Ohio Environmental Protection Agency

Division of Drinking and Ground Waters
Response to Comments

Project: Buckeye Brine, LLC Class I Non-Hazardous Underground Injection Control Permits to Operate

Agency Contacts for this Project

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Ohio EPA held public hearings on Oct.18, 2018, and April 15, 2019, regarding draft issuance of two Class I Non-Hazardous Permits to Operate to Buckeye Brine, LLC. This document summarizes the comments and questions received during the associated comment periods which ran from Aug. 31 to Nov. 26, 2018, and from March 19 to April 19, 2019.

Ohio EPA reviewed and considered all comments received during the public comment period. By law, Ohio EPA has authority to consider specific issues related to the protection of the environment and public health. Often, public concerns fall outside the scope of that authority. For example, concerns about zoning issues are addressed at the local level. Ohio EPA may respond to those concerns in this document by identifying another government agency with more direct authority over the issue.

1. **Comment:** Many comments refer to concerns related to the impacts from potential surface spills of waste due to mishandling at the facility or traffic accidents on the roads leading to the facility. Commenters were concerned such impacts would result in contamination of streams, the underlying aquifer or in releases of hazardous gases to the air.

   Response: The Class I Permits issued to inject waste into two Class I injection wells cover only the injection of the waste into the Class I injection wells and authorizes only that activity as described in the permits. Transportation of the waste must comply with all applicable laws. All surface handling and storage of the waste at the Buckeye Brine facility must meet applicable wastewater requirements. All air emissions from this facility must comply with applicable clean air statutes and rules. The prevention of any surface release of waste either to the air, surface waters or the aquifer via a surface spill is regulated under Ohio Revised Code (ORC) Chapters 6111 and 3704. In addition, the Class I Permits were modified to require Buckeye Brine to obtain waste liability coverage.

2. **Comment:** Several comments urged the disapproval of the permit applications without providing a specific basis.

   Response: Thank you for your comments. Although these comments didn't include a basis for their disapproval, specific objections to approval of the permits are addressed in responses to other comments in this document.

~~**3.**~~ **Comment:** Several commenters urged approval of the permit applications.

Response: Thank you for your comments.

4. **Comment:** Several commenters had concerns regarding the potential for an accident at the facility and asked the following questions: Will there be a warning siren to alert the neighbors? Who will pay for the training, equipment and response to the emergency by the local fire department?

Response: Ohio EPA Underground Injection Control (UIC) permits do not regulate community warning systems or emergency response. The Class I Permits do not relieve Buckeye Brine from complying with all other applicable requirements. The Coshocton County Emergency Management Director's Office may be able to provide additional information.

5. **Comment:** Many commenters expressed concern about the impact of the injection of wastes on the city of Coshocton water supply well field and other private wells within several miles of the Buckeye Brine facility.

Response: ORC Section 6111.044 requires an applicant for a UIC well to demonstrate the proposed activities will not pose an unreasonable risk of contamination of an underground source of drinking water (USDW). Based on information submitted in the permit applications, the injection of waste at the Buckeye Brine facility will not pose an unreasonable risk of impacting the city of Coshocton water supply well field or any USDW. This conclusion is based on a review of documentation related to the geology, hydrogeology and hydrology of the area surrounding the Buckeye Brine facility. It is also based on the construction of the wells and mechanical integrity tests conducted on the proposed Class I injection wells.

To ensure there is no unreasonable risk of injected waste migrating into a USDW, the Class I Permits require additional mechanical integrity testing prior to and during operation of the injection wells to determine the integrity of the casing and cement including annual annulus pressure tests and radioactive tracer tests. Every three years a temperature test is required to demonstrate that waste is not migrating upward toward a USDW behind the casing and cement of the well. All tests are witnessed by Agency staff.

In addition to these tests, the Class I Permits require monitoring of the water quality within the lowermost USDW. Based on comments received, the number of monitoring wells required by the Class I Permits was expanded from one to three wells. One monitoring well will be located adjacent to each injection well (the existing Class II well in addition to the converted Class I wells). These wells will be monitored quarterly.

6. **Comment:** Several commenters questioned the requirement to have only one monitoring well. Their concern is that the hydraulic gradient in the lowermost USDW is unknown and one well would not be sufficient to detect a release of injected waste into the lowermost USDW.

Response: Due to concerns raised by commenters regarding understanding flow direction/hydrologic gradient in the Black Hand Sandstone, Ohio EPA determined additional monitoring wells were warranted and will provide more certainty for evaluating on-site conditions. The Class I Permits were amended to increase the number of wells monitoring the lowermost USDW from one to three wells. These wells will be required to be located adjacent to each injection well at the Buckeye Brine facility and will monitor if any waste is migrating along the outside of the casing and cement of the injection well into the USDW. Three wells will ensure one to two wells will be downgradient of the facility. The monitoring wells will be sampled quarterly and used to verify that injected waste has not impacted the lowermost USDW.

7. **Comment:** Several commenters asserted Buckeye Brine staff have insufficient training and certification, while other commenters stated that Buckeye Brine goes out of its way to make sure its employees have the proper training to do their jobs safely.

Response: Rule 3745-34-26(E) of the Ohio Administrative Code (OAC) and Part I.E.6 of the Class I Permits require the operator of a Class I injection well facility to have adequate staffing and training to properly operate and maintain the Class I injection wells. In addition, the permit applications, including the draft waste analysis plan describe Buckeye Brine's staff training to conduct the testing and operations at the facility. Furthermore, the Class I Permits were conditioned to require the operator to regularly document the training that staff have received and how that training complies with the Class I Permits and plans. This training documentation will be required to be submitted annually and made available upon inspection.

8. **Comment:** Several comments were made, and exhibits submitted regarding the operation of Class I wells at Gibraltar Chemical in Winona, Texas, in the late 1980s through the mid-1990s by the current operators of the Buckeye Brine facility. These commentators questioned, given the problems noted in the comments and exhibits at the Winona, Texas, facility, how the Agency can allow the permit applicants to operate a Class I injection well in Ohio.

Response: The Agency has reviewed the material submitted concerning operations at the Gibraltar Chemical facility in Winona, Texas. In the past three-plus decades, statutes and rules have been changed to increase regulatory oversite and enforcement. Class I injection requirements in Ohio were updated in 1991 and funding and staffing were increased at Ohio EPA to ensure adequate oversite of Class I injection wells. Monitoring (Part II.D of the Class I Permits and OAC Rules 3745-34-38, 3745-34-56, and 3745-34-57), testing, (Part I.H of the Class I Permits and OAC Rule 3745-34-34) and reporting requirements within the applicable rules and the Class I Permits (Part II.E of the Class I Permits and OAC Rules 3745-34-38 and 3745-34-58) ensure proper operation of the Class I wells to prevent migration of waste beyond the injection zone. These include requirements to continuously record and monitor the injection pressure and the annulus pressure of the injection wells. If there is a deviation from acceptable limits as specified within the Class I Permits for either of these measurements, then the well will automatically shut down (Part II.C.6 of the permits and OAC Rule 3745-34-56). The Class I Permits require that operational data collected by the

operator must be submitted to the Agency for review on a monthly basis (Part II.D of the Class I Permits and OAC Rules 3745-34-38, 3745-34-56, and 3745-34-57), along with quarterly and semi-annual reports submitted relaying the results of testing for corrosion of the well materials, and ground water monitoring. In addition, since this is the first conversion of a Class II to a Class I well in Ohio, the Agency commits to conducting inspections at least quarterly every year, rather than the standard two inspections for Class I facilities. Annual testing for mechanical integrity of the wells is conducted by the facility. Agency staff are required by rule to observe these mechanical integrity tests. Operational problems that are discovered reviewing any of the documents or observations made at the facility can result in enforcement (Part I.E.1 of the Class I Permit and OAC Rule 3745-34-26).

The Agency also recognizes (from review of Ohio Department of Natural Resources (ODNR) records) that in six years of operations in Ohio, Buckeye Brine has had no violations of their Class II injection well permits. Also, no data has been submitted or located that demonstrates either a surface release of waste to the environment or migration of injected waste outside of the permitted injection zone at the Buckeye Brine facility has occurred during their six years of operation.

9. Comment: One commenter raised concerns about injected fluids moving upward through fault zones or compression fractures. The commenter also noted that compression fractures do not produce a large fault but do produce micro fissures.

Response: The Buckeye Brine applications demonstrate geologic suitability of the proposed locations of the well(s) in accordance with OAC 3745-34-13(F). In accordance with OAC Rule 3745-34-40, Buckeye Brine was required to conduct a seismic reflection survey for the purpose of determining whether faults or fractures existed within the area of the well where formation pressures may be increased due to the operation of the well(s). Buckeye Brine's seismic reflection study covered nearly 10 miles in the immediately vicinity of the facility. No data presented suggested the presence of any geological features that would allow for unauthorized vertical movement of contaminants outside of the zones designated within the Class I Permits.

10. Comment: One commenter raised concerns about previously injected fluids (flowback water from shale gas wells) that may contain 'slickwater' chemicals and questioned if this increases the risk for seismic activity.

Response: The comment implies that injection of flowback water with antifriction additives (slickwater chemicals) promotes the occurrence of induced seismic events. While the injection of fluid can be one factor, it must occur simultaneously with other factors to induce a seismic event. These other factors are the presence of a fault and increasing hydraulic pressure on the fault. The seismic report included with the application show no faults in the rocks younger than the Pre-Cambrian bedrock. While some faulting was detected in the Pre-Cambrian bedrock, the injection of waste is into the rock formations younger than the Pre-Cambrian and most of the injection is into the upper part of the Rome Formation more than 1,000 feet above the Pre-Cambrian bedrock. The application also indicates that in six years of injection activity at the facility the pressure increase in the injection zone is less than 40

pounds per square inch (psi). Under current ODNR permitted injection pressures, which are identical to the proposed maximum injection pressure in the Class I Permits, no seismic events have been detected in six years of injection at and around the facility. In summary, the Class I Permits do not propose to inject waste into any known fault and do not propose to inject at a pressure that would cause an unreasonable risk of seismic activity.

While there is no unreasonable risk of seismic activity occurring due to injection of waste at the Buckeye Brine Class II Facility, Ohio EPA has the authority to require passive seismicity monitoring at or near the injection site and has added passive seismic monitoring requirements to the Class I Permits.

11. Comment: Several commenters were concerned that injection at the Buckeye Brine facility could induce earthquakes in the vicinity of the facility. Some commenters have noted that they have felt earthquakes while living in the area of the city of Coshocton and have put forth this as evidence that fault lines exist beneath Coshocton County.

Response: ORC 6111.044 requires an applicant to demonstrate that there is no unreasonable risk of inducing seismic activity as part of its proposed operations. The seismic survey conducted and submitted with the permit applications showed no faults within or above the Cambrian Mount Simon Sandstone within the 2-mile area of review around the Buckeye Brine facility. In addition, ODNR required Buckeye Brine to maintain and operate a seismic monitoring station at their facility for the six months prior to operating the Class II injection wells and for the first 12 months after injection commenced. No seismic events were recorded by the seismic monitoring station. ODNR released Buckeye Brine from the seismic monitoring requirement at the end of one year of injection operations due to a lack of seismic activity. There have also been no seismic events suspected to be caused by injection at the facility during the six years of Class II injection well operations.

While, as the commenters note, earthquakes have been felt in Coshocton County, there is no record of an earthquake above a magnitude 2.0 that was centered in Coshocton County according to ODNR (https://gis.ohiodnr.gov/MapViewer/?config=earthquakes) or information linking any earthquake to the operation of the Class II injection wells. Based on the seismic survey completed as part of the application and all other available information, there appears to be no unreasonable risk of the injection activity causing an earthquake under or near the Buckeye Brine facility.

See Response 10 regarding the passive seismic monitoring requirement that was added to the Class I Permits.

12. Comment: Several commenters expressed concern that the bottom 87 feet of 8.625-inch long string casing in Adams Well #3 had separated from the upper part of the production casing. The commentators questioned how this well could be approved as a Class I injection well with this defect.

Response: The permit application indicated the lower 87 feet of long string casing in Adams #3 separated from the upper 5,912 feet of casing and dropped 50 feet into the borehole.

See Figure 1 for the well schematic for Adam's #3. All indications are that the casing separation occurred shortly after the casing was cemented in place. The day after cementing, contractors re-entered the well to drill out the cementing tools and shoe track of the base of the casing. In doing so, two joints of casing, a float shoe and float collar disengaged from the long string casing. Based on cement bond logs reviewed, the bottom hole cement wasn't given adequate curing time before re-entering the well to drill out the shoe track. At no time did Adams #3 lose mechanical integrity as defined by OAC Rule 3745-34-34. When the bottom portion of the casing separated, it did so at a depth immediately below the injection packer. Therefore, Buckeye Brine was able to comply with the ODNR requirements for maintaining annulus pressure to demonstrate mechanical integrity.

Review of the well construction specifications and tests completed on the well indicate the upper portion of the well from ground surface to the present bottom of the casing at 5,912 feet below ground surface (bgs) meets the construction standards (OAC Rule 3745-34-37) for a Class I injection well and will prevent the migration of waste into the underground sources of drinking water at the facility.

To establish a baseline for future comparisons, as is customary for new Class I injection wells, the Agency is requiring the operator to conduct several tests (radioactive tracer log, casing inspection log, etc.) prior to injection of waste under the Class I Permits (Part I.H.2 of the Class I Permits and OAC Rule 3745-34-55). Annual testing observed by Agency staff (Part I.H.3 of the Class I Permits OAC Rule 3745-34-57) will allow the Agency to monitor the condition of the well materials over time.

13. Comment: Several commenters expressed concern that Adams Well #1 does not have cement behind the seven-inch diameter long string casing from about 900 feet below ground to surface. The commenters questioned how this well could be approved as a Class I injection well with this defect.

Response: The permit application demonstrates the absence of cement behind the upper 900 feet of seven-inch diameter long string casing in Adams #1. See Figure 2 for the well schematic for Adams #1. To address this issue, the Class I Permit contains a condition requiring the operator to place cement behind the long string casing, and that it be witnessed by Ohio EPA staff, prior to commencing injection into Adams #1 under the Class I permit. The remainder of the well above 906 feet below ground surface has cement behind the conductor casing and surface casing as has been witnessed by ODNR staff. Further, a review of data concerning the casing and cement indicates that the well is properly constructed from 906 feet bgs to 5,898 feet bgs and will prevent the migration of waste behind the casing into a USDW.

14. Comment: Several commenters stated that the Area of Review (AOR) examined for these permit applications was too small given most of the waste will flow into a paleo-karst feature located at the top of the Rome Formation.

Response: OAC Rule 3745-34-32 describes how the AOR is to be determined. The AOR can be calculated or a fixed radius can be utilized. The fixed radius established in rule for an AOR for a non-hazardous Class I injection well is one-quarter of a mile (OAC rule 3745-34-32(B)). Buckeye Brine calculated a radius of waste migration after 6 years of injection in Section IV of the permit applications. The calculated distance was 0.85 miles. The AOR used in the permit applications is two miles and is more than twice as far as the calculated distance. Accordingly, the two-mile AOR used within the permit applications is protective of the USDW.

15. Comment: Several commenters expressed a concern that waste migration within the Rose Run Formation could have an impact on the oil and gas deposits within the Rose Run.

Response: The Agency is required, per Section 6111.044 of the ORC, to consult with the ODNR Division of Oil and Gas Resources Management (DOGRM) to determine the potential impact of injection of waste via a Class I injection well on oil and gas reserves. The results of this consultation are contained in amended Sections VI and VII of the permit applications and in a July 18, 2018, determination by the Chief of DOGRM that "…the proposed well or injection will not present an unreasonable risk that waste or contamination of recoverable oil or gas in the earth will occur."

16. Comment: Several commenters expressed concern that injected fluid would migrate to one of the oil and gas wells completed within the Rose Run Formation within the two-mile AOR and then migrate to the surface via the oil and gas well.

Response: There is no unreasonable risk (ORC Section 6111.044) of waste injected into the wells at the Buckeye Brine facility migrating toward and into any of the oil and gas wells completed in the Rose Run Formation. None of the nine currently active wells producing oil and gas from the Rose Run Formation are completed in any formation beneath the Rose Run Formation, and the part of the Rose Run Formation the oil and gas wells are completed within are isolated from one well to another.

Buckeye Brine identified 32 artificial penetrations (injection, oil and gas wells) below the confining layer (deeper than 5,200 feet bgs) (Table V.C of the permit applications) within the permit applications (Section V of the permit application). Based on review of the well completion logs submitted with the permit applications, three of these are the injection wells at Buckeye Brine, 11 are plugged and abandoned oil and gas wells per ODNR requirements and nine are oil and gas wells that were cemented back to above 5,200 feet bgs and produce oil and gas from the Clinton or Berea Formations per ODNR requirements. The remaining nine wells produce oil and gas from the Rose Run Formation. All the oil and gas wells drilled below the Rose Run have had casing installed from the top of the well to the bottom with cement installed behind the casing per ODNR requirements and to prevent excess salt water from entering the well. This casing has been perforated in the production sands of the Rose Run and the only fluids entering these oil and gas wells are through these perforations.

The oil and gas deposits in the Rose Run Formation in the AOR are contained within the upper three sand zones of the formation (Section VI and VII of the permit applications). The upper surface of the Rose Run in the AOR is an erosional surface where the oil producing sand zones solely exist within isolated erosional remnants (Figure 3). These erosional remnants are capped by the impermeable limestones and dolomites of the Wells Creek and Lower Chazy Shale formations and surrounded by the impermeable dolomites of the remaining Rose Run Formation. Because the oil-bearing sand zones only exist within these erosional remnants and are isolated from each other by the erosional surface, the Rose Run dolomites and the Beekmantown dolomite, it is not possible for contaminants to migrate along the oil-bearing sands from one erosional remnant to another. Therefore, no injected waste can migrate into the oil and gas bearing zones and then into an oil or gas well completed into these zones.

17. Comment: Several commenters questioned whether a Class II injection well can be converted to a Class I non-hazardous waste well in an environmentally safe manner. They noted that this type of conversion had never taken place in Ohio before.

Response: The Agency acknowledges that no permitted Class II injection well has been permitted as a Class I injection well in Ohio to date. Several Class II injection wells have been permitted as Class I injection wells in California and Texas and U.S. EPA Region V has permitted this re-classification in Michigan. No well would be permitted as a Class I injection well unless it meets the standards in Ohio statute and rule for a Class I injection well. In order to approve a permit to operate for a Class I injection well, the director of Ohio EPA must determine the construction and operation of the well meets the criteria in Section 6111.044 of the ORC and Chapter 3745-34 of the OAC. If these criteria are met, then the construction and operation of the Class I injection well will be environmentally safe (ORC Section 6111.044). Information submitted with the permit applications supports that the two injection wells at the Buckeye Brine facility meet the Class I requirements.

18. Comment: Several commenters expressed concern with the presence of two types of injection wells (Class I and II) at the same facility, and that confusion will result over jurisdiction and whether either Ohio EPA or ODNR will take the action necessary to enforce their requirements.

Response: Ohio EPA will be enforcing Class I injection well requirements pursuant to OAC Chapter 3745-34. Ohio EPA will be responsible to ensure the operation of the Class I injection wells is compliant with these rules and will take the appropriate action if they are not. ODNR will have primary responsibility for the permitted operations involving the injection of oil and gas wastewater in the Class II well. Ohio EPA and ODNR will coordinate in responding to violations regarding any permitted activity.

19. Comment: One commenter asked if Buckeye Brine has requested confidentiality on any information about any aspect of their operation.

Response: Buckeye Brine has made no requests to Ohio EPA for confidentiality under Rule 3745-34-03 of the OAC for any information submitted to Ohio EPA as part of these permit applications.

20. Comment: Several commenters asked what non-hazardous waste will be allowed to be injected.

Response: Part II.C.4 of the Class I Permits only allows those substances defined as non-hazardous waste to be injected into the Class I injection wells at the Buckeye Brine facility. A list of non-hazardous wastes proposed by Buckeye Brine to be accepted for injection are contained in Attachment III.B.4 (Class I Waste Matrix) of the permit applications (Table 1).

To provide clarity that hazardous waste is not allowed to be injected, Part II.C.4 of the Class I Permits was amended to ensure consistency with Sections 3 and 5 of the Waste Analysis Plan submitted as Attachment III.B.4 of Section III of the draft permit applications that was approved under Part II.D.3 of the Class I Permits. The following wastes will not be permitted for injection:

a. Waste that is identified and regulated as a hazardous waste under ORC 3743.01(J) and Title 40 of the Code of Federal Regulations (CFR) Section 261.3, and Rule 3745-51-03 of the OAC;
b. Sewage generated by Buckeye Brine as defined within OAC Rule 3745-34-01(S)(5);
c. Infectious waste as defined per OAC Rule 3745-27-01(I)(6);
d. Radioactive wastes other than naturally occurring radioactive material (NORM) or technologically enhanced naturally occurring radioactive material (TENORM) as defined by the Ohio Department of Health;
e. PCB wastes as defined in the federal Toxic Substances Control Act (TSCA);
f. Any waste resulting from an action taken under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) or the Superfund Amendments and Reauthorization Act (SARA);
g. Non-infectious medical wastes;
h. Explosives;
i. Military or civilian ordnance;
j. Gaseous wastes in high pressure cylinders; or
k. Waste of unknown origin.

21. Comment: One commenter asked about what hazardous waste products will be allowed to be injected.

Response: There are two types of Class I wells: those that can accept non-hazardous wastes and those that can accept hazardous waste. The permit applications submitted by Buckeye Brine were for Class I wells that will only take non-hazardous wastes. The Class I Permits do not allow the injection of hazardous waste into either of the Class I injection wells at the Buckeye Brine facility.

With respect to Class I wells that can accept hazardous waste, they can accept any material that meets the definition of hazardous waste per ORC 3743.01(J) and 40 CFR 261.3 and OAC Rule 3745-51-03. Applicable permits must be obtained from Ohio EPA and U.S. EPA prior to the injection of hazardous waste into a Class I injection well. This includes an underground injection control permit to operate that specifically allows the injection of hazardous waste, all permits that authorize the surface handling of hazardous waste and a U.S. EPA approved land ban petition. Again, the Buckeye Brine Class I wells that are the subject of this review are not able to accept any hazardous waste pursuant to the terms of the Class I Permits.

22. Comment: One commenter asked if Buckeye Brine provided enough data and documentation to show no artificial penetrations or faults exist in formation and surrounding structures.

Response: The applications contain sufficient information and data to indicate that there are no artificial penetrations or faults that could allow contaminants to migrate vertically above the confining zone. Buckeye Brine submitted a seismic report based on a seismic survey conducted per a plan approved by Ohio EPA. This report is included in Section II.C of the permit applications. The data indicates no faulting extending up above the Pre-Cambrian bedrock into the injection zone within two miles of the Buckeye Brine facility. In addition, a review of the artificial penetrations beyond 5,200 feet bgs indicate no unreasonable risk (ORC 6111.044: see previous comment) for migration of waste into these artificial penetrations.

23. Comment: One commenter asked if Ohio EPA will require the facility to conduct continuous pressure monitoring, record injection rates, conduct routine calibration of monitoring equipment and will there be an automatic shutdown system if limits are exceeded.

Response: Yes, all these items are addressed in the Class I Permits. Continuous monitoring is required for the following data (Appendix D and Part II.D.4 of the Class I Permits and OAC Rules 3745-34-38 and 3745-34-56): injection pressure, annulus pressure, flow rate, volume of injection fluid, temperature of injectate and the specific gravity of the injectate. Part I.E.10 and Part II.D.1 of the Class I Permits and OAC Rules 3745-34-38 and 3745-34-57 require that all measurements taken be representative of the monitored activity. This includes proper calibration of all instruments performing the readings. Part II.C.6 of the Class I Permits and OAC Rule 3745-34-56 require that the operator have an automatic warning and shut down (AWSD) system to automatically issue a warning and shut down the wells should the injection pressure equal or exceed the permits' maximum injection pressure or whenever the annulus pressure is less than 50 pounds per square inch above the injection pressure.

24. Comment: Several commenters said the permit applications should be denied because of the lack of core samples recovered and tested as required by ORC 6111.043(E)(5) and OAC 3745-34-15(A)(2)(b). Other commenters questioned how Ohio EPA can feel confident that the geology of the area is known well enough that waste, fate and transportation models will be accurate?

Response: ORC 6111.043(E)(5) requires the results of core samples and the results of laboratory testing of core samples "…to the extent they are available..." While the ORC does not require tests on cores if the cores are not available, Buckeye Brine's permit applications included mud logs, geophysical logs, injectivity testing, pressure fall off testing and radioactive tracer tests that have provided the information regarding locations of specific formations, porosity of each formations, and the permeability and injectivity of the formations in the injection zone. Despite the unavailability of core samples, this additional data from the permit applications provided substantively the same information that would have been derived from core samples.

25. Comment: Several commenters said the permit applications should be denied due to the lack of sampling of undisturbed formation water as required by ORC 6111.043(E)(5).

Response: ORC 6111.043(E)(5) does require the submission of the results of laboratory tests of formation fluids. No physical or chemical testing of the native formation water was performed when the injection wells were initially constructed. However, Section IV.3 of the permit applications contains the results of tests and information concerning the properties of the native formation fluid in the injection zone as determined from other wells in the area surrounding Buckeye Brine. This information fulfills the requirements of ORC 6111.043(E)(5).

26. Comment: One commenter said that Buckeye Brine has failed to meet the provisions of ORC 6111.043(C)(9) and OAC 3745-34-12(E)(1) that require the applicant to provide the chemical composition and physical properties of the substances to be injected.

Response: The permit applications included the information required regarding chemical composition and physical properties of substances to be injected. Specifically, Part II.C.4 of the Class I Permits only allow the injection of non-hazardous waste into the Class I injection wells. Attachment III.B.4 of the permit applications list a variety of non-hazardous wastes that Buckeye Brine proposes to accept (Table 1). This attachment also gives the general chemical composition of these wastes.

27. Comment: One commenter raised concerns about the facility injecting unknown or untested materials that may chemically interact with the previously injected fluids.

Response: The permit applications describe the non-hazardous wastes to be accepted and their general chemical properties within Attachment III.B.4 (Table 1). The injection zone formation water properties are described within Section IV.3 of the permit applications. The waste injected into the Class II wells by Buckeye Brine has been predominantly saltwater that results from oil and gas well exploration and production. Based on the information that has been submitted the wastes to be injected will be compatible with the Class II well wastes previously accepted and are not expected to cause an adverse reaction within the well. The proposed Waste Analysis Plan describes the waste acceptance procedure (Sections 2.3 and 4.2.2 of the proposed Waste Analysis Plan).

In order to clarify that non-compatible waste shall be identified, stored and handled in a manner to prevent an adverse chemical reaction either above ground or below, the Class I Permits and the waste analysis plan are conditioned to require director approved amendments to the waste analysis plan specifying procedures to identify non-compatible waste. The Class I Permits were also be amended to require a director's approved plan, as part of the Waste Analysis Plan, for the handling and storage of identified non-compatible wastes. These amendments will have to be approved prior to acceptance of waste for disposal into the Class I injection wells.

28. Comment: One commenter said the lack of horizontal spacing between the injection wells. He noted that depending on depth, one oil and gas well can only be placed on a 20- or 40-acre parcel and questioned why injection wells do not have the same spacing requirements.

Response: Neither Ohio statute nor rule require a minimum distance between Class I injection wells or a minimum amount of acreage per Class I well.

29. Comment: One commenter said that due to the high pressure (greater than 4,000 psi) in the injection zone created by injecting the waste into the injection zone and due to native fluid in the injection zone flowing against this pressure towards the injection well, that the injected fluid will migrate upward into the lower pressurized formations above the injection zone and then into the USDW.

Response: Pressure within the injection zone prior to injection beginning in 2013 was measured at 2,730 psi. Because the injection pressure is greater than the natural formation pressure, the injection fluid will radially migrate horizontally in the injection zone away from the injection wells. While pressure in the injection zone near the injection wells is above the natural formation pressures above the injection zone, the presence of formations with low to zero permeability prohibits the movement of injection fluid upward toward the USDW. These confining zones preventing migration upward include the Trenton Formation, the Cincinnatian Shales and the Devonian Shales.

30. Comment: One commenter asked if the 10,000 barrels of fluid allowed to be injected into the injection wells under the Class I Permits included any of the fluid to be injected into the remaining Class II well?

Response: The Class I Permits and the limitations on injection contained within the Class I Permits only apply to the Class I wells and not the Class II wells. The quantity of fluid being injected into the Class II wells is regulated by ODNR. The permitted injection quantities for the Class I Permits are a slight reduction from what was allowed under the Class II Permits.

31. Comment: Several commenters expressed concern that financial assurance covers only closing the injection wells but does not cover any environmental damage that may be caused by a spill or release to a USDW.

Response: OAC Rule 3745-34-62 establishes the financial assurance obligations and the rules referenced require financial assurance be provided for waste liability, closure and post-

closure care. The Class I Permits were modified to include a requirement to comply with the waste liability requirements of OAC Rule 3745-55-47. In addition, the permits require the permittee to comply with all other applicable laws and regulations

32. Comment: One commenter asked what prevents Buckeye Brine from taking a load of waste that does not meet the non-hazardous specifications?

Response: As discussed in Comment 27, Buckeye Brine must receive director's approval for its Waste Analysis Plan prior to injecting waste. Following this plan will ensure that hazardous waste is not accepted at Buckeye Brine. The Waste Analysis Plan describes the procedures that Buckeye Brine will follow in accepting waste at the facility for disposal into the Class I injection wells. These procedures include pre-acceptance procedures, such as the generator of the waste submitting chemical and physical data of the waste for pre-approval prior to shipment of the waste. No waste can be accepted at Buckeye Brine per the Waste Analysis Plan unless it has been through the pre-acceptance procedure. Every load of waste delivered to the Buckeye Brine site is cross checked against the pre-acceptance data including visual inspection and chemical testing prior to acceptance and injection. Buckeye Brine will be required to maintain records, submit reports and will be inspected regarding compliance with the Waste Analysis Plan. Any violations will be subject to potential enforcement action from Ohio EPA.

33. Comment: One commenter asked that someone or some agency should be identified as being responsible for closures or post closures that includes monetary coverage for keeping them closed so when the place finally closes, there is assurance nothing will go wrong.

Response: Buckeye Brine is required to establish a financial assurance mechanism that is fully funded to the estimated cost of closing the two wells and monitoring during post closure care (OAC Rule 3745-34-62 and Part I.F.7 of the Class I Permits) prior to commencing injection into the Class I wells. They are required to regularly update these costs and the funding mechanism they provide (Part I.I.1.b of the Class I Permits and OAC Rule 3745-34-62). If Buckeye Brine cannot close the two Class I wells when necessary, then the Ohio EPA will draw on the money set aside in the financial assurance mechanism and complete the closure and post closure of the wells utilizing that money.

34. Comment: One commenter noted that shale gas wells are often cleaned with acids and raised concerns about adverse reactions with fracking water (proprietary ingredients) and the overlying confining rock layers and casing cement.

Response: Non-hazardous acidic waste ($2<pH<7$) injected into the limestone or dolomite formations could cause some insignificant dissolution of the receiving formation and concrete around the casing. However, based on concern for migration of waste upward along the bore hole or behind the casing, Part I.H.3.b of the Class I Permits require that the bottom hole cement be annually tested by means of an approved radioactive tracer survey in accordance with OAC 3745-34-57(I)(2). Part I.H.3.c of the Class I Permits require that every three years the operator perform a temperature log, a noise log or another approved test to test for fluid movement along the bore hole in accordance with OAC 3745-34-57(I)(3).

Migration of waste behind the casing or along the borehole would require cessation of injection and corrective action on the part of the operator to prevent further migration (OAC Rules 3745-34-30 and 3745-34-33). In addition, see Response 27 for requirements related to the compatibility of wastes.

35. Comment: One commenter raised concerns that limestone or other rock layers could be eroded by the high pressure injected fluids.

Response: The comment implies that due to the pressure differential between the injection fluid and the formation fluid that mechanical erosion is occurring to the sidewalls and receiving formations particularly the upper part of the Rome Formation that is interpreted as a collapsed karst feature. Caliper logs performed in 2016 demonstrated that any mechanical erosion occurring is insignificant and not comparable to “solution caves” or to the physics of jetting water out of a pressure washer against cement. The pressure exerted at the receiving rock formation(s) is hydraulic pressure based mostly on the weight of the 5,900-foot fluid column throughout the length of the 4 ½-inch injection tubing in the well.

36. Comment: One commenter raised concerns about the steel casing being corroded by sulfides, heavy metals or other corrosive products that are injected.

Response: Buckeye Brine is required to conduct a corrosion monitoring program per OAC Rule 3745-34-57 and Part II.D.6 of the Class I Permits. The operator is required to comply with the corrosion monitoring plan (Attachment III.B.2) that was included in the permit applications. This plan requires that samples of casing and injection tubing be placed in the injection waste and evaluated quarterly as to the amount of corrosion that has occurred. A quarterly report must be submitted per Part II.D.6 of the Class I Permits. Other required monitoring that checks for corrosion includes the continuous monitoring for annulus pressure, annual radioactive tracer tests, and casing inspection logs (performed any time the injection tubing is removed). Failure to maintain annulus pressure or pass either the radioactive tracer test or the casing inspection log will result in immediate cessation of injection and shut in of the well until the necessary repairs are made.

37. Comment: One commenter said that while Ohio EPA expressed the opinion at the public hearing that there would be strong regulation of these Class I injection wells if approved, there are nationwide issues with lax enforcement of violations at permitted injection wells. (commenter cited a 2012 Propublica article by Abrahm Lustgarten.

Response: Ohio EPA has had approval to enforce the UIC program for U.S. EPA since 1984. In 1991, Class I UIC regulations were expanded, and increased funding from Class I injection well and disposal fees allowed increased staffing to monitor the Class I injection wells in Ohio. Ohio EPA has established Class I operational standards that exceed the federal requirements for monitoring, testing and reporting. Ohio EPA staff review and comment on all monthly, quarterly and other reports submitted in requirement of statute, rule or permit from Ohio Class I well operators. U.S. EPA has audited the Ohio UIC program many times over the years and found Ohio EPA’s UIC program equivalent to or more stringent that the federal program. The last U.S. EPA audit results concluded that Ohio

EPA's UIC Program "continues to run a sound and effective UIC program for Class I, IV, and V wells in Ohio."

38. Comment: One commenter asked how often will Ohio EPA actively monitor these injection wells?

Response: Monitoring (Part II.D of the Class I Permits and OAC Rules 3745-34-38, 3745-34-57, and 3745-34-58), testing, (Part I.H of the Class I Permits and OAC Rule 3745-34-34) and reporting (Part II.E of the Class I Permits and OAC Rules 3745-34-38 and 3745-34-58) requirements are included within the Class I Permits. These include requirements to continuously record and monitor the injection pressure and the annulus pressure of the injection wells. If there is a deviation from acceptable limits as specified within the Class I Permits for either of these measurements, then the well will automatically shut down (Part II.C.6 of the permits and OAC Rule 3745-34-56). The Class I Permits require that operational data collected by the operator must be submitted to the Agency for review on a monthly basis (Part II.D of the permits). There are also quarterly and semi-annual reports submitted relaying the results of testing for corrosion of the well materials and ground water monitoring. In addition, because this is the first conversion of a Class II to a Class I well in Ohio, the Agency commits to conducting inspections at least quarterly every year, rather than the standard two inspections for Class I facilities. Annual testing for mechanical integrity of the wells is conducted by the facility. Agency staff are required by rule to observe these mechanical integrity tests. Operational problems that are discovered reviewing any of the documents or observations made at the facility can result enforcement action.

39. Comment: One commenter mentioned the lack of transparency and accountability.

Response: All documents required by statute, rule or permit submitted by Buckeye Brine are and will be available on the Agency's website in the eDocs repository. In addition, all Agency written correspondence to Buckeye Brine is posted on the Agency's website. Buckeye Brine is accountable to comply with all applicable requirements in statute, rules and permits during the operations of their facility. Any failure on the part of Buckeye Brine to comply with these requirements could result in enforcement.

40. Comment: Several commenters asked how the facility can take out-of-state waste.

Response: There are no state or federal laws prohibiting a permittee from taking waste which originated outside of the state where the permitted facility is located.

41. Comment: One commenter stated there appears to be at least 32 pages of the document by Titanium Environmental Services LLC omitted from the Ohio EPA permit proposal and requested they be made available.

Response: Ohio EPA has re-reviewed the applications and there did not appear to be any missing pages to this application(s). The application is available on the Agency's website at https://epa.ohio.gov/dir/publicrecords.

Ohio EPA has reviewed the permit applications and it includes all information required by the applicable statutes and rules.

42. Comment: One commenter questioned the validity of a statement in the application that asserts the injected waste will be sequestered for 10,000 years.

Response: Approval on the Class I Permits is not based on Buckeye Brine's assertation referenced in the comment; sequestration of waste for 10,000 years is not one of the criteria for approval or denial of a permit application. The Class I Permit approvals are based on Ohio EPA's determination that the permit applications comply with the provisions of ORC 6111.044 and rules.

43. Comment: One commenter said that Page 11 Appendix I, item 10(E) of the application states "other than the two wells Buckeye is seeking to permit there are no solid waste disposal units at the site." This answer infers that the two wells seeking permits are considered solid waste facilities. What authority has been granted Buckeye Brine to accept, handle, pre-treat and/or dispose of solid waste under Ohio law regulating solid waste?

Response: ORC Section 3734.01 defines a solid waste facility and the two wells have not been licensed or permitted as solid waste facilities. The draft Waste Analysis Plan establishes the procedure for accepting waste to be injected into the proposed Class I injection wells at the Buckeye Brine facility. Buckeye Brine does not have a license or a permit to accept, handle, pre-treat or dispose of waste beyond the scope of these the Class I Permits. Any solid waste generated through operation of the facility must be handled, stored and disposed in accordance with all applicable laws.

44. Comment: One commenter said that given the Utica Shale is located as a component of the confining zone where it is considered impermeable when no hydraulic fracturing occurs, how will Ohio EPA handle any future attempts to develop the Utica Shale within the proximity of the AOR?

Response: The Utica Shale is not a component of the confining zone. The Utica Shale is above the confining zones of the Class I Permits. All oil and gas exploration activities in Ohio are managed by the ODNR-DOGRM.

45. Comment: One commenter asked for the status of the unplugged wells and who is responsible for enforcing OAC Rule 1501:9-3-07(K) which states that any well which is or becomes incapable of injection must be plugged in accordance with ORC Rules 1509.13 and 1509.15 unless permission is granted by the chief.

Response: Adams #3 was removed from service under the direction of ODNR after the casing part at the bottom of the well was discovered (discussed in Response 13). Given the depth of the parting, which corresponded to a formation other than that originally permitted as the injection interval, operation of the well in the current state would prohibit Buckeye Brine from complying with its Class II Permits as originally issued. Based on review by Ohio EPA staff, Adams #3 is physically capable of injection, but as stipulated in the Class I

Permits, Buckeye Brine is required to demonstrate mechanical integrity with UIC Program staff as witness, prior to injecting Class I fluids. Please direct any further questions or comments regarding the rules of OAC 1501:9 to ODNR's DOGRM which is responsible for enforcing those rules.

46. Comment: One commenter asked if there is cause for concern with overlapping intervals listed for the confining zone and injection zones proposed in the Adams #1 permit to operate.

Response: The permitted injection interval is from the total depth of the casing to the originally drilled total depth. The casing depth used for the upper range value of the injection interval range was inadvertently used for the bottom range value used in the permits for the containment interval. Both Class I Permits were revised. The 5,898-foot depth used for the bottom value of the containment interval for Adams #1 was changed to 5,860 feet which corresponds to the top of the Gull River Formation. The Adams #3 containment interval was revised from 5,912 feet to 5,842 feet which also corresponds to the depth of the top of the Gull River.

47. Comment: One commenter asked how Ohio EPA can guarantee the confining zone, which has been penetrated frequently for oil and gas exploration, hasn't been compromised.

Response: Per the AOR requirements discussed previously in this document, the applicant is required to identify all "artificial penetrations" within the AOR that penetrate the proposed injection zone. Once identified, the applicant must determine that all wells are adequately "completed or plugged" per the requirements of OAC Rule 3745-34-13(D). No wells were identified by Buckeye Brine or application reviewing authorities as wells which compromise the confining zone's ability to confine injected waste fluids.

48. Comment: One commenter asked that Ohio EPA verify Buckeye Brine is in compliance with the Clean Water Act and asked whether the facility is required to obtain and NPDES permit.

Response: Buckeye Brine is currently in compliance with the Clean Water Act and is in the process of obtaining any necessary permits. All NPDES permitting is managed through Ohio EPA's Division of Surface Water (DSW).

49. Comment: One commenter asked about the radioactive content of the brine water that is currently being injected.

Response: Ohio EPA doesn't regulate the Class II wells in operation at the Buckeye Brine site. Please direct those questions to the ODNR-DOGRM. Regarding acceptance of waste for the Class I injection wells, Buckeye Brine will have to comply with not only the provisions of their permits to operate but with all applicable federal and state statutes and regulations including those applying to radioactive substances regulated by the Ohio Department of Health.

50. Comment: One commenter asked why rumors that Buckeye Brine employees at a Urichsville site failed drug tests was never brought up at the meeting.

Response: Ohio EPA has no jurisdiction over the employees of any company that holds an Ohio EPA issued permit. Facility personnel issues are strictly between the employer and employee.

51. Comment: One commenter asked that Ohio EPA not consider comments submitted on behalf of the Coshocton City Council as that letter has a "highly questionable origin" (because it's not on official letterhead and not signed by the council members) and therefore it should not be considered a position taken by the local government or any of its officials.

Response: Mr. Brad Fuller, City Council Member representing Coshocton's 4th Ward provided testimony on behalf of the Coshocton City Council during the April 15, 2019, public meeting. Councilman Fuller's testimony cited that all seven representatives of City Council opposed Ohio EPA issuance of Class I permits to operate is accepted into the official record and was given consideration before issuing the permits.

52. Comment: One commenter asked that Ohio EPA evaluate the potential impact to endangered wildlife.

Response: Ohio EPA has no evidence to suggest that the Class I wells would present any sort of impact toward any endangered wildlife as the Class I Permits stipulate that all injected waste fluids must remain over 5,000 feet below the Earth's surface. In addition, based on the applications there is no indication that critical habitat for any threatened or endangered species is being impacted as a result of the permitted activities.

53. Comment: One commenter expressed concern that it's unclear how far the injected waste can migrate.

Response: The cover page of the permits to operate define the vertical boundaries for waste migration. The predominant dispersion will occur laterally. A small quantity of waste may migrate vertically within the injection zone, but any further vertical migration would be prevented by the confining zone which begins at 5,860 feet below ground level. The radius of the waste plume at the end of the five-year modeled injection period ending in April 2023 (applications originally submitted June 1, 2017) is calculated to be approximately 4,488 feet.

54. Comment: One commenter asked if there will be periodic water testing at the Coshocton Christian School by an independent company with no expense to the school.

Response: The facility is not required to conduct monitoring at the Coshocton Christian School. The Class I Permits require ground water monitoring at the facility site as discussed in Comment 6. Ohio EPA will require a minimum of three monitoring wells that must be sampled at least quarterly. Ohio EPA believes this will be adequate for determining whether the proposed injection activities, if approved, are affecting the quality of the lowermost USDW.

55. Comment: One commenter asked if the potential for water contamination is the same with Class I wells compared to Class II.

Response: As discussed above, Buckeye Brine demonstrated in its applications that there is no unreasonable risk of contamination to an underground source of drinking water. The construction requirements for Class I wells, with the geologic features present in the confining zone, and the monitoring requirements during operation of a Class I well provide the necessary protection to prevent waste from migrating vertically into an underground source of drinking water.

End of Response to Comments

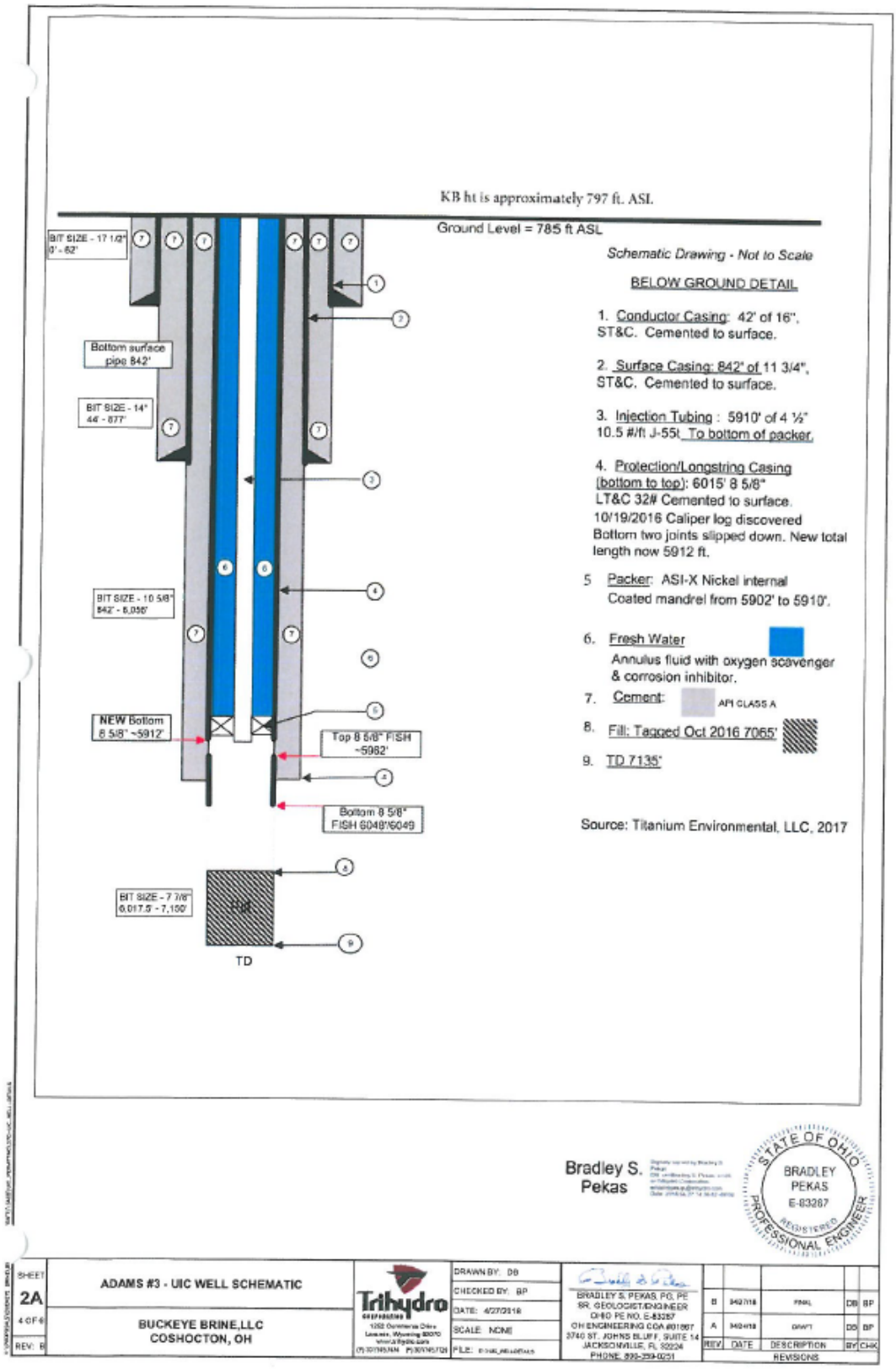
KB ht is approximately 797 ft. ASL
Ground Level = 785 ft ASL
Schematic Drawing - Not to Scale
BELOW GROUND DETAIL
1. Conductor Casing: 42' of 16", ST&C. Cemented to surface.
2. Surface Casing: 842' of 11 3/4", ST&C. Cemented to surface.
3. Injection Tubing : 5910' of 4 ½" 10.5 #/ft J-55(To bottom of packer.
4. Protection/Longstring Casing (bottom to top): 6015' 8 5/8" LT&C 32# Cemented to surface. 10/19/2016 Caliper log discovered Bottom two joints slipped down. New total length now 5912 ft.
5 Packer: ASI-X Nickel internal Coated mandrel from 5902' to 5910'.
6. Fresh Water
Annulus fluid with oxygen scavenger & corrosion inhibitor.
7. Cement: API CLASS A
8. Fill: Tagged Oct 2016 7065'
9. TD 7135'
Source: Titanium Environmental, LLC, 2017
BIT SIZE - 17 1/2" 0' - 62'
Bottom surface pipe 842'
BIT SIZE - 14" 44' - 877'
BIT SIZE - 10 5/8" 842' - 6,035'
NEW Bottom 8 5/8" ~5912'
Top 8 5/8" FISH ~5982'
Bottom 8 5/8" FISH 6048'/6049
BIT SIZE - 7 7/8" 6,017.5' - 7,150'
Fill
TD
Bradley S. Pekas
STATE OF OHIO
BRADLEY PEKAS
E-83267
REGISTERED
PROFESSIONAL ENGINEER
SHEET 2A 4 OF 6
REV: B
ADAMS #3 - UIC WELL SCHEMATIC
BUCKEYE BRINE,LLC
COSHOCTON, OH
Trihydro
DRAWN BY: DB
CHECKED BY: BP
DATE: 4/27/2018
SCALE: NONE
FILE:
BRADLEY S. PEKAS, PG, PE
SR. GEOLOGIST-ENGINEER
OHIO PE NO. E-83267
OH ENGINEERING COA #01867
3740 ST. JOHNS BLUFF, SUITE 14
JACKSONVILLE, FL 32224
PHONE: 800-359-0251
REV. DATE DESCRIPTION BY CHK
B 5/2/18 FINAL DB BP
A 3/23/18 DRAFT DB BP
REVISIONS

Figure 1

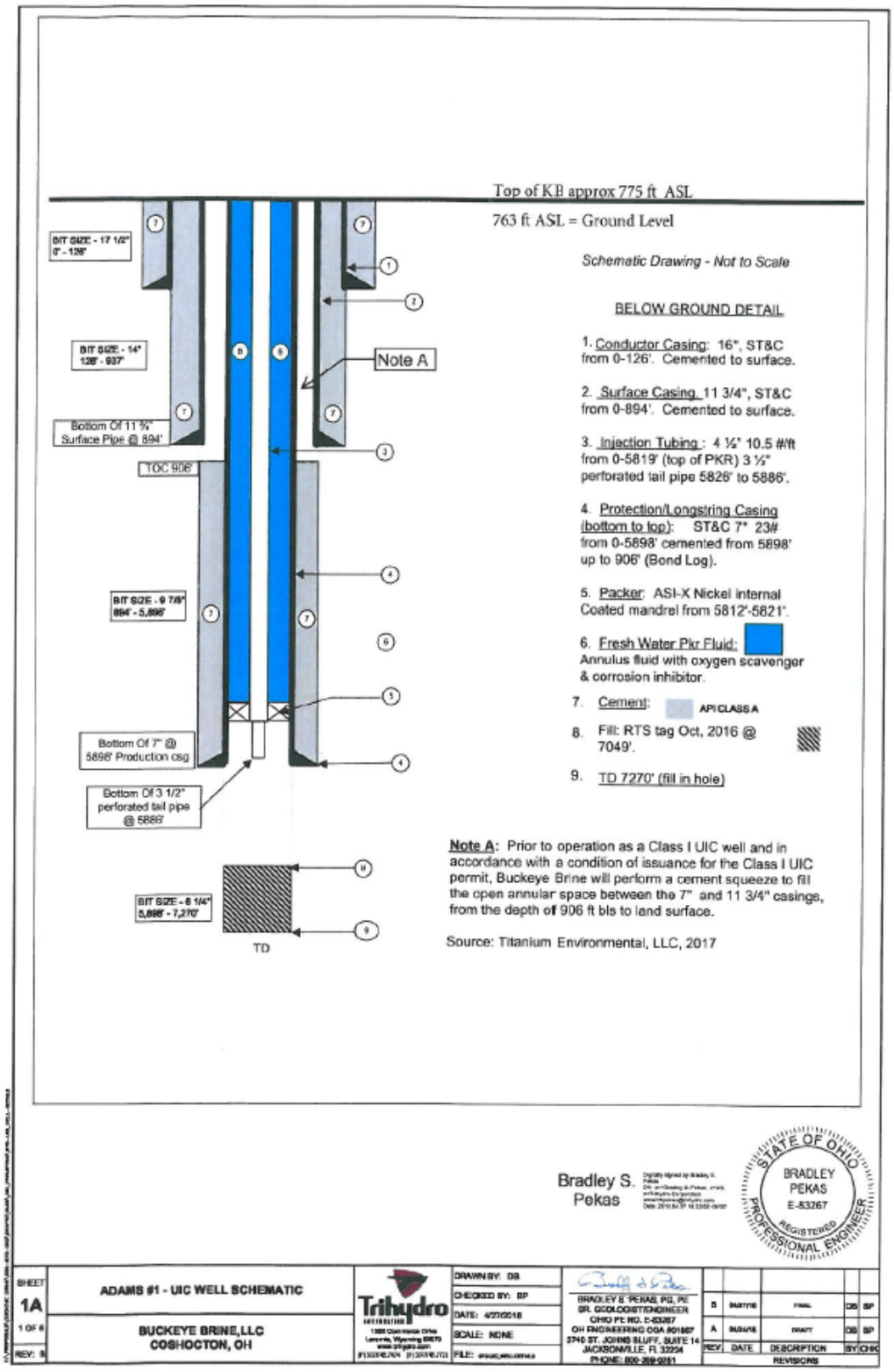
Top of KB approx 775 ft ASL
763 ft ASL = Ground Level
Schematic Drawing - Not to Scale
BELOW GROUND DETAIL
1. Conductor Casing: 16", ST&C from 0-126'. Cemented to surface.
2. Surface Casing: 11 3/4", ST&C from 0-894'. Cemented to surface.
3. Injection Tubing: 4 ½" 10.5 #/ft from 0-5819' (top of PKR) 3 ½" perforated tail pipe 5826' to 5886'.
4. Protection/Longstring Casing (bottom to top): ST&C 7" 23# from 0-5898' cemented from 5898' up to 906' (Bond Log).
5. Packer: ASI-X Nickel internal Coated mandrel from 5812'-5821'.
6. Fresh Water Pkr Fluid: Annulus fluid with oxygen scavenger & corrosion inhibitor.
7. Cement: API CLASS A
8. Fill: RTS tag Oct, 2016 @ 7049'.
9. TD 7270' (fill in hole)
Note A
Note A: Prior to operation as a Class I UIC well and in accordance with a condition of issuance for the Class I UIC permit, Buckeye Brine will perform a cement squeeze to fill the open annular space between the 7" and 11 3/4" casings, from the depth of 906 ft bls to land surface.
Source: Titanium Environmental, LLC, 2017
BIT SIZE - 17 1/2" 0' - 126'
BIT SIZE - 14" 126' - 937'
Bottom Of 11 ¾" Surface Pipe @ 894'
TOC 906'
BIT SIZE - 9 7/8" 894' - 5,898'
Bottom Of 7" @ 5898' Production csg
Bottom Of 3 1/2" perforated tail pipe @ 5886'
BIT SIZE - 6 1/4" 5,898' - 7,270'
TD
Bradley S. Pekas
STATE OF OHIO
BRADLEY PEKAS
E-83267
REGISTERED
PROFESSIONAL ENGINEER
SHEET 1A
ADAMS #1 - UIC WELL SCHEMATIC
BUCKEYE BRINE,LLC
COSHOCTON, OH
Trihydro
DRAWN BY: DB
CHECKED BY: BP
DATE: 4/27/2018
SCALE: NONE
BRADLEY S. PEKAS, PG, PE
SR. GEOLOGIST/ENGINEER
OHIO PE NO. E-83267
3740 ST. JOHNS BLUFF, SUITE 14
JACKSONVILLE, FL 32224
PHONE: 800-359-0251
REVISIONS

Figure 2

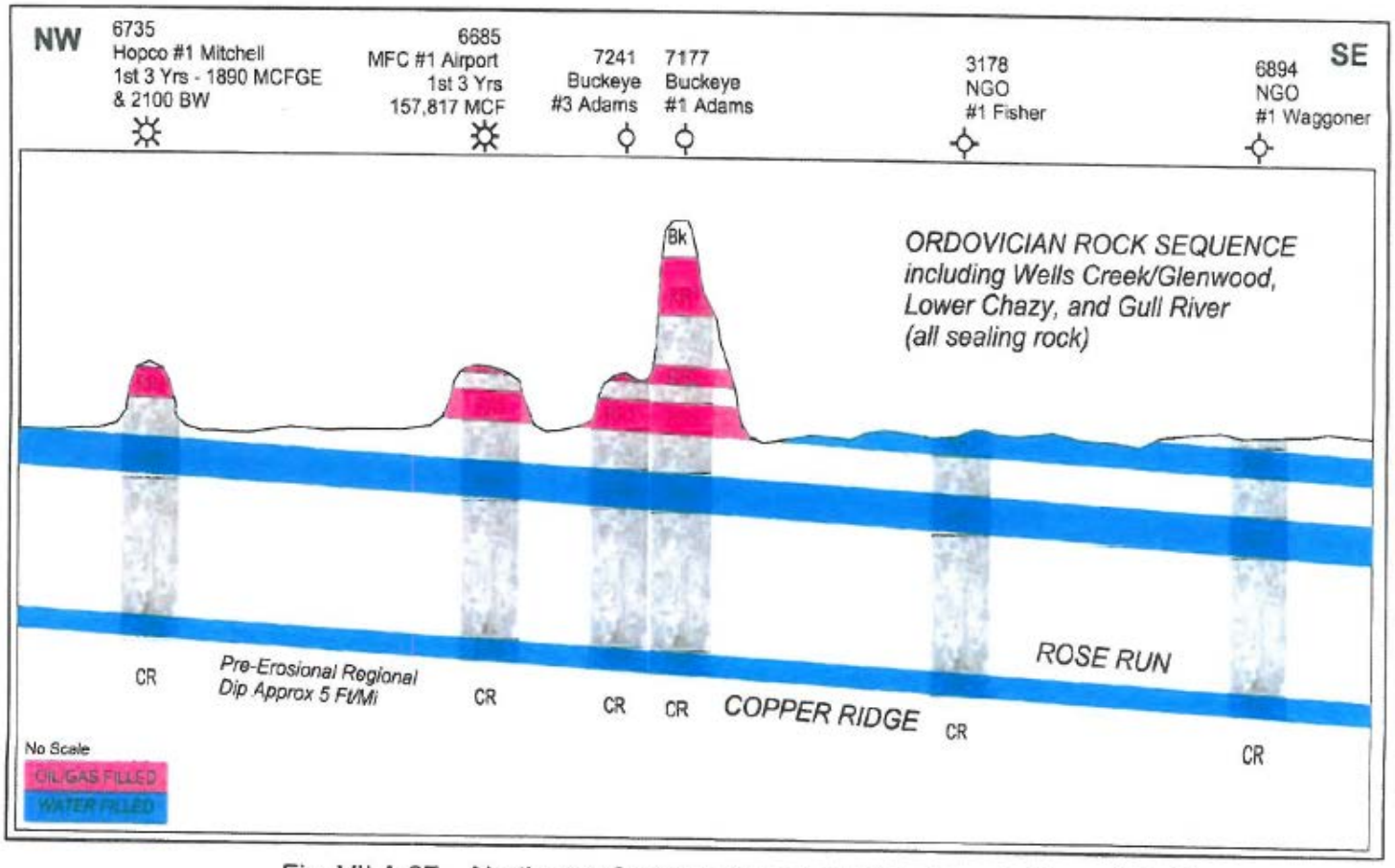

Fig. VII.A.07 – Northwest-Southeast cross section through Area of Review

Figure 3

Attachment III.B.4 Class 1 Waste Matrix

	Water	Inorganic Salts (TDS)	Inorganic Debris (TSS)	Oils	Alcohols	Glycols	Misc. Soluble Organics	Soaps/ Surfactants
Landfill leachates	X	X	X	X			X	
Coal ash impoundment leachates and waters	X	X	X					
Coal fired power plant residual wastewaters	X	X	X					
Water from oily waste streams	X		X	X				
Glycols and glycol containing waters	X		X	X		X		
Soap and surfactant based wastewater streams	X	X	X				X	X
High-BOD food wastewaters	X	X	X	X	X		X	X
Commercial wastewaters	X	X	X	X	X	X	X	X
Metalworking fluids	X			X			X	X
NGL processing wastes	X	X	X	X			X	X
O&G transmission pipeline wastes	X	X	X	X				X
Pipeline test and pigging waters	X		X					
Midstream waste waters and compressor blowdown waters	X	X	X	X			X	
Rinsates from washing operations	X	X	X	X			X	X
Non-exempt, non-hazardous E&P wastes	X		X	X				

Table 1