Responsiveness Summary to Public Comments
for
The Issuance of an Underground Injection Control (UIC) Permit
for
Roulette Oil & Gas Company, LLC

On December 31, 2020, the U.S. Environmental Protection Agency (EPA) Region 3 issued a public notice requesting comment and the opportunity for a public hearing for the proposed issuance of an Underground Injection Control (UIC) permit, PAS2D050BPOT, to Roulette Oil & Gas Company, LLC. EPA received numerous requests to hold this hearing, and on February 2, 2021, EPA held a virtual public hearing. Fifty-eight (58) people attended this public hearing, during which EPA received oral comments from 16 people. EPA also extended the public comment period until April 5, 2021.

The responsiveness summary which follows provides answers to questions and comments raised by 97 people who either sent a written public comment to the attention of EPA Region III, or who provided comments at the hearing. In addition to the written and oral comments, 22 members of the public contacted EPA to request a public hearing, request additional information (*e.g.*, about the well and associated risks), ask for an extension of the comment period, or object to the issuance of the permit (with no additional comment). EPA wishes to thank the commenters for their informative and thoughtful comments.

1. General and Out of Scope Comments

Several commentors raised concerns about matters outside of the UIC Program's jurisdictional scope, which EPA lacks the regulatory authority to address in the UIC permitting process. These commenters raised issues associated with: general environmental impacts and quality of life; noise; air, and light pollution; impacts on soils and agriculture; property values/tourism impacts; ecosystem health, including wildlife, fisheries, and aquatic species concerns; increased truck traffic/impacts on roads; the impacts of clearing land; the activities of other operators; and waste collection and transportation.

When making a decision on whether to issue a UIC permit, EPA's UIC jurisdiction is limited to determining whether the proposed injection operation will safely protect underground sources of drinking water (USDW) from the subsurface emplacement of fluids and a determination that the injection operation, as proposed, will be compliant with all federal UIC regulations. EPA therefore acknowledges its receipt and review of comments but because they raise matters and issues that are not within the jurisdictional scope and purview of the UIC regulations and permitting process, EPA will not respond to them in this document.

2. Comments about the Adequacy of Site Geology

Some commenters expressed an overall objection to the permit based on a general concern about the suitability of the geologic strata in Pennsylvania to injection activities. Other commenters raised specific concerns about the suitability of the proposed injection zones, including their thickness, continuity, and permeability (which, commenters assert, could necessitate higher injection pressures that may lead to fluid movement into USDW). In

furtherance of these comments, several commenters submitted or referenced technical papers, news articles and other information sources that provided general geologic background information and which addressed the suitability of the injection zone. Additional commenters included an expression of concern over the potential for induced seismicity (earthquakes) and some of those commenters referenced seismic events that have occurred in Ohio that were attributed to the underground injection of fluids produced from oil and gas extraction activities.

EPA acknowledges each of the above concerns, and notes that a suitable geologic system is a primary consideration in its review of a Class II UIC permit application. While some of the technical papers, news articles and other submissions made by commenters include information that relates to the general area of the injection well and the injection formations, none describe or address the conditions at the proposed site that is subject to the draft Permit. As EPA noted above, the determination to issue a UIC permit is based on specific information provided by the applicant that demonstrates the suitability of the injection zone to receive and contain the fluids proposed to be injected. EPA's evaluation of this, and all other, permit applications is site-specific and based on information about the geology in the vicinity of each well, as described further below.

EPA has reviewed extensive information about the proposed injection zones (*i.e.,* the Cooper 5-0 Formation, Sheffield 3-1 Formation, and Kane 3-0 Formation) to confirm their suitability to the proposed injection operation. These formations were thoroughly characterized and described in the permit application. Information on the thickness and permeability of the formations is based on logs, including gamma ray, caliper, deep resistivity, temperature, neutron porosity, and bulk density logs. The continuity of the injection zone is demonstrated in regional cross sections. This information collectively demonstrates that the injection zones can receive the volume of fluids proposed to be injected without fracturing. The Permittee also submitted geologic information indicating an absence of faults or fractures within a one-mile radius of the injection well.

To further ensure that injection pressures are suitable to the characteristics of the injection zones and will not lead to fracturing, the draft Permit limits the injection pressure based on the results of formation testing. The surface maximum allowable injection pressure (MAIP) of 974 psi and the bottom-hole pressure (BHP) of 1,683 psi set in Paragraph II.B.4.b. of the draft Permit are based on the results of a 51-day injection test performed by the Permittee. Additionally, and in accordance with applicable 40 CFR § 144.28(f)(6)(ii)(A) requirements, Paragraph III.B.4. of the draft Permit specifies that the Permittee may not inject fluid at a pressure that could initiate new fractures or propagate existing fractures in the confining zone adjacent to USDW or that causes the movement of injection or formation fluids into a USDW.

To commenters doubting the suitability of the confining shale (*i.e.,* its thickness and the potential for upward migration), EPA notes that the confining shales of the Bradford and Venango Groups were thoroughly characterized by the Permittee and evaluated by EPA. These impermeable shales separate the injected fluids from USDW by approximately 1,150 feet of rock. Shale formations have been demonstrated to serve as confining formations in many injection projects. The Permittee provided log data to demonstrate the suitability of these confining layers.

As explained in the Statement of Basis for the draft Permit, EPA must consider appropriate geological data on the injection and confining zones when permitting Class II wells. However, unlike Safe Drinking Water Act (SDWA) regulations for Class I wells used for the injection of hazardous waste (at 40 C.F.R. §§ 146.62(b)(l) and 146.68(f)), the SDWA regulations for Class II wells do not require specific consideration of seismicity. Nevertheless, EPA evaluated factors relevant to seismic activity, such as the existence of any known faults and/or fractures and any history of, or potential for, seismic events in the area of the injection well as discussed below and addressed more fully in "Region 3 framework for evaluating seismic potential associated with UIC Class II permits", updated September 2013.

Initially EPA notes that the Class II injection well that is the subject of the UIC draft Permit is not in a seismically active area or in an area with geologic conditions that have been identified as conducive to injection-induced seismicity. EPA evaluated the following information to make this determination:

- Based upon the map of Pennsylvania Earthquake Epicenters (Faill, 2004) and Seismicity in Pennsylvania and the Pennsylvania State Seismic Network (Nyblade & Honman, 2017), there has not been any measurable seismic activity recorded in Potter County.
- Geologic information provided by the Permittee demonstrates that there are no faults or fractures within a one-mile radius of the injection well. The Facility lies approximately 8,300 feet (1.57 miles) northwest of the subsurface trace of the Clermont syncline and approximately 17,300 feet (3.28 miles) southeast of the subsurface trace of the Smethport anticline. These folds and the areas adjacent to them are not associated with any known faults in the shallow Upper Devonian section, particularly those associated with the injection zones within this area. The nearest inferred fault to the Clara Field #20 well trends southwest to northeast and is located approximately 12,000 feet (2.28 miles) southeast of the Clara Field #20 well. This inferred fault is associated with much deeper Cambrian and Lower Ordovician Rocks (Wagner, 1976. Growth faults in Cambrian and Lower Ordovician rocks of Western Pennsylvania. AAPG Bulletin v60, 3 pp.414-427).
- The depth to the top of the crystalline basement at the location of the Clara Field #20 well is approximately 5,900 feet, based on the Pennsylvania Department of Conservation and Natural Resources (PA DCNR) Open File Report (Gold *et al*., 2004. Basement depth and related geospatial database for Pennsylvania. PA Geological Survey, 4th sur., Open File Report, OFGG 05.01.0). This is approximately 3,600 feet below the total depth of the Clara Field #20 well.

EPA also wishes to point out that the draft Permit itself contains each of the several following provisions that limit the potential for induced seismic activity or the adverse effects of a seismic event:

- Paragraph II.B.4.b. of the draft Permit limits the injection pressure to prevent the initiation or propagation of fractures that could create conduits for the injected fluid to flow to any existing faults. The surface MAIP for this draft Permit was calculated by the instantaneous shut-in pressure (ISIP), which is the minimum pressure necessary to begin to reopen any fractures created during the fracture stimulation process and is significantly lower than the pressure required to fracture the rock. The surface MAIP is less than both the ISIP and the fracture pressure to prevent the initiation of new, or the propagation of existing, fractures.

- The Permittee is limited to injecting into the Cooper 5-0, Sheffield 3-1, and Kane 3-0 sandstone formations, as specified in Paragraph III.B. of the draft Permit. These formations are overlain by a confining zone that is free of known open faults or fractures within the Area of Review (AoR), as required pursuant to 40 C.F.R. § 146.22.
- The construction and testing that the Permittee must perform on the well, as described in Paragraph III.A and Paragraph II.C.2 of the draft Permit, will help to prevent the wells from failing in a seismic event and contributing to the contamination of a USDW. The Clara Field #20 injection well is constructed to withstand significant amounts of pressure, with multiple steel rings of casing that are cemented in place. Furthermore, the Permittee must mechanically test the injection well to ensure integrity before operations begin and to continuously monitor the injection well during operations in order to identify any potential mechanical integrity failures. The injection well is also designed to automatically cease operation in the event that the mechanical integrity of the well is compromised, including by a seismic event.

EPA acknowledges strong evidence that the underground injection of fluids can act as a trigger for seismic events. In some cases, earthquakes have occurred in locations where there were no known faults. However, the likely relevant factors behind these seismic events, specifically the geologic setting or the operational history of the injection wells, differ significantly from the proposed Roulette injection operation. Scientific evidence indicates that seismic activity is most likely associated with the depth of a well, the volume and rate of injection, and the injection pressure. In these aspects, the Clara Field #20 well contrasts greatly with the wells in the known cases of induced-seismicity.

EPA has reviewed the "Preliminary Report on the Northstar 1 Class II injection well and the Seismic Events in Youngstown, Ohio Area, Ohio Department of Natural Resources, March 2012," which indicates that that the seismic activity associated with the injection of fluid in the Northstar 1 Class II injection well was likely due to the injected fluid coming into contact with a fault system located in deep Precambrian basement crystalline bedrock. This bedrock is located beneath the sedimentary bedrock structure and has very low permeability. Fluid injected in crystalline basement rocks is essentially transmitted by a network of inter-connected fractures and joints. Because of the high transmissivity (the ability of fluids to move through rock) and minimal ability to store fluids in these kinds of rocks, the potential exists to create flow at considerable distances from the injection well. Once flow reaches a fault, it allows the frictional forces that exist to be reduced, thereby allowing the rocks to slip, and leading to seismic activity.

In contrast to the Youngstown, Ohio Area and as noted above, the Clara Field #20 well is approximately 3,600 feet above the crystalline basement. Additionally, based on information about the injection zones, EPA has determined that these formations will more readily store injected fluid and that the permeability (the available interconnected space between the grains and natural fractures in the rock) within the rock structure will allow a more uniform flow to occur throughout the injection formations. For these reasons, the geologic setting and reservoir characteristics of the proposed injection well are very different than the circumstances encountered in Ohio. For the proposed Clara Field #20 well, injection will not occur within, or flow into, the deeper Precambrian crystalline rocks, thus reducing the potential for a seismic event.

In summary, EPA considered the potential for induced seismicity as it evaluated the permit application and set permit conditions. Based on an examination of seismic history in Potter County, Pennsylvania a lack of faults or fractures within a one-mile radius of the injection well, and injection

pressure limits, EPA has determined that there is a low potential for a seismic event.

3. Comments about the Size of the Area of Review (AoR) and Wells in the AoR

Some commenters expressed concerns that a one-quarter (1/4) mile area of review (AoR) around the Class II injection well is too small, citing concerns that wastewater has the potential to travel great distances and communicate with other wells or hydraulically-created fractures. Additional commenters noted the importance of identifying and evaluating wells in the AoR and correcting deficiencies, while others raised similar concerns about the number and condition of abandoned, unplugged wells in Pennsylvania and their potential to allow fluid movement toward USDW or release methane to the atmosphere. One commenter asked several questions regarding the sources of information about the wells in the AoR and whether the information about these wells was field-verified.

EPA recognizes and agrees with comments that wells in the AoR of a Class II well are a potential concern for fluid movement. For this reason, EPA considered the following information in its evaluation of the 1/4-mile radius: the chemistry of injected and formation fluids; hydrogeology, population and ground water use and dependence; and historical practices in the area. The Permittee provided documentation on the fluid to be injected, ground water use in the area, and on the well population within the 1/4-mile AoR. EPA also acknowledges concerns that, under certain circumstances, injected fluids have the potential to migrate far from the injection well. EPA clarifies that its evaluation of the AoR is based on site-specific information provided by the applicant. As described above, the injection and confining zones were evaluated for the absence of fractures within *one mile* of the well. Also, injection pressures are limited in order to avoid fracturing.

EPA further acknowledges comments about the importance of identifying and evaluating wells in the AoR and correcting deficiencies. The applicant undertook a thorough review of the AoR. The permit applicant also provided, and EPA has examined, the following data sources to locate the three (3) wells within the Clara Field #20 AoR: original operator location plats scanned by the PA DCNR, Pennsylvania Department of Environmental Protection (PADEP) well records, USGS 7.5 minute Shinglehouse quadrangle map, and a February 2016 survey of the AoR by D. Michael Canada. Based on this search, no streams, water wells, hazardous waste facilities, or springs exist within the AoR

Additionally, no drinking water wells are present within a half mile radius of the injection well. The only wells within this 1/4-mile area are the injection well and two active production wells (Clara Field #19 and Clara Field #11), which will be used as monitoring wells. EPA evaluated well records and completion reports for the Clara Field #20, Clara Field #19, and Clara Field #11 wells to determine that no corrective action is needed. EPA further notes that Paragraph II.C.3 of the draft Permit also requires a fluid level monitoring well which will provide real-time pressure measurements within the AoR. By monitoring the fluid level and making sure that it remains safely below the lowermost USDW, even if an abandoned well were to exist (*i.e.,* a well that might have been drilled in the past without having information of public record), the monitoring would detect and prevent fluid migration into the lowermost USDW.

EPA acknowledges that there are many abandoned wells in Pennsylvania, but assures all commenters that this permitting decision is based on a thorough AoR review of the Clara Field #20 well to demonstrate that there is no potential for fluid movement associated with the injection activities that are the subject of this permitting decision. Any potential release of methane to the atmosphere, however, is outside the jurisdictional scope of this UIC permitting decision.

4. Mechanical Integrity Concerns

Some commenters expressed concerns about the importance of assuring the mechanical integrity of the proposed injection well, in the form of actual comments and the associated submission of, and citations to, relevant literature and other related information sources. Some commenters expressed related concerns about the potential for cement and steel casings to fail over time and the possibility that detection of mechanical integrity failures may not occur until after ground or surface water contamination has occurred. Others wondered about the continued integrity of the well after active operation by the Permittee. Some commenters further suggested that mechanical integrity concerns for production/hydraulic fracturing wells are similarly relevant to injection wells.

EPA acknowledges that proper construction and mechanical integrity testing of injection wells are cornerstones of the UIC regulations and are integral to EPA's permit application review process and its setting of appropriate permit requirements and conditions. EPA herein evaluated information about the Clara Field #20 well's construction and the procedures by which it will be converted from a production well to an injection well. These include: a well schematic for the production well as it was drilled and completed in 2008 and the proposed well schematic for the Class II well, along with the Permittee's proposed conversion procedures. The Permittee proposes to cement the 4.5" intermediate casing string back to the surface, which will provide two strings of cemented casing protecting the lowest known USDW. Following the conversion of the Clara Field #20 well to an injection well, the Permittee may not initiate injection operations until it: (i) demonstrates the mechanical integrity of the injection well, in accordance with 40 C.F.R. § 146; and, (ii) receives notice from the Director of the EPA Region 3 Water Division that such a demonstration is satisfactory, in accordance with Paragraph II.D.2. of the draft Permit.

EPA further acknowledges the need for verifying mechanical integrity over the life of an injection well. For this reason, continuous monitoring of surface injection pressure, annular pressure, flow rate, and cumulative injection volume is required in Paragraph II.C.2 of the draft Permit. Specifically, the tubing annulus will be kept full of fluid and monitored with a pressure gauge for any pressure anomalies or changes in the fluid level due to packer or tubing failure. If a leak were to develop in the tubing or packer, the annular pressure would increase significantly. If the well experiences a leak in the long string casing, the pressure in the annulus would decrease significantly. Either situation would automatically trigger shut-off devices that would cause the well to shut down and cease operating. This would constitute a mechanical integrity failure of the well and, in accordance with Paragraph IIC.6 of the draft Permit, the Permittee would be required to cease injection immediately and to make the necessary repairs. Per Paragraph II.C.6 of the draft Permit, the Permittee must also demonstrate mechanical integrity using tests identified in 40 C.F.R. § 146.8, at

least once every five (5) years and after any repair, modification, or rework of the injection well. In addition, operator staff will be on site on a daily basis to monitor the wells in the AoR

When the Permittee elects to no longer operate the injection well, it must be permanently plugged and abandoned in a manner that does not allow movement of fluids into or between USDWs (*i.e.*, with appropriate plugging procedures and materials), in accordance with Paragraph II.D.11 of the draft Permit. And while no hydraulic fracturing will be performed under this permit (which is for the disposal of oilfield brines), EPA acknowledges all comments, literature and other cited sources of information provided by commenters regarding the importance of ensuring the continued mechanical integrity of injection wells.

Based upon an extensive review of the initial construction of the Clara Field #20 well, the Permittee's proposed conversion procedures and the draft Permit's requirements for continuous monitoring and periodic pressure testing, EPA is confident that the well will maintain its mechanical integrity throughout the duration of injection operations.

5. Comments about the Injected Fluid

Commenters expressed concern about the composition of the proposed injection fluid and asked EPA to clarify the composition of the injectate. Some commenters asserted that the injected fluid is a hazardous or toxic waste or contains heavy metals. Other commenters expressed concern about injecting wastewaters that have radioactive components. Some commenters had questions about the source of the injectate wastewater and expressed concerns regarding the composition of hydraulic fracturing fluids. Others asked for clarification about the volume of wastewater to be injected into the proposed Clara Field #20 injection well and whether EPA monitors the source of the injected fluids. Another commenter, noting that the injectate sample described in the permit application is 2 years old, requested that EPA require that a newer injectate sample be analyzed for all of the parameters specified in the permit prior to injection. Commenters also asked for clarification about the volume of wastewater to be injected into the proposed Clara Field #20 injection well.

EPA acknowledges each of these concerns and notes that, as part of its review of the permit application, it evaluated the applicant's analysis of a baseline fluid sample from the oilfield that is the source of the wastewater to be injected. The sample contains constituents that are typical of oilfield brines, including: oil and grease, chloride, sulfate, barium, calcium, iron, lead, magnesium, sodium, benzene, toluene, ethylbenzene, and xylenes. The injected fluid does not contain any hazardous constituents and is not a hazardous waste. Paragraph III.B.2 of the draft Permit prohibits injection of hazardous waste, as defined by 40 C.F.R. § 261. Individual constituents contained within fluid produced from an oil or gas production reservoir could be determined to be toxic, hazardous, or radioactive. However, these fluids, when generated in association with oil and gas production, are exempt from hazardous waste regulation under the UIC Program because they are not classified as hazardous under the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6901 et seq. In December 1978, EPA proposed hazardous waste management standards that included reduced requirements for several types of large volume wastes. EPA believed these large volume "special wastes" were lower in toxicity than other RCRA regulated hazardous wastes. Subsequently, Congress exempted the wastes from

RCRA Subtitle C regulation pending a study and regulatory determination by EPA. In 1988, on the basis of further study and scientific review, EPA issued a regulatory determination that the control of oil and gas exploration and production wastes under RCRA Subtitle C was not warranted, in part because other State and Federal programs, such as the UIC Program, effectively manage the disposal of such wastes. Therefore, the UIC Program regulates fluids produced in association with oil and gas production activities, but not as hazardous waste.

EPA further acknowledges concerns that injected wastewaters may have radioactive components. However, this is certainly not true of all oil and gas production fluids. Whether a production fluid contains radioactive byproducts depends on the geologic formation from where the fluid has been produced. Produced fluid may contain Naturally Occurring Radioactive Material, or NORM. The NORM concentrations in produced fluids are typically low and do not exceed the RCRA definition of hazardous waste. If this wastewater were to be disposed in a different manner (*i.e.,* disposed directly into the environment by stream discharge) then a more extensive characterization would be necessary. However, this wastewater will be injected over 1,000 feet beneath Earth's surface into an environment similar in nature to where the wastewater was generated. The management and disposal of NORM wastes associated with the production of oil and gas are not federally regulated and EPA considers the injection of Class II fluids deep underground to pose minimal environmental risk and to be a safer alternative than other available methods of disposal, such as allowing them to be discharged into a stream, disposed of in a landfill or treated and stored in containment pits or storage tanks. EPA also characterizes the reuse or recycling of produced fluid as a sound environmental management practice. Public and privately owned wastewater treatment facilities are unable to adequately remove many constituents found in brine, for example, chlorides and bromides. When these constituents are discharged to streams or rivers, they can pose serious risk to fish and other aquatic organisms living in the stream as well as contribute to serious health effects for people who obtain their drinking water from these streams and rivers. The UIC permitting program is designed to provide an alternative through which injection activities may occur in a regulated and environmentally protective manner which ensures that best management practices are identified and employed.

In response to commenters' specific questions about the source of the wastewater, the injected brine will come from approximately 60 conventional oil and gas wells on the Permittee's lease and another 50 conventional oil and gas wells on the Permittee's leases in the general area. All of these wells are in Pennsylvania. Paragraph III.B.2 of the draft Permit limits the injected fluids to treated fluids produced from Roulette's oil and gas production operations. It also prohibits the Permittee from injecting fluids from any other sources than its wells as described in the permit application, nor any other fluid, other than the fluids produced solely in association with the Permittee's oil and gas production activity, and additives necessary to maintain the integrity of the injection well. Injection of fluids other than produced fluids associated with oil and gas production would be in violation of the draft permit and are prohibited. EPA clarifies that hydraulic fracturing will not be performed under this Permit.

With respect to injectate source monitoring, EPA acknowledges that this level of monitoring is outside of the scope of the draft Permit. However, the draft Permit ensures that the wastewater that will be injected is safe and suitable to the geologic conditions and the well's construction. The only fluids that Roulette will be allowed to inject into the proposed Clara Field #20 injection well are disposal fluids produced as a byproduct of Roulette's own oil and gas production activities. In addition, the draft Permit requires that the injection fluids must be classified as Class II fluids, which are primarily brines (salt water) that are brought to the surface while producing oil and gas. Wastewater from hydraulic fracturing activities, including the brines that are separated from hydrocarbons at the surface, can be injected into Class II wells. The fluids injected into the proposed Clara Field #20 injection well are limited by the draft Permit to Class II fluids produced by Roulette Oil & Gas.

EPA also points to Paragraph II.C.4 of the draft Permit, which requires the Permittee to sample the injectate every two (2) years, or whenever the operator observes or anticipates a change in the injection fluid. The parameters chosen for sampling reflect not only some of the typical constituents found in the injection fluid, but also in shallow ground water. Should a ground water contamination event occur during the operation of the injection well, EPA would be able to compare samples collected from ground water with the injection fluid analysis to help determine whether operation of the injection well may be the cause of the contamination. EPA believes that the draft Permit conditions are sufficient to adequately characterize and monitor the wastewater for injection purposes, *i.e.,* to verify that the fluids injected in the well are the type of fluids authorized in the draft Permit. Based upon its knowledge of oilfield operations and brine compositions, EPA finds no reason to believe that the composition of the oilfield wastewater has changed. If, however, the source of the injectate were to change in the future (*i.e.,* from the one that the baseline sample represents), then EPA would require the Permittee to perform another injectate sample analysis.

Regarding the volume of wastewater to be injected into the proposed Clara Field #20 injection well, Paragraph III. B.3 of the draft Permit establishes a maximum monthly injection volume of 15,500 barrels per month of these disposal fluids into the injection well. One barrel of fluid is equal to 42 gallons.

6. Comments about Testing and Monitoring

Commenters requested baseline and ongoing monitoring of ground and surface water and local springs in order to protect ground water quality. Others stressed the importance of pressure testing the injection well as a means of ensuring mechanical integrity. Some commenters also requested that seismic monitoring be performed.

EPA acknowledges the importance of protecting ground water quality. For this reason, the draft Permit requires adequate well construction and a mechanical integrity demonstration, as noted under Response 4. In addition, the confining shales of the Bradford and Venango Groups separate the injected fluids from USDW by approximately 1,150 feet of impermeable shales. However, protection of springs and surface water bodies is outside the scope of EPA's UIC permitting authorities, which are limited, by statute, to the protection of USDW. Nevertheless, the confinement

of fluids within the injection zone will also serve to protect surface water bodies. (*See also* Response 14.)

EPA agrees that pressure testing the injection well is an important provision to ensure that the well maintains mechanical integrity. The MIT provisions in Paragraph II.C.2 of the draft Permit require that a pressure test be conducted in order to ensure that the casing, tubing, and packer in the injection well do not leak. The Permittee must also continuously monitor the injection well for surface injection pressure, annular pressure, flow rate and cumulative volume throughout the duration of injection operations. This monitoring information will be reviewed by EPA.

As to proposed seismic monitoring, EPA clarifies that the United States Geologic Survey (USGS) monitors several active seismometers located in Potter County in the vicinity of the proposed well. The USGS and the PA DCNR, which includes the Bureau of Topographic and Geologic Survey, are the principal organizations that conducts geologic research in Pennsylvania. They have not recorded any seismic activity that has originated in Potter County, Pennsylvania. See also EPA's Response 2 above for additional information about seismicity concerns.

7. Plugging and Abandonment and Financial Assurance

Commenters expressed concern that the permit requires inadequate financial assurance to plug the well, and that the $5,500 amount is not sufficient. Some expressed concerns that public monies might, therefore, need to be used to plug the well. Some commenters questioned the qualifications of the company that provided the plugging cost estimate and others questioned whether that estimate considered potential inflation and how relevant the plugging cost estimate would be at the end of the permit term. Another commenter worried that a low financial assurance bond amount could incentivize the abandonment, rather than proper plugging, of the well. One commenter stated that the Plugging and Abandonment Plan for the Clara Field #20 appeared to indicate that conversion to a non-injection well was planned and the commenter requested a clarification of that Plan.

EPA acknowledges the importance of adequate financial assurance to plug injection wells and to ensure that public monies need not be used for this purpose. The Permittee submitted a cost estimate of $5,500, which EPA determined to be adequate for plugging the Clara Field #20 well, based on an evaluation of the well's construction. EPA is aware of studies that estimate the cost to plug injection wells, including information provided by commenters. However, the cost to plug a well is specific to the individual well's depth, diameter, and construction. Therefore, the plugging and abandonment financial assurance amount in the draft Permit is based on specific information provided about the Clara Field #20 well. As such, questions from commenters about other wells that EPA may have contracted to plug, or average well plugging costs, are not germane to EPA's determination of an appropriate financial assurance amount for the Clara Field #20 well.

The intent of a plugging cost estimate is to demonstrate the cost of all activities needed to meet the plugging requirements in the draft Permit by use of an independent, third-party professional (*i.e.*, not the Permittee). Evaluating the qualifications of that third party, or the cost of other jobs they have performed, is outside the scope of the UIC permitting decision. However, EPA notes that the source of the Clara Field #20 plugging cost estimate is an independent third-party professional firm that has over 50 years' experience in the oil and gas business. Regarding related questions about

inflation, EPA calls attention to Paragraph III.D.2 of the draft Permit, pursuant to which EPA may require the Permittee to submit a revised demonstration of financial responsibility if there is reason to believe that the original demonstration is no longer adequate to cover the costs of plugging and abandonment. This would include any information that EPA receives about overall increases in well plugging costs.

In response to noted comments regarding the adequacy of the required financial assurance, the Permittee is subject to the financial responsibility provision at 40 C.F.R. § 144.52(a)(7)—a "permittee […] is required to demonstrate and maintain financial responsibility and resources *to close, plug, and abandon* the underground injection operation in a manner prescribed by the Director" (emphases added). Therefore, a failure to maintain sufficient financial responsibility would be a violation, actionable under the duty to comply at 40 C.F.R. § 144.51(a). EPA adds that, if the operator were to not meet the requirements for plugging at 40 C.F.R. § 146.10 (which are incorporated into the draft Permit via 40 C.F.R. § 144.51(o)) before abandonment, this potentially could be considered a "willful" violation of the permit, leading to potential criminal liability (under SDWA 1423(b)(2)).

In response to a commenter's stated concerns, and at EPA's request, the operator has now revised the "Type of Action" section on form 7520-19 ("Well Rework Record, Plugging and Abandonment Plan, or Plugging and Abandonment Affidavit") to clarify that its plan for the Clara Field #20 well, at final closure and after use as an injection well, is to plug and abandon the well -- not to convert it into a non-injection well. The revised and updated form 7520-19 will in the administrative record and will be included as "Attachment 1" in the final permit.

8. Public Notice and the Public Hearing

Several commenters claimed that they were not provided adequate notice of the permit and requested an extension of the public comment period to allow residents more time to review available information and to accommodate the needs of the sparse population that does not all live in the area year round and COVID-19 restrictions. Several other commenters requested a public hearing. Commenters asked EPA to post the public notice on Solomon's Word (a local electronic source of information), noting that not all local residents live in the area year-round or read newspapers. Some commenters also asked EPA to inform them of the final permitting decision.

40 C.F.R. § 124.10 specifies the requirements for public notice, public comment, opportunity for public hearing and other administrative aspects of the UIC permitting process. A public notice was placed in a local newspaper of significant circulation, requests for a public hearing were received, and a hearing was held. The permit application, including all addendums, the draft Permit, and the statement of basis were available for public review pursuant to UIC regulations. EPA acknowledges the importance of public communications and recognizes that the COVID-19 pandemic and the seasonal variations in local population provide unique challenges. For this reason, EPA extended the public comment period for this permitting action by 60 days, for a total comment period of 90 days, that ended on April 5, 2021.

To accommodate COVID-19 restrictions and ensure the safety of the public while affording all members of the public an opportunity to comment, EPA conducted a virtual public hearing via a phone-based operating service on February 2, 2021 from 6:00 – 8:00 p.m. local time. Fifty-eight (58) people attended the public hearing and sixteen (16) comments were received during

the hearing. These comments were considered and addressed within this response to comments document.

In addition to publishing the public notice in the Potter-Leader Enterprise newspaper (pursuant to 40 CFR 124.10(c)(2)) as described above, a link to EPA's website was shared on Solomon's Word to provide an opportunity for the readers of that publication to learn about the draft permit.

EPA will attempt to contact all commenters to notify them of the final permit decision as well as provide them with a copy of this response to comments document.

9. Objections to Injection for Wastewater Disposal

Commenters objecting to the use of injection as a wastewater disposal method asserted that: there is a potential to damage surface and ground water; there are too many injection wells in Pennsylvania and nationwide; and that some injection wells have leaked. Some commenters asserted that there are environmentally safer ways to dispose of, or treat, the wastewater. One commenter stated that Clara Township has banned injection wells and another asked if the Township has to approve the project.

EPA acknowledges that improperly managed injection wells have the potential to adversely affect water quality and agrees with commenters on the importance of careful permitting and management of injection wells. For this reason, the UIC regulations and the draft Permit for the Clara Field #20 well have conditions that are specific to the risks to USDW, including provisions for proper construction, monitoring, and closure of the well. The applicable Permit conditions ensure that injected fluids do not endanger USDW and include:

- Paragraph III.A of the draft Permit, which requires construction of the injection well with surface casing from the surface to a depth of at least 50 feet below the base of the lowermost USDW and cementing along that entire length of casing back to the surface to protect ground water.
- Paragraph II.B.4.b of the draft Permit, which sets maximum surface injection pressure and bottom-hole pressure limitations that were developed using a formula that considers the depth to the injection zones, the specific gravity of the injection fluid, and a fracture gradient based on a shut-in test. This will ensure that injection does not create fractures through which injected or other fluids could potentially move to USDW.
- Paragraph II.C.2 of the draft Permit, which requires the Permittee to demonstrate and maintain mechanical integrity. This includes continuously monitoring surface injection pressure, annular pressure, flow rate and cumulative volume. Also, pressure testing of the casing, tubing and packer will occur every five (5) years and whenever a rework on the injection well requires the tubing and packer to be released and reset.
- The Plugging and Abandonment Plan in Paragraph II.D.11 of the draft Permit, which will ensure environmentally protective injection well closure after the cessation of operations.

EPA recognizes that there are alternative disposal methods for oilfield wastewaters. However, the applicant has requested to use a Class II well as a means to dispose of their wastewater. Based on its evaluation of the UIC permit application, EPA has determined that this

can be performed in an environmentally protective manner that does not endanger USDW. If managed and operated properly, EPA believes the risk to the environment by injecting fluids deep underground can be considered safer than other methods of disposal, such as allowing them to be discharged into a stream, disposed of in a landfill, or treated and stored in containment pits or storage tanks.

The Board of Supervisors of Clara Township submitted several comments to EPA and did not inform EPA that injection wells are banned in Clara Township. EPA advises all commenters that EPA reviewed and evaluated all of the comments submitted by the Township as part of this response to comments process. EPA also informs all commenters that any permits required by Clara Township are outside of EPA's UIC authorities and beyond the scope of this UIC permitting decision.

10. Concerns for Public Health and Safety

Commenters expressed concerns about the potential impacts of the chemical constituents of wastewater on the health of the local population. One commenter suggested that a risk assessment (e.g., of a casing/cement failure) needs to be performed. Other commenters expressed concerns that local emergency responders do not have adequate resources, training, or equipment to respond to a spill, well failure, or other adverse event at the project and asked if the applicant has the financial or technical resources to address an emergency event.

EPA acknowledges public concerns about the presence of chemicals that may be found in oilfield brines and their impact on public health. For this reason, EPA developed permit conditions that are appropriate to the risk associated with injection activities in order to prevent movement of injected fluids into USDW. As described in Response 2, above, the injection zones were evaluated to confirm their suitability to the proposed injection operation, *i.e.*, that they are sufficiently thick and extensive to receive the volume of wastewater to be injected. These zones are overlain by a confining zone that separates the injected fluids from USDW by approximately 1,150 feet of impermeable shale. As further described in Response 9, the draft Permit for the Clara Field #20 well contains conditions that are specific to the risks to USDW, including provisions for proper construction, operation, mechanical integrity testing, and closure of the well. Should any noncompliance that endangers or may endanger human health or the environment occur, the Permittee must notify EPA within twenty-four (24) hours so that an appropriate response can be taken.

EPA does not agree with comments suggesting that a risk assessment should be performed. The construction of the well and the conversion procedures (*i.e.*, using suitable types and amounts of casing and cement), as described in the permit application, are specific to the area geology and planned operations of the Clara Field #20 well. Continuous monitoring and pressure testing will verify the integrity of the well throughout the duration of injection operations.

While the level of training and equipment available to local emergency responders is outside of the scope of this UIC permitting decision, the goal of setting and ensuring compliance with permit conditions is to avoid the need for an emergency response.

11. Compliance History of the Operator

Commenters questioned the applicant's compliance history and its suitability to operate the injection well, citing multiple transfers of well ownership/change in well type or status and inadequate field inspections. One commenter described eight injection wells owned by the Permittee that have been abandoned and out of compliance for years and asserted that these wells should be properly plugged before a new permit is issued. Another commenter alleged that the Permittee's non-compliance with Pennsylvania's Oil and Gas Act or PADEP waste production reporting requirements means that EPA should deny the UIC permit. One commenter expressed concerns about the solvency of the Permittee and another asked if a well that the commenter found in the area belongs to the applicant.

In response, EPA reiterates that it expects all operators to comply with applicable regulatory requirements as well as their UIC permit requirements. An operator's failure to comply with a permit, including accurate monitoring and reporting to EPA, subjects that operator to possible civil or criminal penalties or both. EPA inspects every Class II disposal well in Pennsylvania at least annually. EPA's inspection of injection well facilities and review of annual reports helps ensure operator compliance and supplements the reporting by Permittees. EPA adds that the Permittee's compliance *with other regulatory programs* is outside the scope of this UIC permitting action.

In regard to the eight injection wells that a commenter alleged to be out of compliance, EPA can confirm that each of those wells is in compliance with the UIC regulations. The eight wells were covered under EPA Permit No. PAS2R940BPOT, issued on December 7, 1984. However, the injection wells were never operated after the UIC permit was issued and the wells were then converted back into production wells. The wells were inspected and EPA has confirmed that these eight wells were converted into production wells. The permit was terminated on February 18, 1992.

While EPA has reviewed all well-related information provided by commenters, EPA must stress that it's evaluation of the subject permit application is limited to ensuring that the Clara Field #20 well does not endanger USDW pursuant to UIC Program requirements. Pursuant thereto , the proposed well identified in the permit application will be subject to all applicable UIC regulatory requirements and conditions for construction, testing, maintenance, and financial assurance to ensure that it maintains mechanical integrity throughout the life of the well and is properly closed. EPA further clarifies that the wells regulated under Pennsylvania's Oil and Gas Act are producing wells (*i.e.*, not injection wells), and therefore are *not under the UIC Program*. The UIC draft Permit imposes specific conditions that are designed to ensure that USDW are not endangered by injection activities. EPA will verify compliance with each UIC permit by reviewing reports required to be submitted and by conducting annual inspections.

EPA reiterates that the purpose of providing financial assurance is to ensure that resources are available to plug the injection well should the Permittee experience financial difficulty. To ensure proper plugging of the injection well, the Permittee will secure a Certificate of Deposit along with a Standby Trust Agreement that will cover the estimated cost to close, plug and abandon the Clara Field #20 injection well. Authorization to construct and operate the injection well will not be given by EPA until financial assurance is in place. EPA is, at present, unaware of any injection wells in the vicinity of the Clara Field #20 well that are not the subject of UIC permits.

12. Concerns about State Oversight

Commenters expressed doubts about the State's ability to provide needed oversight. Commenters cited investigations of misconduct at PADEP by the Attorney General's Office, expressed concerns that PADEP favors the oil and gas industry over environmental protection, made inquiry about the Fish and Game Commission's role in the permitting process, questioned the ability of existing regulations to ensure safety from spills of hazardous waste, and cited the need for noncompliance penalties.

EPA acknowledges commenters' concerns about various State agency activities, perceptions and concerns. However, these comments and the associated programs are outside of the scope of this UIC permitting decision. EPA also acknowledges commenters' general concerns about the oil and gas industry, including past violations and the industry's perceived unwillingness to address spills or contamination. However, as noted above, EPA's permitting decision for the Clara Field #20 well is focused on evaluation of the permit application and setting UIC permit conditions to ensure that injection operations do not endanger USDW via conditions for construction, testing, maintenance, and financial assurance to ensure that it maintains mechanical integrity throughout the life of the well and is properly closed.

13. General Concerns about Ground Water Quality

In addition to the specific topics above, commenters also expressed general concerns about the impact of the injection well on ground water quality. They were concerned that a leak from the injection well or a spill could contaminate ground water or springs and adversely affect local private water wells or the ground water-based drinking water supply for the Village of Roulette. Commenters also expressed concern that contaminated ground water can migrate long distances, and referenced spills associated with a nearby industrial user where contamination spread for several miles.

EPA acknowledges commenters' concerns about the importance of protecting ground water quality, including local drinking water wells. For this reason, the UIC regulations and the draft Permit for the Clara Field #20 well have conditions that are specific to the potential risks posed to USDW by injection activities. These include:

- Selection of suitable injection zones that are sufficiently thick and extensive to receive the volume of wastewater to be injected and that are overlain by a confining zone that separates the injected fluids from USDW by approximately 1,150 feet of impermeable shale.
- Adequate construction of the injection well that includes installation of surface casing from the surface to a depth of at least 50 feet below the base of the lowermost USDW and cementing along that entire length of casing back to the surface to protect ground water.
- Operation within pressure limitations that were developed based on testing of the injection zone to ensure that injection does not create fractures through which injected or other fluids could potentially move to USDW.
- Demonstration and maintenance of mechanical integrity via continuous monitoring of surface injection pressure, annular pressure, flow rate, and cumulative volume along with periodic pressure testing of the casing, tubing, and packer to ensure that the well does not become a conduit for fluid movement to USDW.

- Plugging and abandonment procedures to ensure an environmentally protective injection well closure at the time of cessation of injection operations.

EPA reiterates that spills or activities at other industrial sites are outside of the scope of this UIC permitting action.

14. General Concerns about Surface Water Quality Impacts

Comments addressing surface water quality included concerns that spills or runoff could negatively affect surface water bodies; potential impairment of specific water bodies including the headwaters of the Allegheny River, which provides drinking water for millions of people as far downstream as Pittsburgh; and general concerns about watershed protection. EPA also received comments expressing concerns about leaking wellbores, which, in addition to potentially affecting surface water, can pose an endangerment to USDW.

EPA, through its UIC Program, only has jurisdiction for the permitting of subsurface injection activities. The protection of springs and surface water bodies is outside of the scope of EPA's UIC permitting and decision-making authority, which is limited to the protection of USDW. However, EPA notes that the draft Permit's conditions, which ensure the proper siting, construction, operation, monitoring, and closure of the Clara Field #20 well in order to prevent fluid movement to USDW, will also protect surface water bodies, including Fishing Creek, Clara Creek, water sources in New York, and the Allegheny River headwaters. Also, as part of the AoR evaluation described under Response 3 above, the applicant determined that no streams or springs exist within the AoR of the Class II injection well.

EPA also notes that, while surface spill prevention cannot be addressed through the UIC permitting process, surface disturbances, fluid containment and spills which could occur on the injection well site are all regulated by PADEP, which is the State agency responsible for all surface construction and spill prevention at the proposed well site. Title 25, Chapter 78, of the Pennsylvania Code requires the well operator to report any surface spills or releases of brine to PADEP. There may also be local or county ordinances or regulations that address surface spill prevention and related threats to surface water bodies. When making the decision on whether to issue a UIC permit, EPA's jurisdiction rests solely in determining whether the proposed injection operation will safely protect USDW from the subsurface emplacement of fluids. Since 1984, there has been no reported injection well contamination of USDW as a result of EPA Region III permitting actions.

EPA can also confirm, based upon the applicant's AoR study, that the only wells within 1/4 mile of the injection well are active production wells (Clara Field #19 and Clara Field #11), which will be used as monitoring wells. EPA determined that both of these wells have adequate construction, based on a review of PADEP well records and completion reports. EPA also considers the availability and use of Clara Field Well Nos. #11 and #19 for Clara Well #20 monitoring purposes to be especially advantageous because their prior existence and proximate location to the proposed injection well make them particularly well-suited for monitoring the fluid level in the injection zones (to confirm that the ¼-mile AoR is adequate) and to ensure that fluid does not migrate into USDW.

15. General Objections to the draft Permit

Several commenters generally opposed issuing the permit. In addition to submitting written comments, several members of the public contacted EPA to ask it to deny the permit. One commenter claimed that issuance of the UIC permit would violate the Pennsylvania constitution's guarantee of access to clean water. Some commenters generally objected to the disproportionate social costs of industrial projects on poorer populations and expressed concern that the site was picked because there are few citizens to oppose it. Some commenters asserted that the project is "experimental." Other commenters identified very minor inaccuracies in the permit application and suggested that these were a basis for permit denial.

EPA acknowledges commenters' various concerns about issuance of this UIC permit. However, as noted above, EPA's thorough evaluation of information about the project and the setting of permit conditions for siting, construction, operation, monitoring, and closure of the Clara Field #20 well directly address the risks posed to USDW by injection activities. Therefore, EPA believes that issuance of a UIC permit is appropriate and that the activity can be performed in a manner that does not endanger USDW.

EPA disagrees with the comment alleging that permit issuance would violate the Pennsylvania constitution's guarantee of access to clean water. UIC requirements and permit conditions are designed to ensure non-endangerment of USDW and to ensure that wastewater disposal operations can proceed in a manner that protects drinking water for local residents.

EPA takes significant care to ensure that its permitting decisions do not adversely affect poorer/disadvantaged populations in rural areas. EPA performed an Environmental Justice (EJ) review as part of the permitting process using EPA's EJScreen Tool, an online mapping tool that integrates numerous demographic, socioeconomic, and environmental data sets that can be overlain on the delineated AoR to identify whether any portions of the AoR encompass disadvantaged communities. EPA's EJ review did not identify the presence of EJ issues, determined that none of the eleven Primary EJ Indexes are at or above the 80th percentile in the nation for the area around the well and did not support the need to conduct a further assessment of potential EJ concerns prior to making a permit approval or disapproval determination. Even in the absence of identified EJ concerns, the siting, construction, operation, monitoring and closure requirements of the UIC permitting process are designed to ensure that the drinking water supply for the residents of Clara Township is protected.

EPA disagrees with any characterization of the project as "experimental." The Clara Field #20 well and the planned operation fit the definition of a Class II well at 40 C.F.R. § 144.6(b)(1) because the well will be used to dispose of fluids that are brought to the surface in connection with conventional oil or natural gas production. The Permittee will use proven technologies that have been employed in the construction, testing, and closure of thousands of Class II injection wells.

Minor inaccuracies identified by commenters in the permit application included the date the Clara Field #20 well was constructed, the original operator of the Clara Field #19 and Clara Field #20 wells, and the number of active wells operated by the applicant. EPA acknowledges such minor inaccuracies in the permit application; however, they are deemed inconsequential to EPA's permitting decision. EPA has no reason to believe that any of the substantive information

in the completion reports for the Clara Field 19 and Clara Field #20 wells is incorrect, or that any of these noted, minor, inaccuracies would adversely affect EPA's ability to evaluate the permit application or any of the information provided about the construction of the Clara Field #20 well or the applicant's planned operations.

Federal Underground Injection Control Program

Permit Appeals Procedures

The provisions governing procedures for the appeal of an EPA UIC permit are specified at 40 C.F.R. Part 124.19 (Please note that changes to this regulation became effective on March 26, 2013. See 78 Federal Register 5281, Friday, January 25, 2013.) Any person who commented on the draft permit can appeal the final permit by filing a written petition for review with the Clerk of the EPA Environmental Appeals Board (EAB).

A petition for review must be filed within thirty (30) days of the date of the notice announcing EPA's permit decision. This means that the EAB must receive the petition within 30 days. (Petitioners receiving notice of the final permit by mail have 3 additional days in accordance with 40 C.F.R. 124.20(d).) The petition for review can filed by regular mail sent to the address listed below with a copy sent to EPA Region 3 at the address listed below.

Environmental Appeals Board

U.S. Environmental Protection Agency

1200 Pennsylvania Avenue N.W.

Mail Code 1103M

Washington, DC 20460-0001

U.S. Environmental Protection Agency Region 3

Source Water & UIC Section (3WD22)

Water Division

1650 Arch Street

Philadelphia, PA 19103-2029

See the Federal Register notice cited above or the EAB website for how to file with the EAB electronically or by hand delivery.

The petition must clearly set forth the petitioner's contentions for why the EAB should review the permit. The petition must identify the contested permit conditions or the specific challenge the permit decision. The petitioner must demonstrate the issues raised in the petition had been raised previously during the comment period. The petitioner must also state whether, in

his or her opinion, the permit decision or the permit's conditions appealed are objectionable because of:

1. Factual or legal error, or
2. The incorporation of a policy consideration which the EAB should, at its discretion, review.

If a petition for review of this permit is filed, the permit conditions appealed would be deemed not to be in effect pending a final agency action.

Within a reasonable time of receipt of the Appeals Petition, the EAB will either grant or deny the appeal. The EAB will decide the appeal on the basis of the written briefs and the total administrative record of the permit action. If the EAB denies the petition, EPA will notify the petitioner of the final permit decision. The petitioner may, thereafter, challenge the permit decision in Federal Court. If the EAB grants the appeal, it may direct the Region 3 office to implement its decision by permit issuance, modification or denial. The EAB may order all or part of the permit decision back to the EPA Region 3 office for reconsideration. In either case, if the permit is appealed, a final agency decision occurs when after appeal the permit is issued, modified or denied and an Agency decision is announced. After this time, all administrative appeals have been exhausted, and any further challenges to the permit decision must be made to Federal Court.