

REGION III'S RESPONSE TO PETITION FOR REVIEW

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INTRODUCTION

The United States Environmental Protection Agency, Region III (Region) hereby responds to the Borough of Plum Petition for Review filed with the Environmental Appeals Board (the Board), challenging Permit No. PAS2D701BALL issued by the Region to Penneco Environmental Solutions, LLC (Penneco), under the Underground Injection Control (UIC) Program, Part C of the Safe Drinking Water Act (SDWA), 42 U.S.C. § 300h *et seq.* Attached to this response is a certified index of the administrative record for the challenged permit.

For the reasons set forth below, the petitioner has failed to meet their burden to obtain review by the Board, and therefore their petition should be denied.

STATUTORY AND REGULATORY FRAMEWORK

Congress enacted the SDWA in 1974 to ensure that the Nation's sources of drinking water are protected against contamination and "to prevent underground injection which endangers drinking water sources." 42 U.S.C. § 300h(b). Part C of the SDWA, 42 U.S.C. §§ 300h to 300h-8, is designed to protect underground sources of drinking water from contamination caused by underground injection of fluids. Among other things, the SDWA directed EPA to promulgate permit regulations containing minimum requirements for State UIC programs. 42 U.S.C. § 300h. In states without an approved UIC program, EPA directly implements the UIC regulations and issues permits. The Commonwealth of Pennsylvania has not received approval to implement the UIC Program of the SDWA. Therefore, the Region is the permitting authority for the UIC Program in Pennsylvania. *See* 40 C.F.R. §§ 147.1951 – 147.1955.

EPA's regulations implementing the UIC program are contained in 40 C.F.R. Parts 144-148. Part 144 establishes the regulatory framework, including permitting requirements, for EPA-administered UIC programs. Part 146 sets out technical criteria and standards that must be met in permits. Certain procedural requirements applicable to UIC permits are found in 40 C.F.R. Part 124. In addition, state-specific requirements applicable in Pennsylvania are set forth in 40 C.F.R. §§ 147.1951 – 147.1955.

The UIC regulations classify injection wells as Class I, II, III, IV, V, or VI. *See* 40 C.F.R. §§ 144.6, 146.5. The permit at issue in this appeal is for a Class II well. Class II wells are defined as

[w]ells which inject fluids: (1) Which are brought to the surface in connection with natural gas storage operations, or conventional oil or natural gas production and may be commingled with waste waters from gas plants which are an integral part of production operations, unless those waters are classified as a hazardous waste at the time of injection; (2) For enhanced recovery of oil or natural gas; and (3) For storage of hydrocarbons which are liquid at standard temperature and pressure.

40 C.F.R. § 144.6(b). The Penneco permit is for the disposal through injection into a Class II UIC well of brine and other fluids brought up in association with gas and oil production.

STANDARD OF REVIEW

The Board must decline review of a UIC permit decision unless it finds that a permit condition is based on a clearly erroneous finding of fact or conclusion of law, or involves an important matter of policy or discretion that warrants review. 40 C.F.R. § 124.19; *see In re Beeland Group, LLC*, 14 E.A.D. 189, 195 (EAB Oct. 3, 2008). The discretion of the Board to review permit decisions should be exercised sparingly. *Id.* at 195-96 (quoting the Consolidated Permit Regulations, preamble to 40 C.F.R. § 124.19, 45 Fed. Reg. 33290, 33412).

Petitioners have the burden of demonstrating that the issues raised in their petitions warrant review. *See In re Beeland Group*, 14 E.A.D. at 195; *In re Env'tl. Disposal Sys., Inc.*, 12 E.A.D. 254, 264 (EAB 2005). A petitioner does not satisfy this burden merely by relying on previous comments or statements. *See In re Penn. General Energy Co., LLP*, 16 E.A.D. 498, 503 (EAB 2014). Instead, the petitioner must demonstrate why the regional response to particular comments or objections is clearly erroneous or warrants review. *See In re Beeland Group*, 14 E.A.D. at 196; *In re Env'tl. Disposal Sys., Inc.*, 12 E.A.D. at 264; *In re Sunoco Partners Marketing & Terminals, LP*, UIC Appeal No. 05-01 (EAB June 1, 2006)(Order Denying Review in Part and Remanding in Part) at 9. In addition, the Board generally defers to the permit issuer on the review of technical issues. *See, e.g., In re Beeland Group*, 14 E.A.D. at 199; *In re Sunoco Partners*, UIC Appeal No. 05-01 (EAB June 1, 2006) at 9. Finally, the Board's authority to review a UIC permit does not extend beyond the goals of the UIC program to protect underground sources of drinking water (USDWs). *See In re Env'tl. Disposal Sys., Inc.*, 12 E.A.D. at 266; *see also In re Sunoco Partners*, UIC Appeal No. 05-01 (EAB June 1, 2006) at 10; *In re Envotech, L.P.*, 6 E.A.D. 260, 286 (EAB 1996)("[T]he SDWA ... and the UIC regulations ... establish the *only* criteria that EPA may use in deciding whether to grant or deny an application for a UIC permit.")(emphasis in the original).

FACTUAL AND PROCEDURAL BACKGROUND

On March 9, 2016, the Region received an application from Penneco for a UIC permit authorizing the construction and operation of a new Class II disposal well, to be located in Plum Borough, Allegheny County, Pennsylvania. *See* Exh B. Following an EPA issued Notice of Deficiency dated July 8, 2016, (*See* Exh. C), Penneco submitted a supplement to its application on September 10, 2016, and the application was additionally supplemented on March 22, 2017.

See Exh. B. In accordance with 40 C.F.R. §144.31, the permit application included information on the well's construction; how the well would be operated and monitored; information on drinking water wells and gas production wells that exist in the area surrounding the injection well; and the geologic conditions surrounding the site, including location of a fault system in the area and shallow ground water depth. *See* Exh. B.

Following receipt of Penneco's application, the Region conducted a review of the application. As part of this review, the Region evaluated the geology of the injection and confining zones, and determined whether the well construction, the proposed operation and monitoring of the well, the plugging and abandonment plan, and financial responsibility worksheets that the permittee submitted met the regulatory requirements for Class II wells. *See* Exh. D. In compliance with the mandate of the SDWA, the Penneco application review was done with the purpose of ensuring that if the Region granted the permit, the permit conditions would protect USDWs from endangerment from the injection operations. *See* 42 U.S.C. § 300h(b)(1)(B); 40 C.F.R. § 144.12.

Based on the technical review, the Region developed a draft permit and a statement of basis. *See* Exhs. D, E. Consistent with the requirements of 40 C.F.R. § 124.10, the Region provided public notice on June 22, 2017, in the Pittsburgh Tribune-Review, a Pennsylvania newspaper, that the Region was accepting public comment on the draft permit. *See* Exh. F. EPA received numerous requests for a public hearing, which was held on July 26, 2017 at the Plum Community Center in Plum Borough. *See* Exh. V. Copies of the permit application as well as the statement of basis and the public notice were sent to the Plum Borough Community Library, Plum Borough, Pennsylvania, for public review. In addition, the notice was posted on June 22, 2017 on the Region's public notices website. *See id.*

The Region received numerous written comments on the draft permit by mail and email and on the day of the hearing. *See* Exhs. G and H. In addition, over 200 people attended the public hearing. After the hearing, the Region extended the public comment period until August 9, 2017. *See* Exh. H.

On March 7, 2018, the Region issued a final permit to Penneco for a UIC Class II injection well, which was appealed to the Board by a Petition for Review filed by Plum Borough, Filed on April 5, 2018 (Petition). *See* Exh. I. As described below, the Petition raised a single issue, stating that “injection wells may cause an increase in seismic activity, and the effects of such increased seismic activity can impact” USDWs, and therefore the Board should remand the Penneco permit to EPA for a more thorough review or require that EPA amend the Penneco permit to include specific monitoring requirements for seismic activity. *See* U.I.C. Appeal No. 18-02 at 3,7

The Region issued concurrently with the permit a Response to Comments document that provides a detailed explanation of the permit decision and detailed responses to the public comments. *See* Exh. J. Pursuant to 40 C.F.R. § 124.15(a), the Region mailed or emailed the Response to Summary Comments and Notice of Final Permit to all who provided written comments.

In reaching this permit decision, the Region established permit conditions to prevent the injection operations from endangering USDWs. The lowermost USDW at the location of the well site is approximately 450 feet below surface level. *See* Exh. I at Part III.A.2.c. The Region determined that based on PA Geological Survey Water Resource Reports, within the AOR “water quality is extremely poor beyond 500 feet in depth.” *See* Exh. D at 2-3. The injection of fluids is limited by the permit to a 40 foot section of the Murrysville Sand Formation, which is

128 feet thick and lies between 1,822 and 1,950 feet below the well site. The Region further determined that approximately 1,400 feet separates the injection zone from the lowermost USDW and is favorable for injection due to its highly permeable, porous structure that allows for storage and accumulation of fluids under adequate confining conditions. *See* Exh. D at 3. The Riceville-Oswayo Shale layer, a dark gray to greenish and grayish black laminated shale and siltstone layer with occasional sandstone and limestone beds, is approximately 80-90 feet thick, and is the lower confining zone located directly below the Murrys ville Sands. *Id.* This will help contain the injected fluid within the injection zone, and prevent upward movement of the injectate. *Id.* The permit requires the proposed well to have surface casing cemented back to the surface from a depth of approximately 643 feet. In addition, injection will occur through a 7-inch-long string casing surrounding a 4 inch injection string cemented to the surface from a depth of 1,948 feet. *See* Exhs. D at 2-3; I at Part III B.2. The long string casing will be run to the bottom of the well. *See id.*

The permit also includes injection volume and pressure limits, as well as monitoring requirements, to ensure the proper operation of the well. *See* Exhs. D, J. The maximum injection pressure was calculated to prevent fracturing of the injection zone during operation. *See* Exhs. D at 3 and W. The permit requires that, prior to commencing injection into this well, the permittee conduct a two-part mechanical integrity test to ensure that the well as constructed does not leak or cause fluid movement outside the injection zone. *See* Exh. I at Part III A.4 and Exh J at 4. The permit also requires that prior to commencing operations the permittee submit a completion report which includes drilling and cementing records, gamma ray logs of the formations, which will confirm the formation layers, and a cementing log, to confirm proper cementing of the casings. *See* Exh. I at Part III A.3. Once the injection begins, continuous

monitoring of the injection pressure, annular pressure¹ and injection volume is required, to verify continuous compliance with injection pressure limits and the mechanical integrity requirement. *See* Exh. I at Part II C.2, *see* Exh. J at 4. The well will also be equipped with an automatic shut-off device in case a leak is detected and the annular pressure increases. *Id.* Furthermore, to ensure the proper operation of the well, the permit requires the permittee to test the well for mechanical integrity every two years. *See* Exh. I at Part II C.3.

The Region also evaluated the geologic suitability of the wells based on an analysis of known faults or fractures and any seismicity concerns in the area. Specifically, the Region evaluated whether there was evidence of 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, September 2013.*" *See* Exh. K; *see also*, 40 C.F.R. §146.22. The Region also established a maximum injection pressure in the permit designed to limit the potential for seismic events. *See* Exhs. J at 9 and W.

The Region's review confirmed that the Permittee shall inject through the injection well only into a formation which is free of known open faults or fractures within the Area of Review as required by 40 C.F.R. § 146.22. *See* Exh. D at 2, 4-5. The Permittee submitted geologic information that indicates the absence of faults in the confining and injection zone. This further demonstrates that the probability of injection induced seismicity is low because permit conditions require the operator to operate the well at a pressure low enough so any existing fractures will not be activated. *See* Exh. J at 6-10.

¹ The annulus is the space between the tubing and the long string casing. It will be filled with fluid and monitored for pressure changes. *See* Exhs. J at 10 and I at Part II.C.2.

Earthquake activity in Pennsylvania has been associated with the Precambrian, crystalline, igneous/metamorphic bedrock, sometimes referred to as “basement rock”, which is located below sedimentary bedrock. Earthquakes in Pennsylvania are commonly related to either faulting in the basement rock, or to faulting at a shallower depth caused by tectonic stresses that originated from the basement rock. *See* Exh. D at 3; *See* Exh. J at 6-10. The available geophysical and seismic information researched by the Permittee, as well as through EPA’s review of published information of seismicity in Pennsylvania, shows no evidence of faults that reach the land’s surface from basement rock. *See* Exh. S. The United States Geologic Survey (USGS) has not recorded any seismic activity that originated in Allegheny County, Pennsylvania. *See* <http://earthquake.usgs.gov/earthquakes/search/> (search performed on February 28, 2017); *See* Exh. J at 6.

In addition, the National Academy of Sciences, National Research Council’s report, *“Induced Seismicity Potential in Energy Technologies”, National Academy Press*, 2013, indicates that oil and gas production in a reservoir can assist in preventing future impacts from seismicity due to injection because of the reduction in reservoir pore pressure during the years of gas production. *See* Exh. L. Penneco identified in the permit application significant gas and oil production in the vicinity of the proposed injection well. *See* Exh. B.

EPA developed the maximum injection pressure for the injection well using data submitted by Penneco in the permit application. Penneco provided to EPA fracture stimulation data obtained by HFrac Consulting Services, LLC that included an instantaneous shut-in pressure (“ISIP”). The ISIP 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. *See* Exhs. D at 3-4 and W. The Region limited in the Penneco permit the

surface injection pressure and the bottom-hole injection pressure to a level lower than both the ISIP and the fracture pressure to prevent the initiation of new or the propagation of existing fractures. *See* Exh. J at 9. Finally, a number of factors help to prevent injection wells from failing in a seismic event and contributing to the contamination of a USDW. Most deep injection wells, those that are classified as Class I or Class II injection wells, such as covered by the Permit, are constructed to withstand significant amounts of pressure. *See* Exh. J at 10. The Penneco Well is constructed with multiple steel strings of casing that are cemented in place. *See id.* Furthermore, the Pennecopermit requires the Permittee to mechanically test the injection well to ensure integrity before operations begin and to continuously monitor the injection well during operations to detect any potential mechanical integrity concerns. *See* Exh. J at 9-10; Exh. I at Part II.C.2.

RESPONSE TO PETITION FOR REVIEW

The Petition filed by the Borough of Plum appears to argue that the Region should (1) more thoroughly evaluate seismic activity related to the Penneco permit, or (2) include modifications to the permit to require Penneco to monitor seismic activity at the UIC location. *See e.g.*, U.I.C. Appeal No. 18-02 at 3,7. EPA did thoroughly evaluate seismic concerns and concluded that conditions included in the Penneco permit were sufficiently protective of USDWs and addressed potential seismic issues. *See e.g.*, Exhs. B and J.

The Petition fails because there is no permit condition (or lack thereof) that is based upon a clearly erroneous finding of fact or conclusion of law, or an abuse of discretion or that raise an important policy consideration that the Board should review. *See* 40 CF.R. § 124.19; *see In re Beeland Group, LLC*, 14 E.A.D. 189, 195 (EAB Oct. 3, 2008). Their Petition does little more than reference general studies concerning seismic activity and injection wells without providing

any factual basis to carry the Petitioner's burden that the Region's thorough evaluation and Response to Comments concerning seismic activity was clearly erroneous or otherwise warrants Board review of the Penneco permit. *See In re Pennsylvania General Energy Company, LLC*, 16 E.A.D. 498 at 506-507 (EAB 2014)(noting that the petition's restatement of seismicity concerns raised during public comment that were addressed in EPA's response to comments was insufficient to warrant Board review). Petitioner makes only references to a number of articles, studies and reports (*i.e.*, Congressional Research Service report (Peter Folger and Mary Tieman, *Human-Induced Earthquakes from Deep-Well Injection: A Brief Overview* (2015), Abraham Lustgarten, *Injection Wells: The Poison Beneath Us*, ProPublica (2012)) to attempt to discredit the Region's response to comments concerning seismic activity, claiming that the Region's reference to the absence of known fault lines it is "inherently suspect" and "without merit." *See*, U.I.C. Appeal No. 18-02 at 5-6.

Petitioner fails to point to any specific finding or conclusion or response by the Region and demonstrate how it could be clearly erroneous or otherwise warrant Board review. Petitioner merely repackages comments raised during the public comment period, and ignores the Region's well supported and thorough response to the seismicity concerns raised during the review process. *See In re Sammy-Mar, LLC*, 17 E.A.D. 88 at 96 (EAB 2016). Therein, the Board states that "[s]imply repeating concerns before the Board that have been previously presented to and answered by the permit issuer does not satisfy Petitioner's obligation to confront the permit issuer's responses and explain why the responses were clearly erroneous or otherwise warrant Board Review." *Id.* (citing 40 C.F.R. § 124.19(a)(1)(4)(ii)). The Petition fails because it does not specifically and substantively confront the Region's thorough evaluation and Response to Comments. *See id* (internal citations omitted).

The Region carefully and thoroughly evaluated seismic related issues at the site and concluded that based on the known geologic conditions and the monitoring, detection and safety provisions contained in the Permit, USDWs were protected from potential earthquake risks. EPA's analysis of seismic concerns was comprehensive as explained in its Statement of Basis that accompanied the draft permit and its Response to Comments that accompanied the Final Permit. *See* Exhs. B and J. As noted above and in greater detail below, the Region performed a thorough analysis of potential seismic concerns related to the Penneco permit before determining that the conditions in the Penneco permit were protective of USDWs. For these reasons, the Petition for Review should be denied.

1. The Region thoroughly evaluated seismicity as related to the Penneco permit

Petitioner appears to argue that the Region should have more thoroughly analyzed seismic risks associated with the Penneco permit. *See, e.g.,* UIC Appeal No. 18-02 at 3,7. However, Petitioner does not identify any factual support for its contention. Rather, Petitioner only references some studies that discuss seismic activity and injection wells and makes a general statement that the Region's conclusions were "inherently suspect" and "without merit". *See id.* at 5-6.

The Region's thorough evaluation of seismicity is evidenced by the detailed explanation provided in the Statement of Basis and Response to Comments, *See* Exhs. B and J. Therein, the Region explained its detailed analysis of seismicity and the Penneco permit. The Region described in great detail how it considered appropriate geological data on the injection and confining zones when analyzing the Penneco permit, similarly to how it reviews all Class II UICs. Among other things, the Region examined 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

addressed more fully in *“Region 3 framework for evaluating seismic potential associated with UIC Class II permits, updated September 2013.”* See Exh. B at 4; Exh. J at 6; Exh. K. The Region found that based on the geological information submitted by the applicant and other geological data, there were no known faults in the confining or injection zones within the AOR.

The Region also used an EPA report that looks at injection-induced seismicity, *“Minimizing and Managing Potential Impacts of Induced-Seismicity from Class II Disposal Wells: A Practical Approach,”* EPA UIC National Technical Workgroup, February 5, 2015, which provides a recommended approach for assessing regional and local seismicity when reviewing permit applications. See Exh. M. This approach correlates any area seismicity with past injection practices; evaluates geological information to assess the likelihood of activating any faults; evaluates storage capacity of the formation with consideration of porosity and permeability; includes operational parameters to limit injection rate and volume and to limit operation at below fracture pressure; and requires monitoring of injection pressure and rates. See Exh. J at 6-7.

The Region examined induced seismicity, which relates to the conditions under which the disposal of fluids through injection wells has the potential to trigger seismicity. The Region noted that induced seismicity associated with brine injection such as permitted by the Penneco permit, is uncommon, as conditions necessary to trigger seismicity often are not present. In fact, as the Region described, seismic activity induced by Class II wells has the potential to occur only where all of the following conditions are present: (1) there is a fault in a near-failure state of stress; (2) the fluid injected has a path of communication to the fault; and (3) the pressure exerted by the fluid is high enough and lasts long enough to allow movement along the fault line. See Exhs. J at 7, L at Chapters 2 and 3. Although there are approximately 30,000 Class II-D wastewater disposal

wells (like the Penneco well) operating in the United States, only a few of these wells have been documented to have triggered earthquakes of significance and none of these earthquakes, which the Region is aware of, has caused injected fluids to flow into or contaminate a USDW. *See* Exh. J at 7. The Region described the potential concerns that can influence seismic risks, such as the presence of a fault in a receiving formation, which potentially creates a more vulnerable condition for a future seismic event. *See id.* After describing the concerns if there is a fault in the receiving formation, the Region discussed that it examined and verified the submissions of the permit applicant concerning geological information indicating the absence of faults in the injection and confining zones in the vicinity of the proposed injection well. As the Region noted in the Response to Comments, the absence of faults in the injection and confining zones significantly diminish the risk of injection- induced coal mine subsidence and make seismic activity from the injection well very unlikely. *See* Exh. J at 6-10.

In addition, as the Region also noted in its Response to Comments, the United States Geologic Survey (USGS) has not recorded any seismic activity that originated in Allegheny County, Pennsylvania (Search performed via <http://earthquake.usgs.gov/earthquakes/search/> on February 28, 2017). Also, the Pennsylvania Department of Conservation and Natural Resources (PA DCNR) which includes the Bureau of Topographic and Geologic Survey, the principal organization that conducts geologic research in Pennsylvania, has not recorded any seismic activity that has originated in Allegheny County. The PA DCNR website <http://www.dcnr.state.pa.us/topogeo/hazards/earthquakes/index.htm> has an interactive seismicity map and catalog of all recorded seismic events in or near Pennsylvania from 1724 to present. *See* Exh. J at 8.

The Region's evaluation also included analysis of the National Academy of Sciences or

National Research Council's report, *Induced Seismicity Potential in Energy Technologies*, National Academy Press, 2013, which indicates that oil and gas production in a reservoir can assist in preventing future impacts from seismicity due to injection because of the reduction in reservoir pore pressure during the years of gas production. *See* Exh. L and Exh. J at 8. Penneco identified in the permit application significant gas and oil production since the late 1800s in the Murrys ville Sand Formation near the proposed injection well. *See* J at 8. The Region also made the important distinction between open faults, or transmissive faults, which allow fluid to move along the fault and between formations, and non-transmissive faults, which act as a barrier which would prevent movement of fluid along the fault and into another formation across the fault. Because not all faults act as a channel to conduct fluids, but rather as barriers, the UIC Class II requirements focus on ensuring that open faults are not present within the area an injection operation could influence. *See id.*

Additionally, the Region evaluated fluid transmission and pore pressure for the Penneco permit, given that some research indicates that continuous very high rates of injection or over-pressurization of a geologic formation can contribute to the possibility of seismic activity. *See* Exh. J at 8-9; *See* Exh. L. The Penneco permit includes provisions that were developed to prevent over-pressurization of the injection formation. For example, the permit limits the surface injection pressure during the injection operations to 1421 psi and the bottom-hole injection pressure to 2332 psi. *See* Exhd. J at 8-9, I at Part III.B.4 and W. These were calculated to ensure that, during operation, the injection pressure will not propagate existing fractures or create new fractures in the formation. In fact, limiting the pressure not only prevents the propagation of fractures that could become potential channels for fluid movement into USDWs but that could also serve as conduits for fluids to travel from the injection zone to unknown faults. *See* Exh. J

at 9.

The Region also evaluated commenters' concerns about seismic events occurring in other parts of the United States including Ohio, Texas, Oklahoma, West Virginia and Arkansas. The Region, in the Response to Comments, noted that while there is strong evidence that supports the underground injection of fluids as being the trigger in certain cases, 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 Penneco injection operation as discussed above. *See id.* at 9-10; *See e.g.*, Exhs. O, P, Q, R, S and T. 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. The Penneco well contrasts greatly with the wells in the known cases of induced-seismicity in depth, volume and rate of injection. *See* Exh. J at 9-10.

Among other things, the Region noted that the injection depths, distance between the injection depth and crystalline basement rock and geological conditions vary greatly from the more shallow and existing fault systems in Ohio. *See* Exh. J at 8-10:

- The Penneco well injection zone is the Murrysville Sand formation, a sedimentary rock layer of Lower Mississippian age, which has a higher natural porosity and greater interconnection of that pore space throughout the formation than the crystalline bedrock at issue in the Ohio cases. *See* Exhs. J at 9; Exh. N.
- The Murrysville formation is located at a depth of approximately 1800 feet below land surface at the proposed injection well site. *See* Exh. J at 8-9.
- The Precambrian crystalline basement rock in the area of the proposed injection well is located approximately 9000 feet below the proposed injection formation *See* Exsh. N and J at 9; *See* Exhs. O and R.

- In the Murrysville formation, the rock will more readily store injected fluid and 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 formation. *See* Exh. J at 9.
- These geologic settings and reservoir characteristics of the proposed injection well are very different than the circumstances of injection well seismic events in Ohio, as noted in the Response to Comments. *See id.*
- For the proposed Penneco well, injection will not occur within, or flow into, the deeper Precambrian crystalline rocks. *See* J at 9-10.

Similarly, as the Region noted and evaluated, injection conditions and other factors between the cases identified in Texas, Oklahoma and Arkansas vary greatly from the Penneco permit location. *See* Exh. J at 9.

- Concerning the Texas seismic events, studies indicate that it was the significant volume of monthly injections (150,000 barrels per month) that caused the seismic activity. Here, Penneco is limited to 54,000 barrels per month. *See* Exhs. J at 9-10, I at Part III.B.3; Exh. P.
- Oklahoma and Arkansas seismic events were likely caused by over-pressurization of nearby faults. *See* Exh. at 10. However, pressure is controlled by limits in the Penneco permit. *See id.* at 9; Exhs. I at Part III.B.4; *see also* Exhs. S and T.
- The West Virginia seismicity instances were never definitively connected to injection as a cause. *See* Exh. J at 9-10. But following injection rate and volume reduction, seismic activity was no longer identified. Here, the Penneco permit controls for injection rate and volume. *See id.* at 10; Exh. I at Part III.B.

In short, the Region thoroughly evaluated seismicity, , and only after its evaluation, including comprehensive review of concerns raised by the commentators, did it issue the Penneco permit. Petitioner does not identify any factual basis to support its apparent contention that the Region did not thoroughly evaluate seismic risk, let alone that the Region's findings of fact based on its evaluation were clearly erroneous. Absent any such showing, the Board should deny the Petition.

2. The permit conditions control the risk of induced seismicity, and additional conditions are not required.

Petitioner also appears to argue that the Region should include additional provisions in the Penneco permit to address perceived seismic risks. *See, e.g.,* UIC Appeal No. 14-186 at 2-3. As noted above, the Region is aware and recognizes that some injection wells have been linked to seismic activity. However, as the Region noted in the Response to Comments, the Penneco permit was thoroughly evaluated and the Region insured that conditions were sufficient to address actual seismic conditions at the injection site. The Penneco permit contains provisions that will specifically protect USDWs in the event of seismic activity. *See* Exh. J at 6-10; Exh. I.

As the Region described in the Response to Comments, EPA is not aware of any case where a seismic event caused an injection well to contaminate a USDW. *See* Exh. J at 7. Construction factors help to prevent injection wells from failing in a seismic event and potentially lead to USDW contamination. Class II injection wells are constructed to withstand significant amounts of pressure, typically with multiple strings of steel casing that are cemented in place. The casing in these wells is designed to withstand both significant internal and external pressure. *See* Exh. J at 10. The Penneco injection well will have numerous construction and operating safeguards to protect USDWs:

- The Penneco well is constructed with multiple strings of steel casing cemented in place. *Id. at 10.*
- The Penneco well will be required under the permit to be mechanically tested to ensure integrity before it is operated and will be continuously monitored during operation to ensure that mechanical integrity is maintained. This mechanical integrity testing is required by UIC regulations for all brine injection wells. *Id.*
- If a seismic event were to occur that affected the operation and mechanical integrity of the injection well, the well is designed and monitored to detect a failure due to pressure changes in the well annulus between the long string casing and the injection tubing, and this would cause the well to automatically stop injection. *See* Exh. J at 10 and Exh I at (Part II.C.2).

As described above, the conditions at the injection location significantly limit the risk of injection induced seismic activity. In addition, permit conditions further reduce the risk that any seismic activity could lead to contamination of USDWs.

Petitioner has not pointed to any evidence that supports a determination that the conditions the Region included in the Penneco permit are based on clearly erroneous findings of fact. Rather, as demonstrated herein, the permit conditions were based on a thorough evaluations of relevant facts and studies and the sound application of the Region's technical expertise. Additionally, Petitioner did not identify other important policy consideration which the Board, in its discretion, should review. The conditions in the Penneco permit that relate to seismicity are well supported by the Region and are intended to go above and beyond the requirements of the SDWA.

CONCLUSION

The Petitioner has not carried its burden to show that the Penneco permit conditions are based on clearly erroneous findings of fact. Nor has the Petitioner shown that there are any important policy considerations which the Board should, in its discretion, review. Therefore, the Region respectfully requests that the Board deny the Petition.

Respectfully submitted,



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CERTIFICATE OF SERVICE

I hereby certify that I delivered a copy of the foregoing Region III's Response to the Petition for Review on the date specified, by electronic mail and U.S. Mail:

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I also certify that I filed the original electronically with the Environmental Appeals Board.



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