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 IIR PERMIT PAS2R930BMCK

FOR

SLIVERVILLE OIL COMPANY, LLC
42 PARKWAY LANE
BRADFORD, PA 16701

FOR

A project consisting of one Class IIR enhanced oil recovery injection well, which allows injection of produced fluid to enhance recovery of oil, located in:

Allegheny National Forest
at the Evans Lot in Lafayette Township,
McKean County, Pennsylvania

On January 24, 2018, Sliverville Oil Company, LLC ("Sliverville Oil" or "the Permittee") submitted a UIC permit application for the conversion of one active oil production well, Evans Well 106 (API # 083-56582), to an operating class IIR enhanced recovery injection well located on the Evans Lot in the Allegheny National Forest in Lafayette Township, McKean Township, PA. The coordinates for this Injection Well are: Latitude 41° 52' 17.6" and Longitude -78° 41' 33.9". Enhanced recovery is a process whereby fluid is injected into a geologic formation to help produce additional oil within the formation that was not produced during the original, primary oil production process. EPA Region III staff reviewed this application and additional information was requested from Sliverville on February 27, 2018. In response to EPA's request, the Permittee supplemented the original permit application on March 13, 2018. After review of this additional information, EPA deemed Sliverville Oil's permit application complete on March 15, 2018. The Permittee's January 24, 2018 and March 14, 2018 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 § 147.1955, 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 enhanced recovery or disposal. 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 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, 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. Sliverville Oil proposed a fixed radius Area of Review of one-quarter mile which EPA determined is 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 ground-water use and dependence; and historical practices in the area. Sliverville Oil has provided documentation in the permit application on the well population that penetrates the injection zone within the one-quarter mile fixed radius Area of Review. Sliverville Oil indicates in the permit application that there are three wells in the Area of Review with unknown total depths. The Permittee is addressing these three unknown wells by installing three monitoring wells in the same vicinity. The draft permit also requires Sliverville Oil to perform corrective action on any unplugged/abandoned wells that penetrate the injection zone within the Area of Review if they are identified at a future date.

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 reviewed surrounding oil and gas well logs which reported encountering fresh water between 70 and 205 feet below ground surface. Therefore, the depth of the lowermost USDW has been set to approximately 300 feet below ground surface. The proposed construction of the Injection Well will comply with the regulations at 40 C.F.R. § 147.1955(b), which require installing surface casing from the surface to a depth of at least 50 feet below the base of the lowermost USDW and cementing that entire length of casing back to the surface. Sliverville Oil will set the surface casing for the Injection Well at an approximate depth of 456 feet below ground surface and cement the casing back to the surface.

Injection and Confining Zones: Injection of fluids for enhanced recovery is limited by the draft permit to the Lewis Run Formation in the subsurface interval between, approximately, 1980 feet and 2012 feet, depending upon surface topography. The injection zone is separated from the lowermost USDW by an interval of approximately 1680 feet. A shale confining zone of approximately 60 feet in thickness is immediately above the Lewis Run Formation injection zone.

Injection Fluid: The draft permit limits the injection fluids in these wells to produced fluids obtained solely from Sliverville Oil's production operations. The draft permit also establishes a maximum daily injection volume of 500 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.4. 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 ground water 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 will be 1625 pounds/square inch (psi). The maximum pressure was developed using the depth to the Lewis Run injection zone, the specific gravity of the injected fluid (1.12), 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 wells do not require consideration of the seismicity, 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), 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,"* and established a maximum injection pressure in the draft permit designed to limit the potential for seismic events. No faults have been identified in the crystalline basement rock in McKean County, Pennsylvania within the area of review for the proposed Sliverville Oil project. The United States Geological Survey as well as the Pennsylvania Bureau of Topographic and Geologic Survey have not recorded and EPA has not been notified of any seismic activity that originated in McKean County, Pennsylvania, even after extensive oil and gas production and enhanced recovery in the county. This is supporting evidence that seismicity is unlikely, either because no faults are present or because increase in formation pore pressure due to injection have not caused sufficient pressure changes for movement to occur along any fault that could exist. Furthermore, Sliverville Oil's injection at the proposed well 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.

Testing, Monitoring and Reporting Requirements: The Permittee is required to conduct a mechanical integrity test (MIT) after converting the injection well from a production well. The MIT consists of a pressure test to make sure the casing, tubing and packer in the well does not leak and a fluid movement test, through the review of cementing records and a cement bond log or a temperature log to make sure that movement of fluid does not occur outside of the injection zone. In addition to the monitoring described above, additional pressure testing of the casing, tubing and packer will occur every five years and whenever a rework on a 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, flow rate and cumulative volume beginning on the date which the injection well commences operation and concluding when the injection well is plugged and abandoned. The Permittee must submit an Annual Report to the EPA Director summarizing the results of the monitoring required by the draft permit, including monthly monitoring records of the injection fluid, the results of any mechanical integrity testing, and any major changes in the characteristics of the injected fluid. The annual report must be submitted to EPA by January 31 of each year and report the previous calendar year information.

The Permittee has also established three monitoring wells to monitor fluid levels in the vicinity of the injection well. The draft permit requires quarterly monitoring and recording of the fluid level, beginning on the date on which the injection well commences. The draft permit also requires that the Permittee submit the results of the monitoring to EPA within 30 days of the monitoring event. If the fluid level in any of the three wells were to rise 500 feet below the average bottom of the surface casing of the monitoring wells (995 feet below the surface), fluid level monitoring will be conducted monthly. Monitoring will return to a quarterly basis when the fluid level falls below 995 feet. If the fluid level were to rise to 50 feet below the average bottom of the surface casing of the monitoring wells, the draft

permit requires the Permittee to shut down the injection well will be shut down and notify EPA immediately. The EPA Director shall prescribe specific actions to be taken if this should occur.

Plugging and Abandonment: The Permittee has submitted a plugging and abandonment plan that will result in an environmentally protective well closure at the time of cessation of operations. The Permittee has also demonstrated financial responsibility indicating it will maintain adequate financial resources for well closure through an Irrevocable Standby Letter of Credit. The amount of the Letter of Credit is based on an independent third-party estimate for the cost of plugging and abandonment of the injection well. This should preclude the possibility of abandonment without proper closure.

Expiration Date: When issued, a final permit will be in effect for ten years from the date of the permit issuance. EPA will conduct an annual review of the Permittee's operation. The final permit will contain essentially the same conditions of this draft permit unless information is supplied to EPA which would warrant alternative conditions or actions on this permit application.

Additional Information: Please direct any questions, comments and requests for additional information to the contact person listed below. EPA has tentatively scheduled a public hearing for June 13, 2018, 7:00 PM at the Lafayette Township Municipal Building, 7524 PA Route 59, Lewis Run, PA. Requests to hold this public hearing must be received by May 30, 2018. When requesting a public hearing, please state the nature of issues you propose to raise. EPA expressly reserves the right not to hold a hearing unless a significant degree of public interest is evidenced specific on the proposed injection operation. The Administrative Record for this action will remain open for public comment until June 6, 2018.

Requests for a hearing or for additional information should be directed to:

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