



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

STATEMENT OF BASIS

U.S. EPA UNDERGROUND INJECTION CONTROL (UIC)
DRAFT CLASS II-D PERMIT PAS2D015BMCK

FOR

Catalyst Energy, Inc.
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Pittsburgh, PA 15218

FOR

A project consisting of one Class II-D commercial injection well used for the disposal of produced fluids (brine) associated with oil and gas production located at:

Lot 580-1 Injection Well
Keating Township
McKean County, Pennsylvania

On December 8, 2020, Catalyst Energy, Inc., LLC (“Catalyst” or “the Permittee”) submitted a UIC permit application to the U.S. Environmental Protection Agency (“EPA” or the “Agency”), Region 3, for the issuance of a permit that would allow for the construction and operation of a Class II-D commercial brine disposal injection well, Lot 580-1 API No. 37-083-46237, (hereinafter, “Injection Well,” Lot 580-1 well, or the “Facility”), located near Cyclone in Keating Township, McKean County, Pennsylvania. The coordinates for the Injection Well are: Latitude 41° 49’ 50.11” Longitude -78° 34’ 54.26”. EPA Region 3 staff reviewed this permit application and deemed it complete on December 17, 2020. The Permittee’s December 8, 2020 submittal is referred to in this Statement of Basis as the “Permit Application”.

Pursuant to the federal Safe Drinking Water Act, 42 U.S.C. §§ 300f *et. seq.*, and its implementing regulations, 40 C.F.R. §§ 144 -146, and 40 C.F.R. § 147.1950-1955, the EPA has developed a federal UIC Program and, through the issuance of permits, is responsible for regulating the construction, operation, monitoring and closure of injection wells that place fluids underground for disposal or enhanced recovery in oil and gas production. Today’s draft permit specifies conditions for Injection Well construction, operation, monitoring, reporting, and plugging and abandonment which are designed to protect and prevent the movement of fluids into Underground Sources of Drinking Water (USDW). The Permittee’s UIC project and the draft permit conditions specific to the project are described below:



Area of Review: Pursuant to the applicable regulations, 40 C.F.R. §§ 144.3 and 146.6(b), the “Area of Review” is an area surrounding the Injection Well for which the applicant must first research, and then develop, a program for corrective action to address any wells that penetrate the injection zone and which may provide conduits for fluid migration during the injection operation at the Facility. Catalyst proposed a fixed radius Area of Review of one-quarter mile, which EPA has determined to be acceptable. In determining the fixed radius, EPA has considered the following information provided by the Permittee: chemistry of injected and formation fluids; hydrogeology, population and groundwater use and dependence; and historical practices in the area. Catalyst has provided documentation on the fluid to be injected, groundwater use in the area, and the well population within the one-quarter mile Area of Review. The injection formation is an oil and gas bearing zone and therefore compatible with the injectate, which is a byproduct of oil and gas production. There is one drinking water well and one municipal water supply within a half mile radius of the Injection Well. Within the Area of Review there are; the proposed disposal Injection Well Lot 580 #1 (API No. 37-083-46237), the Amoco-Witco #1 well (API No. 37-083-30629) which is proposed to become a monitoring well, nineteen permanently plugged shallow production wells which did not penetrate the proposed injection zone, and the Lot 581 ON-1 well (API No. 37-083-40667). The Lot 581 ON-1 well penetrated the Onondaga injection zone and, based on seismic information provided by Catalyst, did not penetrate the reef portion of the Onondaga Limestone. Catalyst was unable to provide a plugging certificate for this well. Prior to authorization to inject, Catalyst will be required to provide documentation that this well is properly plugged and abandoned or constructed appropriately for use as a monitoring well. If any unplugged/abandoned wells that penetrate the injection zone are found within the Area of Review later, the draft permit requires the Permittee to perform corrective action.

Underground Sources of Drinking Water (USDW): An USDW is defined by the UIC regulations as an aquifer or its portion which, among other things, contains a sufficient quantity of ground water to supply a public water system and which also contains fewer than 10,000 mg/L (milligrams per liter) Total Dissolved Solids, and which is also not an exempted aquifer. The Permittee reported that the deepest USDW in the area of the proposed Injection Well, the Pithole Water Association Municipal Water Supply Well, was drilled in 2014 to a Total Depth of 265 feet. The applicant has proposed the lowermost USDW to be at 350 feet below ground surface. 40 C.F.R. § 147.1955 requires surface casing in the Injection Well to be installed from the surface to a depth of at least 50 feet below the base of the lowermost USDW and cemented back to the surface. The surface casing for the Lot 580-1 Injection Well is installed at an approximate depth of 426 feet below ground surface and cemented back to the surface to protect groundwater.

Injection and Confining Zones: The draft permit limits injection of fluids for disposal to the Middle Devonian Onondaga Formation at a depth of approximately 5169 to 5266 feet below ground surface.

The lowermost USDW is separated from the injection zone by approximately 4819 feet. The upper confining zone consists of numerous shale formations which include the Marcellus Shale, and Middle and Upper Devonian Shales. Beneath the Onondaga, the primary confining unit is the Silurian Salina Formation.

Injection Fluid: The draft permit establishes a monthly maximum injection volume of 100,000 barrels, and limits injection to fluids produced solely in association with oil and gas production. One barrel of fluid is equal to 42 gallons.

The Permit Application includes analyses of the injection fluid that corresponds to the requirements stated in Paragraph II.C.3. in the draft permit. 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 will be able to compare samples collected from groundwater with the injection fluid analysis to help determine whether operation of the Injection Well may be the cause of the contamination.

Maximum Injection Pressure: The maximum allowable surface injection pressure for the permitted operation of the Injection Well will be 2600 pounds/square inch (“psi”) with a bottom-hole pressure of 5,197 psi. The maximum surface injection pressure and bottom-hole pressure were developed using the injection pressure limitation calculation; a formula that considers the depth to the Onondaga injection zone, the highest specific gravity Catalyst expects to encounter (1.16) and a fracture gradient developed by using the instantaneous shut-in pressure of the Marcellus Shale. The Marcellus Shale is the confining unit directly above the Onondaga Limestone.

Potential for Seismicity: The SDWA regulations for Class II wells do not require consideration of the seismicity of the region, unlike the SDWA regulations for Class I wells for the injection of hazardous wastes. See regulations for Class I hazardous injection wells at 40 C.F.R. §§ 146.62(b)(1) and 146.68(f). Nonetheless, because of public concerns about injection-induced seismicity, EPA evaluated factors relevant to seismic activity as discussed below and addressed more fully in “[Region 3 framework for evaluating seismic potential associated with UIC Class II permits](#)”.

The permit provides that the Permittee shall only inject produced fluids into a formation which is overlain by a confining zone free of known open faults or fractures within the Area of Review, as required pursuant to 40 C.F.R. § 146.22. The Permittee submitted geologic information indicating an absence of faults or fractures within a one-mile radius of the Injection Well.

The depth to the top of the crystalline basement from the surface elevation of the Lot 580-1 well is approximately 10,500 feet below sea level, according to the PA DCNR “*Precambrian Basement Map of the Appalachian Basin and Piedmont Province in Pennsylvania*”. The base of the Onondaga Formation at the Lot 580-1 well is approximately 3,100 feet, or approximately 7,400 feet above the estimated top of Precambrian basement.

The USGS Seismic hazards Map for Pennsylvania indicates the Lot 50-1 well is situated in the lowest seismic risk area in the state

The final permit will include an injection pressure limit to prevent the initiation or propagation of fractures that could create conduits for the injected fluid to flow to any existing faults. The surface maximum allowable injection pressure (MAIP) for this permit was calculated by the instantaneous shut-in pressure (ISIP) of the Marcellus Shale which is the confining unit directly above the Onondaga Limestone. 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. 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 formula used to calculate the surface MAIP can be found in Paragraph III.B.4. of the draft permit.

Finally, several factors help to prevent injection wells from failing in a seismic event and contributing to the contamination of a USDW. Most Class I or Class II injection wells, including this Injection Well, are

constructed to withstand significant amounts of pressure. The Lot 580-1 Injection Well is constructed with multiple concentric strings of casing that are cemented in place. Furthermore, the draft permit requires Catalyst to mechanically test the Injection Well to ensure integrity before operations begin and to continuously monitor the Injection Well during operations to identify any potential mechanical integrity concerns. 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.

Testing, Monitoring and Reporting Requirements: The Permittee is required to conduct a mechanical integrity test (“MIT”) after construction of the Injection Well. The MIT consists of a pressure test and a fluid movement test. The pressure test will be conducted in order to ensure that the casing, tubing and packer in the Injection Well do not leak. The fluid movement test, which includes case cement record and cement bond log or temperature log reviews, will be conducted to ensure that fluid movement does not occur outside of the injection zone. In addition to the testing described above, additional pressure testing of the casing, tubing and packer will occur every two (2) years and whenever a rework on the Injection Well requires the tubing and packer to be released and reset.

The Permittee will be required to maintain a record of every load of produced fluid received. The record will include the hauler’s name, the operator’s name, and the location from where the produced fluid was obtained, and the volume of the load and whether the load was a split load or not.

The Permittee will be responsible for continuously monitoring the Injection Well for surface injection pressure, annular pressure, flow rate and cumulative volume from the date on which the Injection Well commences operation and until such date that the Injection Well is plugged and abandoned. The Permittee must submit an Annual Report to the EPA summarizing the results of the monitoring and testing activities required by the permit, including monthly monitoring records of the injection fluid, the results of any mechanical integrity testing and information identifying any major changes in the characteristics of the injected fluid. The Annual Report must be submitted to EPA by January 31 of each calendar year.

Plugging and Abandonment: The Permittee has submitted a Plugging and Abandonment Plan that will result in an environmentally protective Injection Well closure at the time of cessation of operations. The Permittee will secure a Letter of Credit along with a Standby Trust Agreement to ensure proper plugging of the Injection Well. The amount of the Letter of Credit shall cover the estimated cost to close, plug and abandon the Injection Well and shall be in the amount of at least Forty-one Thousand One Hundred Dollars (\$41,100). The amount of the Letter of Credit, which is based upon an independent, third-party professional’s estimate of the costs associated with the plugging and abandonment of the Injection Well, must also be sufficient to preclude the possibility of abandonment without proper plugging and closure. Authorization to construct and operate the Injection Well will not be given by EPA until financial assurance is in place.

Expiration Date: When issued, a final permit will be in effect for ten (10) years from the date of that final permit’s effective date. EPA will conduct an annual review of the Permittee’s Injection Well operation. The final permit will contain the same conditions as in this draft permit unless EPA receives information supporting and warranting alternative final permit conditions or actions on this Permit Application.

Additional Information: The Administrative Record for the draft permit is available for public inspection. All information submitted by the Permittee in support of the draft permit, unless deemed

confidential, is included in the Administrative Record for the draft permit and is available to the public for review. Copies of the Permit Application, the draft permit, the Statement of Basis, and the Administrative Record index are available for review and inspection on EPA's [website](#). Please direct any questions, comments and requests for additional information to the contact listed below. **The Administrative Record for this action will remain open for public comment until August 23, 2021.**

Tentative Public Hearing: EPA has tentatively scheduled a virtual public hearing on August 24, 2021. An in-person hearing will not take place. The call-in information for the teleconference is listed below:

Call-in Number: 866-673-0734

6:00 PM – 8:00 PM Eastern Standard Time

There is no need to register in advance for the virtual hearing. You may call 15 minutes in advance of the start time or any time during the session to listen to the hearing. During the hearing, callers will receive instructions on how to join the queue to make a comment. The operator will call on people to deliver their oral comments. The virtual hearing is an audio-only teleconference. Participants who want to supply written or printed materials, should do so, via email, addressed to the contact listed below.

Request for Public Hearing: Requests to hold this public hearing must be received by EPA, via email or telephone, on or before August 17, 2021. When requesting a public hearing, please state the nature of the issue(s) you propose to raise. EPA expressly reserves the right to not hold a hearing unless a significant degree of public interest is evidenced by August 17, 2021.

Submit comments or requests for a hearing or for additional information to:

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