February 14, 2018

Prairie State Generating Company, LLC
Attn: Randy Short, Chief Operating Officer
3872 County Highway 12
Marissa, Illinois 62257

RE: 1898995007 - Washington County
     Prairie State Energy Campus
     UIC Log No. UIC-213
     UIC Admin Record
     Draft Permit

Dear Mr. Short:

Enclosed is a Draft Underground Injection Control (UIC) permit for two non-hazardous waste Class I UIC wells for the above referenced facility. This draft permit is based on the administrative record contained in the Illinois EPA’s files. The contents of the administrative record are described in 35 Illinois Administrative Code (I.A.C.) Section 705.144. This draft permit was developed in response to your initial UIC permit application, dated May 16, 2016 and received by the Illinois EPA on May 20, 2016. Additional information and revisions to the application submitted after the initial application are identified in Attachment A of the attached draft permit.

Under the provisions of 35 Ill. Adm. Code 705.141(d), the draft permit and administrative record must be publicly noticed and made available for public comment. The application, draft permit and fact sheet are available locally at the Marissa Area Public Library at 212 North Main Street in Marissa, Illinois. The public comment permit will begin on February 14, 2018 and close on March 16, 2018. Any interested party may request a public hearing and one will be held if deemed necessary by the Illinois EPA. Please note that if a public hearing is held, it will be necessary to provide public notice of the hearing at least forty-five days prior to the date of the hearing and the comment period will be extended for up to thirty days after the public hearing.

During the comment period, the applicant or any interested party may submit comments to the Illinois EPA on the draft permit. Comments on the draft permit may be submitted to:

Rachel Stewart
Illinois Environmental Protection Agency
Office of Community Relations (#5)
1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62704-9276
217/778-2224
At the close of the comment period, the Illinois EPA will prepare a written response to significant comments and provide a copy of this response to all interested parties. The Illinois EPA will consider these comments and will issue a final permit after the close of the public comment period unless the Illinois EPA decides to reverse the tentative decision. The appeal process and limitations on the Illinois EPA’s final decisions on UIC permits are addressed in 35 Ill. Adm. Code 705.212.

If the Illinois EPA issues a final permit, Prairie State Generating Company will be allowed to construct two Class I non-hazardous waste underground injection wells, identified as well WWDW #1 and well WWDW #2, at Prairie State Generating Company’s facility located at 1739 New Marigold Road, approximately 6.5 miles northeast of the city of Marissa, Illinois. The wells will be constructed within the boundaries identified in the Area Permit Boundary Map located in Attachment C of the permit. Class I non-hazardous disposal wells inject non-hazardous fluids beneath the lowermost underground source of drinking water. The injection wells will dispose of leachate generated at the facility’s Nearfield Coal Combustion Residual (CCR) Landfill.

Authorization to begin injection or operation of an injection well will not be issued prior to the submittal and approval by the Illinois EPA of a Well Completion Report and other information as required under this permit. In addition, the Illinois EPA will conduct site inspections and witness certain tests that are conducted on the wells prior to the issuance of any authorization to begin injection of wastewater.

If you have any questions regarding the geological and hydrogeologic aspects of this permit, please contact Amy Boley at 217/558-4716. Questions regarding other aspects of this permit should be directed to Kevin Lesko at 217/524-3271.

Sincerely,

Theodore J. Dragovich, P.E. Manager
Permit Section
Division of Land Pollution Control
Bureau of Land

Attachment: Fact Sheet
DRAFT Underground Injection Control Area Permit

cc: John Schmale, Coal Combustion Residual Engineer – Prairie State Generating
James Andrew, Director, Environmental Services – Prairie State Generating
Stephanie Hill – SCS Engineers
Monte Markley – SCS Engineers
Floyd Cotter, P.E. – SCS Engineers
Chad Milligan, LPG – SCS Engineers
FACT SHEET

DRAFT CLASS I NON-HAZARDOUS UNDERGROUND INJECTION CONTROL WELL PERMIT

1898995007 - WASHINGTON COUNTY
PRAIRIE STATE ENERGY CAMPUS
PERMIT NO. UIC-018-PSG
UIC LOG NO. UIC-213

This fact sheet has been prepared pursuant to the requirements of Title 35 Illinois Administrative Code (35 Ill. Adm. Code) Section 705.143. This fact sheet is intended to be a brief summary of the principal facts and significant factual, legal, methodological, and policy questions considered in preparing a draft Class I Underground Injection Control (UIC) Area permit for two non-hazardous waste Class I UIC wells at the Prairie State Generating Company, LLC (PSG) located near Marissa, Illinois.

Pursuant to 35 Ill. Adm. Code 705.143(a), this fact sheet is sent to the applicant, the information repository, and to any other person who requests it.

I. INTRODUCTION

Prairie State Generating Company, LLC operates a 1600-megawatt power plant utilizing coal from its adjacent underground mine. The facility located at 1739 New Marigold Road, Marissa, Illinois, approximately 6.5 miles to the northeast of Marissa. PSG has applied for an Underground Injection Control (UIC) Area permit which if granted would allow for the construction of two Class I non-hazardous waste injection wells at the facility within the Area Permit Boundary identified in Attachment 1 of this fact sheet. Class I non-hazardous disposal wells inject non-hazardous fluids beneath the lowermost underground source of drinking water. In this case, the wells will be used to dispose of non-hazardous leachate collected from the facility's Near Field Coal Combustion Residual (CCR) Landfill. The leachate wastewaters will be injected into the St. Peter Sandstone formation which is located approximately 3,440 feet below the ground surface.

II. INJECTION FLUID

If following construction, authorization for operation of the injection wells is granted, the wells will be used to dispose of non-hazardous leachate collected from the facility's CCR landfill. The primary component of the leachate is rain water falling on the landfill and infiltrating through the waste before collecting in various leachate sumps. A secondary component contributing to the leachate is produced by the facility's sulfur dioxide (SO₂) absorber system. The SO₂ absorber system is an air quality control system designed to help remove sulfur oxides from the flue gas exhaust of the power plant. This system produces dewatered gypsum which is sent to the CCR landfill and process water collected during the dewatering of the gypsum. A portion of the process water is recycled back into the SO₂
absorber system, in addition to being used to condition fly ash prior to transport to the landfill. The process water is also used for dust control at the landfill cell. Any excess process water from the system is sent to the CCR landfill. The injection wells will dispose wastewater pumped from the North Leachate Pond which receives wastewater from the landfill leachate sumps.

The facility expects to dispose of an average of 144,000 gallons per day (gpd) at each well, and a maximum of 576,000 gpd per well. This water is high in total dissolved solids (TDS) averaging 15,962 milligrams per liter (mg/L) of dissolved solids. However, the water present in the St. Peter Sandstone formation is expected to have a TDS of 53,000 mg/L.

III. UNDERGROUND INJECTION CONTROL WELL CONSTRUCTION

The following is a brief overview of the construction of the proposed injection wells. Attachment 2 to this fact sheet contains a diagram of the proposed injection wells. Class I injection wells are designed with multiple casings (large diameter steel pipes) nested vertically inside of each other and cemented into place as the well is built to assure that fluids do not migrate along the well bore.

The construction of an injection well begins by drilling the wellbore to the depth to which the largest casing (the surface casing) is to be installed. Information is then collected about the existing geology through a process known as logging. Other tests are also performed, including the collection of samples of the rock (cores) at certain levels of particular interests. A set of casing, known as a casing string, is assembled into a continuous pipe as it is lowered into the wellbore. The casing is then cemented in place from the bottom of the casing to ground level. After the cement has hardened, additional logging and testing is performed to evaluate the integrity of the casing and cement.

The wellbore is then deepened and a second casing string (the intermediate casing) is installed using the same process of logging and testing the wellbore, installation of the casing string and additional logging and testing. The diameter of the intermediate casing string is smaller than the diameter of the surface casing string and thus the intermediate casing is located inside the surface casing. Once the second casing string has been installed, a similar process will be used to install a third casing string within the intermediate casing.

The last casing string installed is called the longstring casing. The longstring casing is installed from the surface to depth below the confining layer and continues to a point below the zone into which waste will be injected. The confining layer is a geologic formation that prevents the injected fluid from migrating upwards into Underground Source of Drinking Water (USDW). The casing is then cemented from the bottom of the well to the surface. After the longstring casing is cemented in place, perforations or holes are created in the casing over the vertical thickness of the injection zone. These perforations allow the
wastewater which is pumped down the injection tubing to flow through the perforations and into the injection zone.

The injection tubing is a smaller diameter pipe that conveys the injection fluid from the wellhead down the well into the injection zone. A device called a packer is installed near the bottom length of the injection tube as it is installed into the longstring casing of the well. The packer seals the area between the injection tubing and the longstring casing preventing fluids from migrating up the well between the inside of the longstring casing and outside of the injection tube. The wellhead at the top of the well seals the top of this space. This area above the packer to the wellhead and between longstring casing string and outside of the injection tubing is called the annular space. The annular space of the well is filled with fluid and pressurized. The annular space pressure is continuously monitored in order to detect any leaks that might occur in the longstring casing or the injection tubing.

IV. INJECTION WELL INTEGRITY MONITORING REQUIREMENTS

During operation of the injection well, PSG will be required to continuously monitor the injection pressure, injection rate, and annular space pressure as well as periodic monitoring of other components of the injection well system. The purpose of this monitoring is two-fold: 1) to ensure the well maintains mechanical integrity during operation; and 2) to ensure the injection operations do not initiate cracks in the injection zone, and do not propagate existing cracks. Should the continuous monitoring system receive readings that are outside of the programed acceptable range for a given parameter, such as injection pressure, the injection well system will be automatically shut down and an alarm will be triggered to notify the operator via a visual alert on a control panel in the facility’s central control room, which is manned by PSG personnel 24 hours a day, 7 days a week. Alerts will also be sent out via text message to appropriate PSG personnel.

In order to ensure the injection well’s mechanical integrity, PSG will be required to perform periodic mechanical integrity testing of the well. PSG will be required to perform an annulus pressure test every year to ensure the integrity of the injection tubing, packer, and casing. PSG will be required to conduct a temperature survey biennially (once every 24 months) to confirm no fluid is moving upward along the outside of the well casing into underground source of drinking water. Temperature surveys can be used to determine the movement of fluid along the exterior well bore by detecting temperature differences between injected fluid, and groundwater present in the adjacent to the injection well.

If the monitoring system or mechanical integrity tests detect changes that may indicate there is a problem with the operation of the well, then the injection well system will be shut down. PSG is required to investigate the problem and determine what action is required to resolve the problem. Any problems with the operation of the well are reported to the Illinois EPA on a monthly basis. If the mechanical integrity of a well is in question, PSG must notify the Illinois EPA within 24 hours and provide a written report within 5 days. PSG must then
perform tests to demonstrate the integrity of the well, and the Illinois EPA must be given the opportunity to witness the testing before a well may be returned to operation.

V. INJECTION ZONE, CONFINING LAYERS AND DRINKING WATER

If this permit is issued and PSG is ultimately authorized to inject wastewater into the injection wells, the wastewater will be injected into the St. Peter Sandstone formation the top of which is located at a depth of approximately 3,400 to 3,600 feet below ground at the facility. Migration of the injection fluid upward towards underground source of drinking water will be prevented by the presence of the overlying Maquoketa geologic formation. The Maquoketa formation is comprised of a low permeability shale the top of which is expected to be present at a depth of approximately 2,550 feet with a thickness of 150 to 200 feet in the vicinity of the facility. A review of available well data from the Illinois State Geological Survey has not identified any production wells (oil, gas or water), injection wells, abandon or dry wells that penetrate the confining layer within 2 1/2 miles of the proposed wells. The low permeability, uniform thickness and lack of artificial penetrations of this confining layer effectively limit the upward movement of any injected wastewater.

The deepest underground source of drinking water at the site is no deeper than 500 feet below the ground surface. Thus, there is approximately 2,000 feet of various geologic formations between the confining zone and the lower most source of drinking water at the site. In addition, the uppermost point of injection is approximately 2,940 feet below the lower most source of drinking water at the site. Finally, the uppermost point of injection is approximately 900 feet below the confining layer.

VI. GROUNDWATER MONITORING REQUIREMENTS

If this permit is granted PSG will be not be required to monitor groundwater as a groundwater monitoring waiver is included within the proposed permit. The waiver is based on multiple factors including: the characteristic of the site geology, design of the injection wells, the lack of artificial penetrations of the Maquoketa confining layer, and the relative locations of the lowermost usable source of drinking water, confining layer and the point of injection.

VII. AUTHORIZATION TO BEGIN INJECTION

If this permit is granted, PSG will be allowed to complete the construction of two injection wells as described in this permit. After PSG has completed construction of a well, including the required testing and collection of information, PSG must prepare a Well Completion Report. This report provides the final construction details for a well; the results from tests conducted on the well; and proposed final operating parameters such as injection pressures and injection rates. The final operating parameters are determined from testing required in the permit that can only be performed after a well has been constructed. These tests include
injection of fluids into the well while monitoring parameters such as pressure and flow over time; measurements of physical samples from the injection and confining zones; and geophysical logging of the well boring. The Well Completion Report will be reviewed by the Illinois EPA to determine if the well can be safely operated. If the review determines that the well can be operated in accordance with the applicable regulations, the Illinois EPA will issue a modified Underground Injection Control permit authorizing PSG to begin injection.

VIII. STRUCTURE OF PERMIT

The Illinois EPA has reviewed PSG's permit application for an Underground Injection Control Area Permit and has prepared a draft permit in accordance with the requirements of Title 35 Illinois Administrative Code Parts 702, 704, 705, and 730, and the Illinois Environmental Protection Act. The draft permit is divided into the following sections:

- **Section A, Authorization for Construction**, sets forth requirements for the construction of injection wells and reporting requirements, including the submittal of a Well Completion Report. The Well Completion Report documents the as built injection well; the results from tests conducted on the well; and proposed final operating parameters.

- **Section B, Operating, Monitoring, and Reporting Requirements**, sets forth site-specific requirements for operation, monitoring and reporting for wells that are authorized for construction.

- **Sections C through G contain standard conditions associated with UIC permits.**

- **Section H, Duties and Requirements**, sets forth standard conditions required by regulation to be included in the permit. Some conditions may be modified to reflect site-specific needs or site-specific codifications may be added that do not fit into other sections of the permit.

IX. PROCEDURES FOR REACHING A FINAL DECISION

The public is given an opportunity to review the permit application and to provide written comments on the draft permit. Under the provisions of 35 Ill. Adm. Code 705.141(d), the draft permit and administrative record must be publicly noticed and made available for public comment. The application and draft permit are available locally at the Marissa Area Public Library at 212 North Main Street in Marissa, Illinois. The public comment permit will begin on February 14, 2018 and close on March 16, 2018. Any interested party may request a public hearing and one will be held if deemed necessary by Illinois EPA. Please note that if a public hearing is held, it will be necessary to provide public notice of the
hearing at least forty-five days prior to the date of the hearing and the comment period will be extended for thirty days after the public hearing.

During the comment period, the applicant or any interested party may submit comments to the Illinois EPA on the draft permit. Comments on the draft permit may be submitted to:

Rachel Stewart  
Illinois Environmental Protection Agency  
Office of Community Relations (#5)  
1021 North Grand Avenue East  
P.O. Box 19276  
Springfield, Illinois 62704-9276  
217/782-2224

At the close of the comment period, Illinois EPA will prepare a written response to significant comments and provide a copy of this response to all interested parties. Illinois EPA will consider these comments and will issue a final permit after the close of the public comment period unless the Illinois EPA decides to reverse the tentative decision. The appeal process and limitations on Illinois EPA’s final decisions on UIC permits are addressed in 35 Ill. Adm. Code 705.212.

Inspection of the administrative record must be scheduled by contacting Rachel Stewart at the number listed below. For further information regarding the permit process, please also contact:

Ms. Rachel Stewart, Illinois EPA  
Phone: 217/782-2224

Attachments: Attachment 1 - Area Permit Boundary  
Attachment 2 - Proposed Injection Well Diagram
FACT SHEET

ATTACHMENT 1

AREA PERMIT BOUNDARY
FACT SHEET

ATTACHMENT 2

PROPOSED INJECTION WELL DIAGRAM
WELL WWDW#1 AND WELL WWDW#2
**Figure 3-9**

**UIC WWDW#1 Schematic**

*Proposed*

- **3½" borehole w/ 30" galvanized steel culvert for conductor casing set at 20 feet, cemented from bottom to surface.**

- **26" borehole to ± 500 feet.**

- **Surface Casing: 20", 8M/ft, J-55, STC set at 500 feet, cemented from bottom to surface.**

- **Intermediate Casing: 13 ½", 6M/ft, J-55 STC, Range 3, set at ± 1,700 feet, cemented from bottom to surface.**

- **Annulus filled with water and 2% solution of corrosion inhibitor.**

- **17 ½" borehole to ± 1,700 feet.**

- **9 ¼" LV Tool at ± 2,000 feet.**

- **Top of Maquoketa Shale at ± 2,350 feet.**

- **9½" long string Casing 9 ½", 40/ft, J-55, Buttress Thread, Range 3, welded at each joint, set at ±3,600 feet, cemented from bottom to surface in two stages.**

- **Perforation in casing from top of St. Peter Sandstone at ±3,440 feet to ±3,600 feet, (160 feet).**

- **3½" x 4", D&L ASI-X Mechanical, ± 3,100 feet.**

- **12 ½" borehole from ±1,700 to ±3,800 - ±4,000 feet.**

- **9 ½" Flow Collar at ± 40 feet above Total Depth.**

- **Drilled Total Depth ±3,800 feet ± 4,000 feet.**

- **9 ½" Flow Shoe at ± 3,830 feet ± 4,000 feet.**
Non-Hazardous Class I Well
Underground Injection Control Permit

Prairie State Generating Company, LLC
Attn: Randy Short, Chief Operating Officer
3872 County Highway 12
Marissa, Illinois 62257

Re: 1898995007 - Washington County
Prairie State Energy Campus
Permit No. UIC-018-PSG
UIC Log No. UIC-213
UIC Administrative Record File

Issue Date:
Expiration Date:
Effective Date:

A Draft Underground Injection Control Area Permit is hereby proposed pursuant to Title 35 Illinois Administrative Code (III. Adm. Code) Parts 702, 704, 705, and 730, and the Illinois Environmental Protection Act to, Prairie State Generating Company to construct two Class I non-hazardous waste underground injection wells, known as well WWDW #1 and well WWDW #2, at Prairie State Generating Company’s facility located at 1739 New Marigold Road, Marissa, Illinois.

The Permittee, Prairie State Generating Company, shall construct wells WWDW#1 and well WWDW#2 in accordance with this draft permit. A Well Completion Report (Attachment E) and other information as required under this draft permit must be submitted following completion of each well in order for the Illinois EPA to determine if authorization for injection of waste into the well can be granted. The wells authorized for injection at this facility will dispose of leachate generated at the facility’s Nearfield Coal Combustion Residual (CCR) Landfill.

This draft permit consists of the conditions contained herein (including those in any attachments and appendices) and applicable regulations contained in the Illinois Environmental Protection Act and Title 35 Ill. Adm. Code Parts 702, 704, 705 and 730. The Environmental Protection Act 415 ILCS 5/1 et seq. grants the Illinois Environmental Protection Agency the authority to impose conditions on permits which it issues.

This draft permit is issued based on the information submitted in the approved permit application identified in Attachment A of this draft permit and any subsequent amendments (hereafter referred to as the approved permit application). Any inaccuracies found in this information may be grounds for the termination or modification of this permit (see 35 Ill. Adm. Code 702.187 and 702.186) and potential enforcement action.

If you have any questions regarding the geology and hydrogeology aspects of this draft permit, please contact Amy Boley at 217/558-4716. If you have any questions regarding the other aspects of this draft permit, please contact Kevin Lesko at 217/524-3271.

Sincerely,

DRAFT

Theodore J. Dragovich, P.E. Manager
Permit Section
Division of Land Pollution Control
Bureau of Land

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A. AUTHORIZATION FOR CONSTRUCTION

1. Authorization for Construction. The Permittee is hereby authorized to complete construction of 2 Class I non-hazardous waste underground injection wells, identified as well WWDW#1 and well WWDW#2. The wells must be constructed within the area identified in Condition A.5. The construction of the wells shall be performed in accordance with the conditions of this permit, the approved permit application, identified in Attachment A, the Illinois Environmental Protection Act and Title 35 Illinois Administrative Code Sections (Ill. Adm. Code) 702, 704, 705 and 730. In the event of a conflict between the conditions of this permit and the approved permit application, the conditions/requirements of the permit shall supersede the application.

   a. Casing Cement. The Permittee proposes, in the permit application Form UIC-3 Permit Item XIV.B: Cementing and Permit Item XV.B: Drilling Schedule (item 13 and 23), that should cement fail to return to the surface during the cementing of the surface or intermediate casings, a 1-inch cementing string will be run alongside the casing and used to fill the annulus with cement to the surface using the tremie method.

      i. Prior to implementing remedial cementing job to address the failure of cement to return to the surface, the Permittee must locate the top of the cement in the annulus through the use of a temperature survey, cement bond log or other means.

      ii. The use of a 1-inch cementing string run alongside the casing to fill the annulus with cement to the surface is not likely to be effective at depths greater than a few hundred feet. Therefore, cementing of any casing shall not be completed using the described tremie method if the location of the top of the cement is greater than two hundred feet below the ground surface. Should a well not be able to demonstrate that it has achieved adequate mechanical integrity, it cannot be authorized to begin operation.

2. Notification of Construction (35 Ill. Adm. Code 704.162). The Permittee must notify the Illinois EPA in writing at least 30 days prior to the date of the planned physical construction of an injection well. The written notification must state that the injection well will be constructed in accordance with the requirements of the Permittee’s UIC permit and include a map that includes the approximate location of the injection well to be constructed, any existing injection wells and the Area Permit Boundaries. A completed Illinois EPA General Application for Permit (Form UIC-1) form must accompany the notification. This form can be found at the following website:
3. Establishment of Financial Assurance. Prior to commencing construction of an injection well the Permittee must establish financial resources to close, plug, and abandon the underground injection well(s) at this facility as required in Condition H.17 of this permit. The amount of financial assurance to be provided is $381,135.75 per well in 2014 dollars. (35 Ill. Adm. Code 704.189)

4. Application and Plans. Construction and if later authorized operation of the injection wells and associated monitoring systems shall be conducted in accordance with the terms and conditions of this permit, the approved permit application, and subsequent approved modifications. The approved permit application is identified in Attachment A of this permit.

5. Well Locations (35 Ill. Adm. Code 704.162(b)). Area Permit Boundary is the defined as the area in which the approved injection wells may be constructed. This area is identified in Form UIC-3, Figure I-2 of the approved permit application. A copy of this figure is included in Attachment C of this permit. The coordinates of the approximate center of this area are:

Latitude: 38° 16’ 55” N   Longitude: 89° 40’ 55” W

6. Injection Fluid. The wastewaters to be injected into the injection well(s) shall be limited to non-hazardous leachate stored in the Permittee’s North Leachate Pond. The source of these wastewaters is leachate collected in the Permittee’s Near Field Coal Combustion Residual (CCR) Landfill. The primary component of leachate is produced from rain water contacting and infiltrating the CCR. A secondary component contributing to the leachate produced by the landfill is from the plant sulfur dioxide absorber system process water. This water is present as residual moisture in the dewatered gypsum (generated in the absorber system) placed in the landfill and is also used to condition fly ash for conveyance prior to placement in the landfill and to aid in dust control on the surface within the landfill cell.

7. Injection and Confining Layers. The injection zone is comprised of the geologic formation designated as the St. Peter Sandstone formation which is located at a depth of approximately 3,100 to 3,260 feet below ground surface (ft-bgs) at the facility. The final location and thickness of the injection zone will be determined during construction of the injection wells. The water in the injection zone has been found to be highly mineralized with concentrations of total dissolved solids expected to be greater than 18,230 mg/L.
The confining layer located above the injection zone is expected to be present at a depth of approximately 2,200 ft-bsg and is comprised of the Maquoketa Shale formation. This formation has a thickness of approximately 150 to 200 feet in the vicinity of the facility. The Maquoketa Shale is a formation with low permeability and uniform thickness making it an effective upper confining unit which will limit the upward movement of any injected wastewater.

8. Injection Well Construction Details (35 Ill. Adm. Code 730.112(b)). The well construction details for well WWDW#1 and well WWDW#2 are provided in Attachment B which contains:

- Injection well schematics;
- Details of the casing strings used in the construction of each well;
- Specification for the cementing of each of the casing strings;
- Tubing and packer specifications;

9. Well Completion Report. The Permittee shall submit a Well Completion Report (Attachment E) upon completion of each well. The report must also include the following:

a. A description of construction of the well, including driller’s log, materials used (i.e., tubing and casing tallies), cement (and other) volumes, appropriate logs and other tests conducted during the drilling and construction.

b. Test and Logs during Construction. At a minimum, during drilling and construction of the injection well(s), all tests and geophysical logs listed under 35 Ill. Adm. Code 730.112(d) shall be performed. Additional tests and geophysical logs identified in the approved permit application or required as a condition elsewhere in this permit shall be performed. The results from logs and tests including appropriate evaluations and interpretations of the results shall be included in the Well Completion Report. A descriptive report interpreting the results of the logs and tests that has been prepared by a knowledgeable log analyst shall be included. Reports prepared by log analysts must be signed by the analyst and include his/her phone number.

c. Revised Contingency Plan. The Well Completion Report for the well shall include a revised contingency plan based on the as-built injection well system. The revised plan must include, at a minimum, the following:

i. A description of the alarm system, including the values for tubing pressure, flow rate and annulus pressure that will trigger alarms;
ii. The action personnel will take in response to alarm conditions;

iii. A description of how operators and other appropriate personnel will be notified of system alarms;

iv. A description of the automatic shutdown of the injection pumps, including the annulus pressure, injection pressure and flow rate that will trigger pumps shut down;

v. Procedures to be followed in the event of injection well or equipment failure; and

vi. A list of the persons designated to oversee well operations in the event of an emergency. Phone numbers and qualifications should be included.

10. Reporting During Well Construction. During drilling and construction of an injection well, a weekly report shall be submitted to the Illinois EPA. The reports should describe the construction completed during the past week and the construction to be completed the following week at the well site. This report should include a list of all tests and logs performed or to be performed on the well. In addition, a daily update shall be submitted that identifies activities that will be occurring and changes to the scheduled activities. These reports should be submitted electronically to: Kevin.Lesko@Illinois.gov, Amy.Boley@Illinois.gov and Connie.Letsky@Illinois.gov. These reports are exempt from the signatory requirement in Condition H.11.


12. Authorization for Injection. The Permittee shall not commence operation of any injection well until they have received written authorization from the Illinois EPA to do so. Authorization to begin operation of an injection well shall not be granted until:

a. The Permittee has submitted a Well Completion Report, which includes a permit modification request for authorization to operate the injection well, and other information as required demonstrating that the well has been constructed in accordance with the approved permit.

b. The Illinois EPA Field Office Section has conducted an inspection of the newly constructed injection well systems to verify the completion of the injection well.
c. The Agency has conducted a review of the Well Completion Report and other information as required by this permit and has determined that the report is complete, i.e., all of the required testing, logging, evaluations and inspections have been conducted in accordance with the approved permit.

d. The information provided demonstrates that the construction and operation of the injection well meets the requirements of the Illinois Environmental Protection Act and Title 35 Illinois Administrative Code Sections (Ill. Adm. Code) 702, 704, 705 and 730.

B. OPERATING, MONITORING AND REPORTING REQUIREMENTS

1. Authorization for Injection. No wells are authorized to inject fluids at this time.

2. Operating Requirements (35 Ill. Adm. Code 730.113(a), 704.185)

   a. Maximum injection pressure. The Permittee must insure that the injection pressure at the wellhead does not exceed the maximum allowed injection pressure. The anticipated maximum injection pressure for injection wells WWDW#1 and WWDW#2 is 1,099 pounds per square inch (psi) at the wellhead.

      The actual maximum injection pressure will be determined from information collected during construction of the injection well. The tests used to determine the maximum injection pressure are described in the permit application, Form UIC-3 Permit Item XVI including a Step-Rate Test.

   b. Maximum injection rate. The maximum expected injection rate for each well is 576,000 gallons per day. This rate may be adjusted based on information supplied in the Well Completion Report.

   c. Injection Fluid. The wastewaters to be injected into the injection well(s) shall be limited to non-hazardous leachate stored in the Permittee’s North Leachate Pond. The source of these wastewaters is leachate collected in the Permittee’s Near Field Coal Combustion Residual (CCR) Landfill. The primary component of leachate is produced from rain water contacting and infiltrating the CCR. A secondary component contributing to the leachate produced by the landfill is from the plant sulfur dioxide absorber system process water. This water is present as residual moisture in the dewatered gypsum (generated in the absorber system) placed in the landfill and is also used to condition fly ash for conveyance prior to placement in the landfill and to aid in dust control on the surface within the landfill cell.
d. Annulus Protection. The following procedures shall be used to limit the potential for any unpermitted fluid movement into or out of the annulus:

i. The casing-tubing pressure within the annular spacing between the injection tubing and the long string casing (the "annulus") shall be maintained at a minimum pressure of 300 psi.

ii. A pressure differential of 100 psi shall be maintained between the annulus pressure and the injection pressure.

iii. The maximum annulus pressure shall be no more than 200 psi above the maximum approved injection pressure.

iv. The annulus between the injection tubing and the long string casing shall be filled with an annulus fluid consisting of a fresh water mixed with Baker Petrolite CRW37 or equivalent. The Baker Petrolite CRW37 contains both corrosion inhibitor and biocide. The fresh water/packer fluid ratio shall be mixed in accordance to the manufacturer's recommendation resulting in a density equal to water.

v. The seal pot of the annulus protection system shall be filled with a mineral oil in order to assure proper operation of the annulus protection system during freezing conditions.

vi. Any changes to the composition of annular fluid shall be reported in the next monthly report submitted to the Permit Section, Division of Land Pollution Control.

vii. The annulus pressure shall be continuously monitored and recorded.

e. Annulus injection prohibition. Injection between the outer most casing protecting underground sources of drinking water and the well bore is prohibited.

f. Prohibition of excessive pressure. The Permittee shall not use excessive injection pressure or volumes and cause:

i. new fractures or propagation of existing fractures in the injection zone (except during stimulation),

ii. initiation of fractures in the confining zone,

iii. migration of injected fluids into any underground source of drinking water,
iv. displacement of formation fluid into any underground source of drinking water, or

v. non-compliance with 35 Ill. Adm. Code 730 operating requirements.

g. Well Stimulation. The Permittee must notify the Illinois EPA at least 30 days before conducting a well stimulation. The well stimulation notification shall include the procedures that will be used for the stimulation of the well. Well stimulation procedures other than as described in Form UIC-3, Permit Item XVI.D of the approved permit application may require the submittal of a permit modification request and subsequent approval in accordance with 35 Ill. Adm. Code 704.261. It should be noted that this process will require more than 30 days to complete the issuance of a modified permit approving the proposed well stimulation.

3. Monitoring Requirements (35 Ill. Adm. Code 730.113(b)).

a. Sampling. Grab samples of the injection fluid shall be collected in accordance with Condition B.4.

b. Continuous Recording Devices. Continuous recording devices or their equivalents shall be installed and used to monitor the injection pressure, flow rate, volume, and annulus pressure. Information from the following continuous recording devices and manually read gauges/devices shall be utilized to monitor the operation of each injection well:

i. Injection pressure gauges - Yokogawa EJA 110A (or equivalent) gauge pressure transmitter.

ii. Casing-tubing annulus pressure gauges – Yokogawa EJA530A (or equivalent) absolute pressure transmitter.

iii. Flow meter – Yokogawa Magnetic Flow Meter (or equivalent)

iv. Volume – Volume is measured and recorded with equipment identified in item iii above and sum registered in the Yokogawa CX2000 data recorder.

v. pH – Continuous. Manual readings will be obtained using a Hanna pHep4 pH/Temperature Sensor (or equivalent).

vi. Temperature – Continuous. Manual readings will be obtained using a Hanna pHep4 pH/Temperature Sensor (or equivalent).
vii. Seal Pot Assembly fluid level - the sight glass level will be monitored daily. The Permittee shall record the volume of fluid added or removed from the seal pot as described in the approved permit application.

c. Range of Recording Device and Gauges. All recording devices and gauges shall be capable of recording or reporting values that exceed maximum permitted operating range by a minimum of 20%.


5. Ambient Monitoring (35 Ill. Adm. Code 730.113(d)). The Permittee shall conduct an Ambient Pressure Monitoring Test annually in accordance with the procedures outlined in Form UIC-7, Permit Item I.E of the permit application.

6. Waiver of Monitoring (35 Ill. Adm. Code 730.113). A waiver from groundwater monitoring is approved based on information submitted by the Permittee. The approval of this waiver request may be terminated if the Illinois EPA acquires new information regarding the geology in the vicinity of the facility or if new regulations requiring groundwater monitoring are promulgated. If the Illinois EPA terminates the approval of the waiver from groundwater monitoring based on acquisition of new geologic information or promulgation of new regulations, the modification procedures found in 35 Ill. Adm. Code Part 702 must be followed.


   a. Report submittal date. Monthly monitoring reports are due by the 15th day of the month immediately following a reporting period. A reporting period is defined as a calendar month.

   b. Contents of monthly reports. The monthly reports shall include:

      i. Daily value for total volume injected and daily maximum, and minimum values for annulus pressure, injection pressure, and flow rate.

      ii. Weekly averages for annulus pressures, injection pressure and flow rate.
iii. The number of times the well is started up during each day

iv. Total hours of injection each day

v. Total volume injected to date

vi. Monthly summary of:
   1. maximum, minimum, and average values for annulus pressures, injection pressure, and flow rate.
   2. total gallons of fluid injected
   3. total number of well startups

vii. A copy of the operating charts for the month for:
   1. annulus pressure
   2. injection pressure
   3. flow rate

viii. Results of chemical analyses required by this permit.

c. Other information in monthly reports. The results of any of the following tests or work shall be reported with the second monthly report after completion of the test or work:

   i. Periodic tests of mechanical integrity.

   ii. Copies of any logs run on the well, submitted with a log analysis.

   iii. Any other test of the injection well conducted by the Permittee.

   iv. Any well work over.

   v. Maintenance performed on monitoring devices or well components.

   vi. Changes of gauges, pipes, and other well components and monitoring devices.

   vii. Changes in the type of annulus fluid.
viii. Addition or removal of annulus fluid.

ix. Summary of annular fluid level fluctuations.

x. Ambient pressure monitoring results.

d. Illegible reports will be returned to the Permittee and deemed not filed. All graphs and charts must be labeled appropriately.

i. Charts and other information generated from digital/computer data shall provide an accurate representation of the operating condition of the well. The Agency reserves the right to require submission of tabular paper copies of data, changes in the format and resolution of representative graph(s), and the submission of digital data to Field Operations Staff and Permit Section Staff for review. The electronic data submitted must be in a format that is usable to said staff, such as tab or comma delimited CSV format or Microsoft Excel format.

e. Report submission addresses. The cover letter for the monthly report will indicate a copy of the report was submitted to each of the following addresses:

i. Illinois Environmental Protection Agency
Division of Land Pollution Control - #33
Permit Section
1021 N. Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276

ii. Illinois Environmental Protection Agency
Division of Land Pollution Control
Field Operations Section
2009 Mall Street
Collinsville, IL 62234

C. EFFECT OF PERMIT. The existence of a UIC permit shall not constitute a defense to a violation of the Environmental Protection Act or 35 Ill. Adm. Code Subtitle G except for development, modification or operation without a permit. Issuance of this permit does not convey property rights or any exclusive privilege. Issuance of this permit does not authorize any injury to persons or property or invasion of other private rights, or infringement of state or local law or regulations. (35 Ill. Adm. Code 702.181)
The activity authorized by this permit shall not allow the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR Part 142 or may otherwise adversely affect the health of persons or the environment. Any underground injection activity not authorized in this permit or otherwise authorized by permit is prohibited. (35 Ill. Adm. Code 704.122)

Compliance with the terms of this permit does not constitute a defense to any action brought under Section 1431 of the Safe Drinking Water Act (SDWA) or any other law governing protection of public health or the environment for any imminent and substantial endangerment to human health, or the environment. In the case of disagreement between the conditions of this permit and the application, the permit conditions shall govern.

D. PERMIT ACTIONS. This permit may be modified, reissued or revoked during its term for cause set forth in 35 Ill. Adm. Code 702.183 through 702.186. The filing of a request by the Permittee for a permit modification or revocation, or a notification of planned changes or anticipated noncompliance on the part of the Permittee, does not stay the applicability or enforceability of any permit condition. (35 Ill. Adm. Code 702.146)

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

F. CONFIDENTIALITY. In accordance with Section 7 of the Illinois Environmental Protection Act and 2 Ill. Adm. Code 1828 allows certain information submitted to the Illinois EPA may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission by stamping the words "confidential business information" on each page containing such information. In addition, justification for the claim must also be made and all requirements of 2 Ill. Adm. Code 1828 must be followed. If no claim is made at the time of submission, the Illinois EPA may make the information available to the public without further notice. If a claim is asserted, the information will be treated in accordance with Board and Agency procedures. (35 Ill. Adm. Code 130) (2 Ill. Adm. Code 1828) Claims of confidentiality for the following information will not be approved:

1. The name and address of any permit applicant or permittee;

2. The identity of substances being placed or to be placed in landfills or hazardous waste treatment, storage or disposal facilities (including injection wells);
3. Information, which deals with the existence, absence or level of contaminants in drinking water.

G. PENALTIES FOR VIOLATIONS OF PERMIT CONDITIONS. Any person who violates a permit requirement is subject to civil penalties, fines, and other enforcement action under the Safe Drinking Water Act (SDWA) and the Environmental Protection Act.

H. DUTIES AND REQUIREMENTS.

1. Duty to Comply. The Permittee shall comply with all applicable UIC program regulations and conditions of this permit, except to the extent and for the duration such noncompliance is authorized by a temporary emergency permit under 35 Ill. Adm. Code 704.163. Any permit noncompliance constitutes a violation of the Illinois Environmental Protection Act and is grounds for enforcement action, permit revocation, modification, or denial of a permit renewal application. Such noncompliance may also be grounds for enforcement action under the Resource Conservation and Recovery Act (RCRA). (35 Ill. Adm. Code 702.141 and 35 Ill. Adm. Code 704.181(a)).

2. 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 submit an application for a new permit at least 180 days before this permit expires. (35 Ill. Adm. Code 702.142)

3. Need to Halt or Reduce Activity. It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. (35 Ill. Adm. Code 702.143)

4. Duty to Mitigate. The Permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from non-compliance with this permit. (35 Ill. Adm. Code 702.144)

5. Proper Operation and Maintenance. The Permittee shall at all times properly operate and maintain all facilities, systems of treatment, and controls (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, adequate laboratory and process controls, and appropriate quality assurance procedures. This provision requires the operation of backups, auxiliary facilities, or similar systems used only when necessary to achieve compliance with the condition of the permit. (35 Ill. Adm. Code 702.145)

7. Duty to Provide Information. The Permittee shall furnish to the Illinois EPA, within the specified times, any information which the Illinois EPA may request, to determine whether cause exists for modifying, revoking and reissuing, terminating this permit, or to determine compliance with this permit. The Permittee shall also furnish to the Illinois EPA, upon request, copies of records required to be kept by this permit. (35 Ill. Adm. Code 702.148)

8. Inspection and Entry (35 Ill. Adm. Code 702.149). The Permittee must allow an authorized representative of the Illinois EPA, upon the presentation of credentials and other documents, as may be required by law, and at reasonable times, 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 any records that must be kept under the conditions of this permit;
   c. Inspect any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
   d. Sample or monitor for the purposes of assuring permit compliance or as otherwise authorized by the appropriate Act, any substances or parameters at any location.
   e. Have access to witness the running of any logs or tests.

9. Monitoring. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. (35 Ill. Adm. Code 702.150(a))

10. Records (35 Ill. Adm. Code 702.124; 702.150(b), (c) & 704.181(b))
   a. The Permittee shall keep records of all data used to complete the permit applications and any supplemental information submitted pursuant to 35 Ill. Adm. Code 702.123, and 35 Ill. Adm. Code 704.161 for a period of at least three years from the date the application is signed.
   b. The Permittee shall retain records of all monitoring information, including all calibration, maintenance records, original chart recordings for continuous monitoring instrumentation, 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 3 years from the date of the sample, measurement, report, or application. This period may be extended by request of the Illinois EPA at any time.
c. Retention of records. The Permittee shall retain records concerning the nature and composition of all injected fluids until three years after the completion of any plugging and abandonment procedures specified under 35 Ill. Adm. Code 704.188 or under Subpart G of 35 Ill. Adm. Code 730, as appropriate. The Owner or Operator shall continue to retain the records after the three-year retention period unless the Owner or Operator delivers the records to the Illinois EPA or obtains written approval from the Illinois EPA to discard the records.

d. Records of monitoring information shall include:

   i. The date, exact place, and time of sampling or measurements;

   ii. The individual(s) who performed the sampling or measurements;

   iii. A precise description sampling methodology and handling, including chain of custody procedures;

   iv. The date(s) analyses were performed;

   v. The individual(s) who performed the analyses;

   vi. The analytical techniques or methods used; and

   vii. The results of such analyses.


12. Reporting Requirements.

   a. Planned changes. The Permittee shall give written notice to the Permit Section, Division of Land Pollution Control within 15 days of any planned physical alterations or additions as to the permitted facility. (35 Ill. Adm. Code 702.152(a))

   b. Anticipated noncompliance. The Permittee shall give advance notice to the Permit Section, Division of Land Pollution Control, of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements. (35 Ill. Adm. Code 702.152(b)).

   c. Other noncompliance. The Permittee shall report all instances of noncompliance not reported under 35 Ill. Adm. Code 702.152 paragraphs (d), (e) and (f) at the
time monitoring reports are submitted. The reports shall contain the information required in 35 Ill. Adm. Code 704.181(d)(2). (35 Ill. Adm. Code 702.152(g))

d. A summary of the reporting dates can be found in Attachment D for information required by this permit. This summary is provided as a convenience and is not necessarily complete, nor is it to be construed as a substitute for actual permit conditions.


a. The Permittee shall notify the Division of Land Pollution Control, Permit Section, in accordance with the notification procedures in Condition H.15, and the injection well(s) shall be immediately shut-in upon: the discovery of upward fluid migration occurring through a previously unknown well bore, or other improperly sealed, completed or abandon wells in the area of review, due to injection of fluid into the Permittee’s well(s), and/or;

b. In the event of the discovery of a well or wells described in item (a) above, the Permittee must prepare a permit modification request consisting of a corrective action plan describing such steps to be taken to properly plug or seal the wells or wells and/or other actions necessary to prevent movement of fluid into Underground Sources of Drinking Water (USDW). A copy of the plugging affidavit(s) filed with the Illinois Department of Public Health and the Illinois Department of Natural Resources, Office of Mines and Minerals, Division of Oil and Gas for wells that are subsequently properly plugged and abandoned must be submitted to the Division of Land Pollution Control, Permit Section.

14. Well Failure (35 Ill. Adm. Code 704.190, 730.108) The Permittee shall notify the Division of Land Pollution Control, Permit Section, in accordance with the notification procedures in Condition H.15, and the injection well(s) shall be immediately shut-in upon:

a. the discovery of the loss of mechanical integrity of an injection well or;

b. the discovery of a well failure including, the inability of the Permittee to properly monitor and/or operate an injection well, as required by the permit, due to the malfunction of equipment or the failure of other well components.

c. In case of an injection well failure, the Permittee shall implement the contingency plan developed for the injection wells, contained in Form UIC-7, Permit Item III of the approved permit application. An investigation of the well failure and plan of action to eliminate the problem must be conducted and the remedial work performed.
The Permittee may be required to submit a permit modification request for review and approval by the Illinois EPA prior to implementation of work to investigate and/or repair a well. Remedial work that would likely require the submittal a permit modification request for review and approval prior to implementation includes:

- Alterations to the design of the injection well system; and/or
- Procedures used to investigate and/or repair a well failure that may affect the mechanical integrity of the well.

If a well failure results in an imminent and substantial threat to the health of persons, the Illinois EPA may issue a temporary emergency permit in response to a modification request which describes the steps to be taken to address this threat pursuant to 35 Ill. Adm. Code 704.163.

15. Twenty-Four Hour Reporting. (35 Ill. Adm. Code 702.152(f); 704.181(d))

   a. The Permittee shall report to the Permit Section, Division of Land Pollution Control, any noncompliance or well activity which may endanger health or the environment including but not limited to the following.

      i. Any monitoring or other information which indicates any contaminant may cause an endangerment to underground sources of drinking water.

      ii. Any noncompliance with a permit condition or malfunction of the injection well system which may cause fluid migration into or between underground sources of drinking water.

      Any information shall be provided orally within 24 hours from the time the Permittee becomes aware of the circumstances.

   b. A written submission must also be provided to the Permit Section, Division of Land Pollution Control, within 5 days of the time the Permittee becomes aware of the circumstances. The written submission must contain:

      i. a description of the noncompliance problem and its cause;

      ii. the period of noncompliance including exact dates and times;

      iii. if the noncompliance problem has not been corrected, the anticipated time it is expected to continue; and
iv. steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance problem.


a. Transfers. This permit is not transferable to any person except after notice to the Illinois EPA. The Illinois EPA may require modification of the permit to change the name of the Permittee and incorporate such other requirements as may be necessary under the appropriate Act. (35 Ill. Adm. Code 702.152(c))

b. Transfer by modification. A permit may be transferred by the Permittee to a new owner or operator only if the permit has been modified or reissued (under Sections 704.261 through 704.264) to identify the new Permittee and incorporate such other requirements as may be necessary under the appropriate Act. The new owner or operator to whom the permit is transferred must comply with all the terms and conditions specified in such permit. (35 Ill. Adm. Code 704.260(a))

c. Automatic transfers. (35 Ill. Adm. Code. 704.260(b)) As an alternative to transfers under condition 15(b), a UIC permit for a well not injecting hazardous waste may be automatically transferred to a new Permittee if each of the following conditions are fulfilled:

i. The current Permittee notifies the Illinois EPA at least 30 days in advance of the proposed transfer date, described in condition 16(c)(ii) of this section;

ii. The notice includes a written agreement between the existing and new Permittee containing a specific date for transfer of permit responsibility, coverage, and liability between the current and new Permittee;

iii. The notice demonstrates that the financial responsibility requirements of 35 Ill. Adm. Code 704.189 will be met by the new Permittee and that the new Permittee agrees to comply with all the terms and conditions specified in the permit to be transferred under automatic transfer conditions; and

iv. The Illinois EPA does not notify the existing Permittee and the proposed new Permittee of its intent to modify the permit. A modification under this subparagraph may also be a minor modification under 35 Ill. Adm. Code 704.264. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in condition 16(c)(ii).

   a. The Permittee must show evidence of financial responsibility to the Illinois EPA by the submission of a surety bond, other adequate assurance such as financial statements, or other materials acceptable to the Illinois EPA.


   c. Construction and/or operation of any injection well(s), and groundwater monitoring well(s) is prohibited unless the Permittee has adequate financial assurance as described in subpart (a) of this condition.


   a. The Owner or Operator must prepare a written estimate, in current dollars, of the cost of plugging the injection well in accordance with the plugging and abandonment plan as identified in Condition H.24. The 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. The currently approved cost estimate for plugging and abandonment of each injection well is $381,135.75 (2014 dollars).

   b. The Owner or Operator must adjust the cost estimate for inflation within 30 days after each anniversary of the date on which the first cost estimate was prepared. The adjustment must be made as specified in paragraphs (i) and (ii) of this condition, using an inflation factor derived from the annual Oil and Gas Field Equipment Cost Index. The inflation factor is the result of dividing the latest published annual Index by the Index for the previous years.

      i. The first adjustment is made by multiplying the cost estimate by the inflation factor. The result is the adjusted cost estimate.

      ii. Subsequent adjustments are made by multiplying the latest adjusted cost estimate by the latest inflation factor.

   c. The Owner or Operator must review the cost estimate whenever a change in the plan increases the cost of plugging and abandonment. The revised cost estimate must be adjusted for inflation as specified in paragraph (b) of this condition.
d. The Owner or Operator must keep the following at the facility during the operating life of the facility:

i. the latest cost estimate prepared in accordance with paragraphs (a) and (c) of this condition and,

ii. the latest adjusted cost estimate prepared in accordance with paragraph (b) of this condition.


a. An owner or operator shall notify the Waste Reduction and Compliance Section, Division of Land Pollution Control, by certified mail of the commencement of a voluntary or involuntary proceeding under 11 U.S.C. (Bankruptcy), naming the owner or operator as debtor, within 10 business days after the commencement of the proceeding. A guarantor of a corporate guarantee as specified in 35 Ill. Adm. Code 704.219 must make such a notification if the guarantor is named as debtor, as required under the terms of guarantee in 35 Ill. Adm. Code 704.240.

b. An owner or operator who fulfills the requirements of 35 Ill. Adm. Code 704.213 by obtaining a letter of credit, surety bond or insurance policy will be deemed to be without the required financial assurance in the event of bankruptcy insolvency or a suspension or revocation of the license or charter of the issuing institution. The owner or operator must establish other financial assurance within 60 days after such an event.

20. Revocation of Permits. (35 Ill. Adm. Code 702.186) The Illinois Pollution Control Board will revoke a permit during its term in accordance with Title VIII of the Illinois Environmental Protection Act or the Illinois EPA will deny permit renewal for the following causes:

a. The Permittee's violation of the Environmental Protection Act or regulations adopted thereunder;

b. Noncompliance by the Permittee with any condition of the permit;

c. The Permittee's failure in the application or during the permit issuance process to disclose fully all relevant facts, or the Permittee's misrepresentation of any relevant facts at any time; or

d. A determination the permitted activity endangers human health, or the environment and can only be regulated to acceptable levels by permit modification or revocation.
21. State Mining Board Permits. Issuance of this permit does not relieve the Permittee of the responsibility of complying with the provisions of Illinois State Mining Board Rules and Regulations and an Act in Relation to Oil, Gas, Coal, and Other Surface and Underground Resources. (Rule II, Illinois Department of Natural Resources, Office of Mines and Minerals, Division of Oil and Gas, Rules and Regulations)

22. False or Omitted Information.

   a. The Permittee shall not make any false statement, representation, or certification in any application, record, report, plan, or other document submitted to the Illinois EPA, the United States Environmental Protection Agency (USEPA), or required to be maintained under this permit.

   b. If, or when, the Permittee becomes aware of a failure to submit any relevant facts in a permit application or incorrect information was submitted in a permit application or in any report to the Illinois EPA, the Permittee shall promptly submit such facts or correct information to the Permit Section, Division of Land Pollution Control within ten (10) days. (35 Ill. Adm. Code 702.152(h))

23. Restriction on Unpermitted Waste. Injection of waste other than those specified in the approved permit application is prohibited. Other fluids may be injected for short periods for purposes of well testing, well stimulation or for the purposes of formation testing provided the Permittee provides notice to the Illinois EPA of these tests in accordance with Condition H.27(e).

24. Plugging and Abandonment.

   a. The Permittee shall notify the Permit Section, Division of Land Pollution Control, 60 days prior to abandonment of a well. The Permittee must submit significant changes to the plans for plugging and abandonment 180 days prior to abandonment. (35 Ill. Adm. Code 704.181(e))

   b. The Permittee shall plug and abandon the injection well as provided in 35 Ill. Adm. Code 704.188 and 730.110 and in accordance with the schedule and provisions of the approved plugging and abandonment plan. The approved plan is contained in Form UIC-8, Plugging and Abandonment of the approved permit application, herein incorporated by reference and as modified by conditions of this permit. (35 Ill. Adm. Code 704.188).

   c. No later than 60 days after plugging and abandonment of any injection or monitoring well, the Permittee shall submit a plugging report required by 35 Ill. Adm. Code 704.181 (g) to the Permit Section, Division of Land Pollution Control.
The report shall be certified as accurate by the person who performed the plugging operation, and shall consist of:

i. A statement that the well was plugged in accordance with the plan most recently submitted to the Illinois EPA; or

ii. A statement defining the actual plugging and explaining why the Illinois EPA should approve such deviation, if the actual plugging differed from the approved plan. Any deviation from a previously approved plan which may endanger underground sources of drinking water is cause for the Illinois EPA to require the operator to re-plug the well; and

iii. Copy of well plugging affidavit submitted to the Illinois Department of Natural Resources, Office of Mines and Minerals, Division of Oil and Gas; and the Illinois Department of Public Health.

iv. If the approved plugging and abandonment plan requires a change, a revised plan shall be submitted to the Permit Section, Division of Land Pollution Control for approval. If approved, the revised plugging and abandonment plan shall be incorporated into the approved permit application as a permit modification.

25. Conversion of Wells (35 Ill. Adm. Code 704.181(e)) The Permittee shall notify the Permit Section, Division of Land Pollution Control, 45 days prior to conversion of any well. Plans for conversion must be submitted 180 days prior to actual conversion or abandonment. Injection into converted wells shall not be conducted until the Permittee receives written authorization for injection from the Illinois EPA.

26. Inactive Wells. (35 Ill. Adm. Code 704.188) After cessation of injection for two (2) years, the Permittee shall plug and abandon the well in accordance with Condition H.24 of this permit and 35 Ill. Adm. Code 730.110, unless the Permittee has:

a. Provided notice to the Permit Section, Division of Land Pollution Control; and

b. Described actions or procedures, which are deemed satisfactory to the Illinois EPA, to ensure the well will not endanger underground sources of drinking water during the period of temporary abandonment. These actions and procedures shall include compliance with the technical requirements applicable to active injection wells, including mechanical integrity testing, unless waived by the Illinois EPA in writing.
27. Duty to Establish and Maintain Mechanical Integrity (35 Ill. Adm. Code 704.181(h) and 704.190).


b. A demonstration of mechanical integrity in accordance with Form UIC-7, Permit Item II, Mechanical Integrity Tests During Service Life of Well of the approved permit application shall be conducted to ensure the well has integrity during the life of this permit. A descriptive report interpreting the results of all geophysical logs and tests must be prepared by a knowledgeable log analyst and submitted to the Permit Section, Division of Land Pollution Control. This report shall be signed by the analyst and shall include his/her phone number.

c. The Permittee shall demonstrate the absence of significant leaks in the casing, injection tubing, and packer by use of an annulus pressure test to be conducted annually. The annulus pressure test shall be conducted in accordance with procedures contained in Form UIC-7, Permit Item II of the approved permit application, and the following conditions:

i. The annular space must be completely filled with annular fluid.

ii. A pressure differential between the pressure in the annular space and the injection tubing pressure of at least 100 psi shall be maintained throughout the entire annular space.

iii. Measurements of pressure should be taken at a minimum of every ten minutes.

iv. The well will be deemed to have failed the annulus pressure test if a pressure change of greater than 3% occurs over a one-hour period.

d. The Permittee shall demonstrate the absence of significant fluid movement into an underground source of drinking water through vertical channels adjacent to the injection well bore by use of a temperature survey to be conducted biennially.

e. The Permittee will inform the Permit Section, Division of Land Pollution Control, of its intent to conduct pressure test(s), and temperature log(s), plus any additional mechanical tests, logs, or inspections, at least thirty (30) days prior to the demonstration of mechanical integrity. The notice must include the type of test to be conducted; any fluid that will be injected as part of the test; and a demonstration that the fluid will be compatible with the injection well materials and formation that may come into contact with the testing fluid. If a
demonstration of this compatibility has previously been submitted, the Permittee may reference the previous submittal.

f. The Permittee shall cease injection if an apparent loss of mechanical integrity, as defined by 35 Ill. Adm. Code 730.108, becomes evident during operation or at the time of the mechanical integrity demonstration. Operation shall not be resumed until the Permittee has complied with the provisions of this permit, and applicable regulations, regarding mechanical integrity demonstration and testing.

g. All gauges used in mechanical integrity demonstrations or in daily operations shall be calibrated according to the procedures of the National Bureau of Standards, initially and at least annually thereafter. A copy of the calibration certificate shall be submitted to the Permit Section, Division of Land Pollution Control on January 15 of each year. In addition, recording devices are to be time synchronized at least quarterly.

h. In addition to the mechanical integrity demonstration required by this permit, the Illinois EPA has the authority to require the Permittee to conduct a demonstration of mechanical integrity of the well at any time well operations, or other information, leads the Illinois EPA to decide an additional mechanical integrity demonstration is necessary. The notice requiring the mechanical integrity demonstration shall be in writing and contain justification for requiring the additional testing.

28. Contingency Plan. The Permittee shall implement the contingency plan in accordance with the plans and methods described in Form UIC-7, Permit Item III of the approved permit application.

29. 39i Certification. The Permittee shall submit a 39i certification and supporting documentation within 30 days of any of the following events:

a. the owner or operator or officer of the owner, or operator, or any employee who has control over operating decisions regarding the facility has violated federal, State, or local laws, regulations, standards, or ordinances in the operation of waste management facilities or sites; or

b. the owner or operator or officer of the owner, or operator, or any employee who has control over operating decisions regarding the facility has been convicted in this or another State of any crime which is a felony under the laws of this State, or conviction of a felony in a federal court; or

c. the owner or operator or officer of the owner, or operator, or any employee who has control over operating decisions regarding the facility has committed an act of
gross carelessness or incompetence in handling, storing, processing, transporting or disposing of waste.

d. a new person is associated with the owner or operator who can sign the application or who has control over operating decisions regarding the facility, such as a cooperate officer or a delegated employee.

The certification shall describe the violation(s), convictions, carelessness or incompetence as outlined in a, b, or c above and must include the date that a new person as described in d above began employment with the applicant.

The 39i certification and supporting documentation shall be submitted to the address specified below:

Illinois Environmental Protection Agency
Bureau of Land #33
39(i) Certification
1021 North Grand Avenue East
Post Office Box 19276
Springfield, Illinois 62794-9276

30. Other Permitting Requirements. The issuance of this UIC permit does not relieve the Permittee of the responsibility for obtaining other permits or authorizations required by the Illinois EPA Bureau of Water, Illinois EPA Bureau of Air, Illinois Department of Natural Resources or other federal, state, or local agencies.
ATTACHMENT A

APPROVED PERMIT APPLICATION
ATTACHMENT A

APPROVED PERMIT APPLICATION

<table>
<thead>
<tr>
<th>Document</th>
<th>Dated</th>
<th>Received</th>
<th>Permit Issued</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Addendum No. 1, revised pages</td>
<td>July 28, 2017</td>
<td>July 31, 2017</td>
<td></td>
</tr>
<tr>
<td>Response to IEPA Comments</td>
<td></td>
<td></td>
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</table>
ATTACHMENT B

WELL CONSTRUCTION DETAILS

WELL WWDW#1 AND WELL WWDW#2
Construction Details for Underground Injection Well WWDW #1 and Well WWDW#2

Surface Casing
20-inch diameter, 94 lb./ft., J-55 steel, STC, with a butt weld float shoe will be installed on the bottom of the casing. Ten (10) centralizers spaced out from approximately 20 feet from the bottom of the casing string to approximately 50 feet below the surface. Casing is set at approximately 500 feet BGS (Below Ground Surface). This is below the low the base of the USDW and is designed to protect shallower formations and aquifers from the deeper high TDS waters encountered in the highly mineralized formations.

Cementing: Casing cemented to surface.

- Lead Slurry 625 sacks, 35/65 Poz/A, 6% Bentonite, 1% CaCl₂, 0.7% NFL-211, 1/8# C-30 flake (fill to surface with 100% excess)
  Density: 13.7 pounds per gallon (ppg)
  Yield: 1.7ft³/sack
  Mix Water: 8.47 gal/sack

- Tail slurry 396 sacks, Class “A”, 1% CaCl₂, 0.7% NFL-211, 1/8# C-30 flake (fill to surface with 100% excess)
  Density: 15.6 ppg
  Yield: 1.18 ft³/sack
  Mix Water: 5.2 gal/sack

Intermediate Casing
13 ¾-inch diameter, 61 lb./ft., J-55 steel, LTC, 8rd, Range 3. Casing will be set at approximately 1,700 BGS. The casing will have a guide shoe on the bottom of the first joint and a float collar on top of the first joint. Eighteen (18) swirl-type centralizers will be located in the middle of the first joint and then approximately every 100 feet to the surface.

Cementing: The casing will be cemented in a single stage, unless lost circulation zones or incompetent formations are encountered. If multi-stage cementing is necessary, the stages and locations of the cement baskets will be determined during construction and the information will be included in the Well Completion Report.

- Lead Slurry: 750 sacks, 35/65 Poz/A, 6% Bentonite, 1% CaCl₂, 0.7% NFL-211, 1/8# C-30 Flake (fill to surface with 55% excess)
  Density: 13.7 ppg
  Yield: 1.7ft³/sack
  Mix Water: 8.47 gal/sack
• Tail Slurry: 425 sacks, 10/8 FSS +0.7% NFL-211 + 1/8# C-30 Flake (figured with 40% excess)
  Density: 14.2 ppg
  Yield: 1.63 ft³/sack
  Mix Water: 7.9 gal/sack

Long String Casing
9 ¼-inch diameter casing, 40 lb./ft., J55 steel, buttress thread, 8rd casing welded at each joint. A DV tool installed at ±2,000 feet. Forty-five (45) swirl-type centralizers located in the middle of the first joint, the collar of the first joint, then approximately every 100 feet to the D.V. tool of which one centralizer will be placed approximately 30 feet below and 30 feet above the D.V. tool. If multi-stage cementing is necessary, two (2) cement baskets will be placed just above the top of the insert check valve, plus two (2) more just below the D.V. tool. The casing will pass below the Maquoketa Shale confining zone, and be set at approximately 4,000 feet BGS.

Perforation depths: The casing will be perforated in the injection zone from ±3,100 feet to ±3,260 feet (anticipated depth of the St. Peter and Everton Sandstone). The perforations will be made using a 7-inch gun with 12 shots per foot (spf) on the 9 ¾-inch casing. This will create a total of ±1,920 perforations over ±160-foot injection interval.

Cementing: Casing cemented to surface in two stages.

First Stage (~4,000 to 2,000 feet):
• Lead Slurry: 830 sacks, Class “H”, 3% KCl, 0.9% NFL, 1% C-13 Retarder, 1/8# C-30 Flake (fill from 4000 - 2000 with 50% excess)
  Density: 16.48 ppg
  Yield: 1.07 ft³/sack
  Mix Water: 4.29 gal/sack

Second Stage (~2,000 feet to surface):
• Lead Slurry: 651 sacks, 35/65 Poz/A, 6% Bentonite, 1% C-79 Extender, 0.8% NFL-211, 1/8# C-30 flake (fill to surface with 50% excess)
  Density: 13.7 ppg
  Yield: 1.7 ft³/sack
  Mix Water: 8.47 gal/sack

Tubing and Packer Specifications
Injection Tubing: 3 ½-inch diameter, 9.2 lb/ft, J-55, integral joint

Packer: The 9 5/8-inch by 4-inch packer will be an ASI-X mechanically set retrievable packer, set at a depth of ±3,100 feet BGS and set in ±15,000 lbs. compression or equivalent. The packer will be nickel plated to prevent corrosion. No tail pipe installation.
Injection Well Pumps

Baker Hughes HPump 675 series multi-stage centrifugal pump with a horizontal thrust chamber, fluid intake and discharge, instrumentation and driver mounted on a common fabricated steel skid. Each pump has a capacity of approximately 400 gpm at the expected injection pressures. Manufacturer's specification sheets and pump curves are located in Appendix 4-3 of the permit application.
36" borehole w/ 30" galvanized steel culvert for conductor casing set at 30 feet, cemented from bottom to surface

26" borehole to ± 500 feet

Surface Casing: 20", 94W1, J-55, STC set at 500 feet, cemented from bottom to surface

Intermediate Casing: 13 ¾", 61#/ft, J-55 STC, Rango 3, set at ±1,700 feet, cemented from bottom to surface

Annulus filled with water and 2% solution of corrosion inhibitor

17 ½" borehole to ±1,700 feet

9 ¾" DV Tool at ±2,000 feet

Top of Maquoketa Shale at ±2,550'
Annulus Pressure Monitoring & Transmitting Device

- PSI Gauge
- Sight Glass
- Casing Spool
- Gate Valve 5 1/16" 5000 PSI
- Casing Hanger Mandrel W/ Primary Seal Plate, Baffles
- Flowline Support
- Grade

- Nitrogen Bottle
- Concrete Pad
- Yokogawa EGA Gauge Pressure Transmitter
- 3/4" Steel Line
- Filled with mineral oil

Prairie State Generating Company
Washington County
Prairie State Energy Campus
Page 32 of 47
ATTACHMENT D

SUMMARY OF SUBMITTAL DATES
ATTACHMENT D

SUMMARY OF SUBMITTAL DATES

The following is a summary of submittal dates for data required by this permit. This summary is provided to highlight some of the submittals required by this permit. The referenced condition must be consulted for complete details.

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<thead>
<tr>
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<th>Submittal</th>
<th>Date Due</th>
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<td>A.2</td>
<td>Notification of Construction</td>
<td>30 days prior to planned construction.</td>
</tr>
<tr>
<td>A.9</td>
<td>Well Completion Report</td>
<td>After completion of injection well.</td>
</tr>
<tr>
<td>A.9(c)</td>
<td>Revised Contingency Plan</td>
<td>Included with Well Completion Report for WWDW#1</td>
</tr>
<tr>
<td>A.10</td>
<td>Weekly Well Construction Reports</td>
<td>Weekly, during construction of injection well</td>
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<td>B. 2(d)(vi)</td>
<td>Changes to composition of annular fluid used</td>
<td>Next monthly report</td>
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<td>B. 2(g)</td>
<td>Procedures for controlled stimulation</td>
<td>30 days prior</td>
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<tr>
<td>B.7</td>
<td>Monthly Operation Reports</td>
<td>15th each month</td>
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<tr>
<td>B. 7(c)</td>
<td>Results of test, maintenance, and changes of equipment</td>
<td>Second monthly report after completion</td>
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<tr>
<td>H.2</td>
<td>Duty to Reapply</td>
<td>180 days prior to expiration</td>
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<tr>
<td>H. 12(a)</td>
<td>Planned Changes</td>
<td>15 days prior to planned changes</td>
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<td>H. 13(a)</td>
<td>Oral Notification of Corrective Action Requirement</td>
<td>24 hours after the discovery</td>
</tr>
<tr>
<td>H. 13(a)</td>
<td>Corrective Action Notification by Letter</td>
<td>5 days after the discovery</td>
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<tr>
<td>H. 14</td>
<td>Oral Notification of Well Failure</td>
<td>24 hours after the discovery</td>
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<td>H. 14</td>
<td>Notification by letter of Well Failure</td>
<td>5 days after the discovery</td>
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<tr>
<td>H. 15</td>
<td>Oral Notification of Endangerment of Environmental</td>
<td>Within 24 hours of time of endangerment</td>
</tr>
<tr>
<td>Condition</td>
<td>Submittal</td>
<td>Date Due</td>
</tr>
<tr>
<td>-----------</td>
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<td>-----------------------------------------------</td>
</tr>
<tr>
<td>H.15</td>
<td>Notification by letter of Endangerment of Environmental</td>
<td>Within 5 days of endangerment</td>
</tr>
<tr>
<td>H. 24(a)</td>
<td>Notice of well abandonment</td>
<td>60 days prior to abandonment</td>
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<tr>
<td>H. 24(c)</td>
<td>Certification of Plugging and Abandonment</td>
<td>60 days after plugging</td>
</tr>
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<td>H. 25</td>
<td>Plans for Conversion</td>
<td>180 days prior to actual conversion</td>
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<tr>
<td>H. 25</td>
<td>Notify before Conversion or Abandonment</td>
<td>45 days prior to conversion or abandonment</td>
</tr>
<tr>
<td>H. 27(d)</td>
<td>Conduct a Temperature Survey</td>
<td>Biennially</td>
</tr>
<tr>
<td>H. 27(e)</td>
<td>Mechanical Integrity Testing</td>
<td>30 days prior to demonstration</td>
</tr>
<tr>
<td>H. 27(g)</td>
<td>Gauge calibration</td>
<td>January 15 of each year</td>
</tr>
<tr>
<td>H. 29</td>
<td>39i Certification</td>
<td>Within 30 days of any event described in Condition H.29</td>
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</table>
ATTACHMENT E

WELL COMPLETION REPORT INSTRUCTIONS
AND
WELL COMPLETION REPORT Form UIC-9
FORM UIC-9 - WELL COMPLETION REPORT
INSTRUCTIONS

These instructions explain the information required in a Well Completion Report. Most of the information required is based on information that was gathered during the construction of the injection well. The information required in this report will be used to update the facility's current UIC permit with as-built specifications and will allow the facility to update the approved permit application with site specific hydrogeologic data and well specifications. This report also provides the results of logging and testing of the injection well and associated systems as required in the construction permit.

Once the Well Completion Report has been approved by the Illinois EPA, a revised UIC permit will be sent to the facility to authorize operation.

Item I

Indicate the type of permit as either an individual or area permit, including whether it is an emergency, new request. Requests for area permits should indicate the well number and the name of the field in addition to the above information.

Item II

The location of the well is to be provided in the Township-Range-Section System of the Bureau of Land Management of the US Government, Latitude and Longitude coordinates (degrees, minutes, seconds) and the Illinois State Plane coordinate system points. In addition, include the closest municipality name and county.

Items III, IV and V

Provide the surface elevation, referenced to mean sea level, in feet.
Provide the depth of the well in feet.
Provide the static water level, referenced to mean sea level, in feet.

Item VI

Provide the demonstrated fracturing pressure, if applicable, in psi. In addition, include information on the type of test used to determine the fracturing pressure.

Item VII

Indicate whether the well was completed as an open hole, fully cased and perforated, screen and gravel pack or other. If other, please specify.
Item VIII

Provide the schematics of the well, wellhead facilities and annulus monitoring system. The well schematic and wellhead schematic should be on separate pages. Please provide each on an 8.5” x 11” sheet of paper. All casing, cemented intervals, centralizers, packer, tubing or other well equipment must be indicated and labeled.

Item IX. A

Provide the depth interval, in feet, and the corresponding diameter, in inches, of the hole.

Item IX. B

For the annulus protection system, provide the following information:

1. Annular space(s), including the inner and outer diameter;
2. Type of annular fluid;
3. Specific gravity of annular fluid;
4. Packer(s), including:
   - type
   - name and model
   - setting depth, in both feet and meters
   - manufactures spec sheets
5. Indicate if fluid was spotted under the packer, including the type, frequency and quantity
6. Well driller information should include the following information:
   - data on the drilling firm, including name, address and contact person
   - drilling method

Item IX. C

Provide the following information for each of the casing strings used:

- depth interval in feet
- outside diameter in inches
- inside diameter in inches
- weight in pounds per foot
- grade, API
- design coupling
- coupling outside diameter in inches
- thermal conductivity BTU, ft.hr.degrees F
Item IX. D

Provide the following information for the injection tubing:

- type/grade, API
- outside diameter in inches
- inside diameter in inches
- weight in pounds per foot
- joint specification
- depth interval in feet
- thermal conductivity BTU, ft.hr. Degrees F
- maximum allowable suspended weight based on joint strengths of injection tubing
- weight of injection tubing string (axial load) in air
- manufactures spec sheets

Item IX. E

Provide the following cementing information for each casing string:

- depth interval in feet
- type/grade
- additives
- quantity in cubic yards
- circulated, yes or no
- thermal conductivity BTU, ft.hr. Degrees F
- if cement installed in stage identify stages, location of DV tool or perforations of casing used

Item IX.C – IX.E

Provide copies of logs, bottom-hole testing and data evaluation. Each of the logs and test results must be accompanied by a descriptive report prepared by a knowledgeable log analyst interpreting the results of such logs and tests. The results and interpretations of all logs and testing required in the approved UIC permit for the construction of conversion of the UIC well shall be included in the Well Completion Report. At a minimum, this would include the following logs and tests:

1. Surface Hole
   a. Resistivity
   b. Spontaneous Potential
   c. Caliper
   d. Variable density cement evaluation log
   e. Temperature, run down the well

Form UIC-9 Instructions

Rev 2015-12-08
2. Surface Casing (after cementing)
   a. Cement Bond Log
   b. Temperature or Density Log - at least one required

3. Intermediate and Production Hole
   a. Resistivity
   b. Spontaneous Potential
   c. Gamma Ray
   d. Caliper
   e. Porosity
   f. Variable density cement evaluation log
   g. Temperature, run down the well
   h. Fracture finder

4. Cased Hole Logs
   a. Resistivity
   b. Spontaneous Potential
   c. Caliper
   d. Gamma Ray
   e. Porosity
   f. Variable density cement evaluation log
   g. Temperature, run down the well
   h. Fracture finder
   i. Casing Collar

5. Injection Zone
   a. Interpretation of full hole cores of injection zone and overlying confining zone
   b. Interpretation of formation samples
   c. Bottom hole pressure and temperature log
   d. Description of formation sample
   e. Results of formation water sampling

6. Confining Zone
   a. Based on sampling and logging data discuss the adequacy of the confining zone to prevent vertical migration of injected fluids or displaced formation water.
   b. Include parameters of thickness, permeability and porosity
   c. From the above data and factors, provide the projected flow time across the confining zone
   d. Include the results of formation water sampling.
Provide a description of injectivity tests conducted, such as permeability, reservoir limits, reservoir type, etc. A copy of the exact test procedures used and the results of the observed test data shall be included.

If the test or logs have been previously submitted, indicate the date(s) the logs were submitted.

**Item X**

**Surface Installations**

1. Provide a description of pressure and volume monitoring systems installed in the injection and annulus systems. The model and manufacturer of the temperature recorder installed should also be included.

2. Flow diagram with each waste stream identified, with detailed description of the differences in the pretreatment process and facilities, including the size, capacity and construction materials of system components identified.

Provide the following information for all filters and injection pumps:

- location
- type
- name
- model number
- capacity (gallons per minute)
- pore size in microns

**Item XI**

Revised copies of the form(s) are required following construction to account for any changes from the proposed well construction to the final well construction using actual data obtained during construction.

**Item XII**

Provide the results of detailed testing on the compatibility of the injection fluid with each of the listed items at expected bottom hole pressures and temperatures. Include a discussion on corrosiveness, reactivity and byproducts of the injection fluid and formation fluids and minerals and well components expected to come in contact with the injected fluids.

**Item XIII**

Attach a list of any changes in recording devices (including additional devices), specifying the location, name and model, mechanical or electrical if applicable, continuous or non-recording, and whether the gauge exceeds the maximum operating range by 20%, including:
- injection pressure gauges
- casing-tubing annulus pressure gauges
- flow meters
- pH recording devices
- temperature gauges

Item XII. F

Provide a revised Contingency Plan as necessary. This plan must provide a detailed description of procedures the facility will use when implementing a Well Failure scenario or a Well Shut In and must include, at a minimum, the following:

- A description of the alarm system, including the values for tubing pressure, flow rate and annulus pressure which will trigger the alarm.

- A description of the automatic shut down of the injection pumps, including the annulus pressure, injection pressure and flow rate which will trigger pumps shut down.

- A list of the persons designated to oversee well operations in the event of an emergency. Phone numbers and qualifications should be included.
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
UNDERGROUND INJECTION CONTROL PERMIT APPLICATION

FORM UIC-9 - WELL COMPLETION REPORT

IEPA ID NUMBER ___________________ U.S. EPA NUMBER ___________________

FACILITY NAME _____________________
PERMIT NO. _______________________

I. Type of Permit: ______ Area ______ Individual
   New ______ Emergency ______

   Well No. _______________ Name of Well Field ___________________

Please use this form as a checklist and identify the location in the application where the
information listed below may be found. The source of all data used in addressing the items below
must also be identified in the application. A detailed description of the information to be
provided regarding each item below can be found in the instructions for Form UIC-9.

   ______ II. Location of well
   ______ A. Township-Range-Section
   ______ B. Latitude/Longitude
   ______ C. Closest Municipality
   ______ D. Illinois State Plane coordinates

   ______ III. Surface Elevation

   ______ IV. Well Depth

   ______ V. Static Water Level

   ______ VI. Demonstrated Fracturing Pressure, if applicable

   ______ VII. Injection Well Completion Details

   ______ VIII. Well schematic or other appropriate drawing of surface and subsurface
               construction details

   ______ IX. Well Design and Construction

   ______ A. Well hole diameters and corresponding depth intervals

   ______ B. Annulus Protection System
      ______ 1. Annular space, ID and OD

Form UIC-9
2. Type of annular fluid(s)
3. Specific gravity of annular fluid
4. Packer(s)
   a. Setting depth
   b. Type
   c. Name and model
   d. manufactures spec sheets
5. Description of fluid spotting frequency, type and quantity
6. Information on well driller used for construction of this well

C. Casings
1. Conductive casing
2. Surface casing
3. Intermediate casing(s)
4. Long string casing
5. Other casing

D. Injection Tubing
1. Maximum allowable suspended weight based on joint strength
2. Weight of injection tubing string (axial load) in air

E. Cement
1. Conductive casing
2. Surface casing(s)
3. Intermediate casing
4. Long string casing
5. Other casing

X. Surface Facilities
A. Monitoring systems
B. Flow diagrams
C. Filter(s)
D. Injection pump(s)

XI. Hydrogeologic Information
A. Revised Form UIC-2
B. Revised Form UIC-5 using actual data on injection formation
C. Revised Form UIC-8
D. Copy of well completion report submitted to the Department of Natural Resources (Formerly Mines and Minerals)
E. Copy of any plugging affidavits on existing injection wells which were filed with Department of Natural Resources

XII. Injection Fluid Compatibility

A. Compatibility with injection zones fluid

B. Compatibility with minerals in the injection zone

C. Compatibility with minerals in confining zone

D. Compatibility with injection well components
   1. Injection tubing
   2. Long string casing
   3. Cement
   4. Annular fluid
   5. Packer(s)
   6. Well head equipment
   7. Holding tank(s) and flow lines

E. Full description of compatibility of injection fluid with items A through D

XIII. Monitoring Program

A. Injection pressure gauge(s)

B. Casing-tubing annular pressure gauge(s)

C. Flow meter(s)

D. pH recording device(s)

E. Temperature

F. Revised Contingency Plan for Well Failure or Shut In