conservation and Recovery Act, August 31, 2011.

N. USEPA Publication SW-846-Hazardous Waste Test Methods.

O. Application for Permit No. 0010-UR-4 received March 1, 2017.

P. Waste Analysis Plan received May 9, 2017.

Q. Revision to application received June 8, 2017.

R. Annual Mechanical Integrity Testing (Pressure Fall-off Tests and Annulus Pressure Tests) conducted June 19, 2017 for WDW-6S and June 26, 2017 for WDW-7S.

S. Five-year Radioactive Tracer Surveys conducted June 6, 2013 for WDW-7S and July 2, 2015 for WDW-6S.

T. July 17, 2017 email from Adriane Rogers, Environmental Manager, Great Lakes Chemical Corporation, regarding maintaining the Great Lakes Chemical Corporation nomenclature on all permits.

U. July 31, 2017 email from Ryan Hoyler, Senior Paralegal, LanXESS Solutions US Inc., including updated well closure cost estimates.

V. ADEQ field inspection conducted October 10, 2017.