



REGION 3

PHILADELPHIA, PA 19103

STATEMENT OF BASIS

U.S. EPA UNDERGROUND INJECTION CONTROL (UIC)
DRAFT CLASS II-R PERMIT ISSUANCE PAS2R430BMCK

FOR

SANDSTONE DEVELOPMENT LLC
464 BINGHAM ROAD
CYCLONE, PENNSYLVANIA, 16726

FOR

A project consisting of one Class II-R injection well which allows for the injection of produced fluids to enhance the recovery of oil, located at:

McKay Lease
in Lafayette Township
McKean County, Pennsylvania

On February 12, 2024, Sandstone Development LLC ("Sandstone" or "the Permittee") submitted a 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 conversion and operation of a Class II-R enhanced recovery injection well, McKay 7A, API No. 37-083-48829, (hereinafter, "Injection Well", "McKay 7A", or the "Facility"), located at the McKay Lease, in Lafayette Township of McKean County, Pennsylvania. The coordinates for the Injection Well are: Latitude: 41° 48' 16.02" Longitude: -78° 36' 39.36". The EPA staff reviewed the initial permit application and found deficiencies. The EPA issued a Notice of Deficiency to Sandstone on April 3, 2024 to which Sandstone responded on May 22 and June 27, 2024. The Permittee responded to the Notice of Deficiency by correcting information in the permit application and resubmitting the application. On June 27, 2024, the EPA deemed the application complete. On December 17, 2024, the EPA issued a Request for Information to Sandstone to which Sandstone responded on December 26, 2024. The Permittee's February 12, May 22, June 27, and December 26 submittals are collectively 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. Parts 144-146, and 147.1950-1955, the EPA UIC program is responsible for regulating, through the issuance of permits, 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 specified to protect and prevent the movement of fluids into Underground Source(s) of Drinking Water (USDW). The final permit will contain the same conditions in the draft permit unless the EPA receives information supporting and warranting alternative final permit conditions or actions on this Permit Application.

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. Sandstone proposed a fixed radius Area of Review of one-quarter mile, which the EPA has determined to be acceptable. In determining the fixed radius, the EPA has considered the following information provided by the Permittee: chemistry of injection and formation fluids; hydrogeology, population and groundwater use and dependence; and historical practices in the area. Sandstone has provided documentation identifying and describing fluid to be injected, the groundwater use in the area, and on 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 given that the fluids to be injected are byproducts of oil and gas production. There are no drinking water wells within a half mile radius of the Injection Well. The Permittee indicated that there are ten (10) active production wells within the Area of Review, including the proposed injection well McKay 7A. There is one plugged production well, the Witco McKay 1 well, within the Area of Review. There are no known unplugged/abandoned wells within the Area of Review. If any unplugged/abandoned wells that penetrate the injection zone are found within the Area of Review at a later date, 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 groundwater 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 notes that the deepest USDW occurs 160 feet below ground surface which matches the drilling reports for the wells within the Area of Review submitted in the application. Construction of the Injection Well requires the Permittee to install surface casing to a depth of approximately 550 feet and to cement the entire length of casing back to the surface. The Permittee must, among other requirements, also install long string casing from the ground surface to an approximate depth of 2,285 feet and cement the casing to a depth of at least 100 feet above the injection zone. The Permittee must install in the Injection Well, and inject fluids through, a tubing string which is set on a packer and placed above the injection zone interval at approximately 2,285 feet below ground surface.

Injection and Confining Zones: Injection of fluids for enhanced recovery is limited by the draft permit to the Kane Sandstone Formation in the subsurface interval between approximately 2,295 feet to 2,315 feet below ground surface.

The lowermost USDW is separated from the injection zone by approximately 2,135 feet. Directly above the Kane Sandstone Formation is 180 feet of interbedded and unnamed shale that will act as a

confining unit for the injection zone. Additionally, between the lowermost USDW and the injection zone are multiple layers of shale ranging from 30 to 780 feet in thickness which will also act as confining units for the injection zone.

Injection Fluid: The draft permit limits the injection fluids in this well to produced fluids obtained solely from Sandstone's conventional production operations. The draft permit also establishes a maximum daily injection volume of 250 barrels per day. 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 groundwater. Should a groundwater contamination event occur during the operation of the Injection Well, the 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 1,310 pounds/square inch ("psi") with a bottom-hole pressure of 2,393 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 top of the Kane Sandstone injection zone, the specific gravity of the injection fluid (1.09) and a fracture gradient developed by using the instantaneous shut-in pressure (a pressure lower than the fracture pressure).

Potential for Seismicity: The SDWA regulations for Class II injection wells do not require consideration of the seismicity of the region, unlike the SDWA regulations for Class I injection 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, the 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 final permit will provide that the Permittee shall only inject produced fluids through the Injection Well and 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.

A report conducted by the *Commonwealth of Pennsylvania Department of Conservation and Natural Resources Bureau of Topographic and Geologic Survey*, "[Earthquake Hazard in Pennsylvania](#)" documents known epicenters found in Pennsylvania. Per the report, there are no documented cases in which the epicenter of an earthquake was traced back to McKean County, Pennsylvania. On page 7 of the report, the author states, "The great majority of earthquakes occur along boundaries between tectonic plates. The reason for this is not completely clear, but it appears that stress levels are higher along plate boundaries, and that strain energy builds up more rapidly in those areas. Eastern North America, including Pennsylvania, today is far from the nearest plate boundary – the mid-Atlantic Ridge, some 2,000 miles to the East."

According to the United States Geological Survey (USGS), there have been no earthquake epicenters that have occurred in McKean County from 1900 to the present-day. Sandstone's injection activity is for the purpose of enhanced recovery which has a low potential to induce seismicity due to the total change in formation pressure as the injection fluid replaces the volume of oil and gas extracted.

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 draft permit was calculated using the 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. The surface MAIP is less than both the ISIP and the fracture pressure to prevent the initiation of new, or propagation of existing, fractures.

Finally, a number of factors help to prevent injection wells from failing in a seismic event and contributing to the contamination of an USDW. Most Class I and Class II injection wells, including this Injection Well, are constructed to withstand significant amounts of pressure. The McKay 7A Injection Well is constructed with multiple steel rings of casing that are cemented in place. Furthermore, the draft permit requires Sandstone to continuously monitor the Injection Well during operations in order 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 conversion 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 five (5) years and whenever a rework on the Injection Well requires the tubing and packer to be released and reset.

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 Injection Well shall be equipped with automatic shut-off devices which would be activated in the event of a mechanical integrity failure. In addition, Paragraph II.D.3. of the draft permit requires the Permittee to report to the Director, within twenty-four (24) hours, any permit noncompliance which may endanger, or which has endangered, human health or the environment. The Permittee must submit an Annual Report to the EPA summarizing the results of the monitoring and testing activities required by the draft 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 the 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 has secured a Standby Trust Agreement to ensure proper plugging of the Injection Well. The amount of the Standby Trust Agreement and accompanying Certificate of Deposit shall cover the estimated cost to close, plug, and abandon the Injection Well in the amount of at least \$5,507.50. The amount of the Certificate of Deposit, 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.

Effective and Expiration Date: When issued, the final permit will become effective as of the date of signature. If comments received requested a change in the draft permit, the final permit shall become effective 35 days after the date of signature to allow for the filing of appeals to the EPA's Environmental Appeals Board.

The permit will be in effect for the operational life of the Facility, which includes the proper plugging and abandonment of the Injection Well when operations cease. The EPA will conduct an annual review of the Permittee's Injection Well operation.

Additional Information: The Administrative Record for the draft permit is available for public review. All data submitted by the Permittee in support of the draft permit, unless deemed confidential, is included in the Administrative Record. The Administrative Record can be requested by contacting the EPA staff listed below. Copies of the Permit Application, the draft permit, the Statement of Basis, and the Administrative Record index are available for review and inspection on the EPA's [website](#). Please direct any questions, comments on the draft permit, and requests for additional information to the EPA staff listed below. **The public may submit comments on the draft permit until May 6, 2025.**

Tentative Public Hearing: The EPA has tentatively scheduled a virtual public hearing on May 6, 2025. An in-person hearing will not take place. The call-in information for the virtual meeting is listed below:

Call-in Number: (484) 352-3221 6:00 PM Eastern Standard Time
Conference ID: 381 733 216#

MS Teams Link: <https://msteams.link/1H1M>

There is no need to register in advance for the virtual hearing. Attendees may utilize MS Teams by calling via telephone or entering the URL into a web browser. Participants who want to submit written or printed materials can do so using the information listed below.

EPA will hold the virtual public hearing only if the EPA receives requests from the public to do so.

Requests to hold this public hearing must be received by the EPA via email or telephone by April 29, 2025. When requesting a public hearing, please state the nature of the issues you propose to raise. The EPA expressly reserves the right to cancel this hearing unless a significant degree of public interest is evidenced by April 29, 2025.

General Notice: If you would like to be added to a general mailing list for notice of any UIC permitting actions in EPA Region 3 jurisdictions (Pennsylvania, Virginia, and Washington D.C.), please notify the EPA by sending an email to R3_UIC_Mailbox@epa.gov. Please specify if you are interested in permitting actions in all three jurisdictions or only in particular jurisdiction(s). If you don't have access to email, you may also send a request to be included on the list at the physical address listed below.

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

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