



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD CHICAGO, IL 60604-3590

**STATEMENT OF BASIS FOR ISSUANCE OF UNDERGROUND INJECTION
CONTROL (UIC) DRAFT PERMIT**

Permit Number: MI-025-2D-0041

Facility Name: Motz 2-19 SWD

Savoy Energy, LP of Traverse City, Michigan, has applied for a U. S. Environmental Protection Agency (EPA) permit for the Motz 2-19 SWD injection well to be used for brine disposal in Calhoun County, Michigan.

Review of the permit application indicates that no significant environmental impact should result from the proposed injection. EPA, therefore, intends to issue a permit for this well. Under the authority of Title 40 of the Code of Federal Regulations (40 C.F.R.) Parts 144 and 146, EPA permits must specify conditions for construction, operation, monitoring, reporting, and plugging and abandonment of injection wells so as to prevent the movement of fluids into any Underground Source of Drinking Water (USDW). General provisions for EPA UIC permit requirements are found at 40 C.F.R. Parts 144 and 146, while regulations specific to Michigan injection operations are found at 40 C.F.R. Part 147 Subpart X. In accordance with 40 C.F.R. §124.7, general information and highlighted permit conditions specific to this well are as follows:

Area of Review (AOR) and Corrective Action: In accordance with 40 C.F.R. §§144.55, 146.6 and 146.7, this is the area surrounding the well within which the applicant must research wells which penetrate the injection zone. If any of these wells are improperly sealed, completed or abandoned, and might provide a conduit for fluid migration, the applicant must develop a corrective action plan as shown in Attachment C of the permit to address the deficiency. The applicant has provided documentation on the well population within 1/4 mile of the injection well (i.e., the AOR). There is 1 producing, 0 injection, 0 temporarily abandoned, and 0 plugged and abandoned wells within the 1/4 mile radius AOR that penetrates the injection zone. Based on current information, there are no inadequately constructed wells within the AOR so there is no need for a corrective action.

Underground Sources of Drinking Water (USDWs): USDWs are defined by the UIC regulations as aquifers or portions thereof which contain less than 10,000 milligrams per liter of total dissolved solids and which are being or could be used as a source of drinking water. The base of the lowermost possible USDW in the vicinity of the injection well has been identified at

approximately 380 feet below ground surface. This water-bearing formation is the quarternary Glacial Drift.

Injection and Confining Zone: Injection for this brine disposal injection well is limited by the permit to the Niagaran Dolomite in the interval between 2344 and 2596 feet below ground surface. This injection zone is separated from the lowermost USDW by approximately 1964 feet of rock strata. The confining zone is composed of the rocks of the Salina Group C Shale between 2002 and 2344 feet below ground surface, with additional layers that serve to confine or impede potential upward flow between the top of the confining zone and the bottom of the lowermost USDW.

Construction Requirements: The proposed construction of the well meets the regulatory criteria of 40 C.F.R. §146.22. This requires that all newly-constructed wells that inject fluids which are brought to the surface in connection with oil or natural gas production, or for enhanced recovery of oil or natural gas, be sited so that they inject into a formation that is separated from any USDW by a confining zone free of known open faults or fractures within the AOR. All such wells must also be cased and cemented to prevent the movement of fluids into or between USDWs. The permittee shall not commence construction, including drilling, of any new well, until a final permit has been issued. In addition, the permittee shall not commence injection until the requirements of Part I(E)10 of a final permit have been met.

Injection Fluid: The injected fluid is limited by the permit to brine. The expected maximum daily volume of fluid to be injected is 5,000 barrels.

Maximum Injection Pressure: The maximum injection pressure shall be limited to 602 pounds per square inch gauge (psig). EPA calculated this limit using the formula in Part III(A) of the draft permit. This limitation will ensure that the pressure during injection does not initiate fractures in the injection zone.

Response to a Seismic Event: In accordance with 40 C.F.R. §§144.52(a)(9) and 144.52(b)(1), the Director has the authority to include conditions in the permit to protect underground sources of drinking water, in addition to conditions required by other paragraphs in the regulations.

The Moment Magnitude (M_w) of an earthquake measures the actual strength, or force, of the earthquake. An earthquake with an M_w of 3.5 can generally be felt by most people, and can cause very minor damage, such as cracking of plaster or pictures falling off a wall. An earthquake with an M_w of 5.0 can be felt by all, and can cause damage to structures, depending on their construction.

The well site is within 100 km (~62 miles) of the epicenters of 5 earthquakes with $M_w > 3.0$ and within 20 km (~12 miles) of identified structural lineaments. EPA examined the U.S. Geological Survey (USGS) *2018 Long-Term National Seismic Hazard Map* which shows the earthquake peak ground accelerations (PGA) having a 2 percent probability of being exceeded in 50 years. The area near the proposed well is in the second lowest hazard zone equivalent to Zone III – Weak Shaking Zone in the Modified Mercalli Intensity (MMI). Additionally, the USGS *Probability for Damaging shaking Events* was reviewed. This map shows the number of

damaging shaking events, events greater than a M_w of 5.0 or greater in 10,000 years. The area of the proposed well is in the second lowest risk category of 2-4 such events. Based upon this review, EPA concludes that there is a negligible probability of an earthquake of M_w 5.0 or greater in the area. There is a low chance of earthquake occurrence that can be felt, but at levels not likely to damage the proposed injection well.

Part III(A) of the draft permit identifies actions that must be taken if USGS seismic monitoring (see <https://sslearthquake.usgs.gov/ens/>) detects an earthquake of magnitude 3.5 or greater within 100 kilometers (~62 miles) of the proposed injection well. The first step would be immediately to stop injecting, then the Permittee must notify the Director within 24 hours of the event. The next steps depend upon the strength of the earthquake. Please see Part III(A) of the draft permit for more details.

Monitoring and Reporting Requirements: In accordance with 40 C.F.R. §§144.54 and 146.23, the applicant will be responsible for observing and recording injection pressure, flow rate, annulus pressure, and cumulative volume on a weekly basis and reporting this to EPA on a monthly basis. The applicant will also be responsible for observing, recording and reporting annulus liquid loss on a quarterly basis. An analysis of the injected fluid must be submitted on an annual basis. In addition, the applicant is required to conduct and pass a two-part Mechanical Integrity Test (MIT), in accordance with 40 C.F.R. §146.8, before authorization to inject is granted, and after the well is completed. The applicant is also required to repeat the annulus pressure test, which is the first part of the MIT, at least once every five years thereafter. If a temperature or noise log or another method as approved by the Director is used to determine the second part of the MIT (i.e., the absence of fluid movement), then the applicant will be required to repeat this test at least once every five years thereafter. These tests will provide EPA with an evaluation of the integrity of the tubular goods (casing, tubing and packer) as well as documentation as to the absence or presence of fluid movement behind the casing.

Plugging and Abandonment: In accordance with 40 C.F.R. §§146.10 and 146.24(d), the permit includes a plugging and abandonment plan for an environmentally protective well closure at the time of cessation of operations. Savoy Energy, LP has demonstrated adequate financial responsibilities to close, plug, and abandon this underground injection operation. An Irrevocable Standby Letter of Credit (#6405002351-8448) in the amount of \$45,000 has been established for this purpose with Independent Bank (Traverse City, Michigan). Savoy Energy, LP has provided Financial Statement Coverage as financial assurance for the company's injection wells in Michigan. This coverage must be updated on an annual basis.

Issuance and Effective Date of Permit: In accordance with 40 C.F.R. §124.15, the permit will become effective immediately upon issuance if no public comments are received that request a change in the draft permit. However, in the event that public comments are received that request a change in the draft permit, and EPA issues a final permit, then the final permit will become effective 45 days after the date of issuance unless the permit is appealed. In accordance with 40 C.F.R. §144.36(a), the permit will be in effect for the life of the facility, unless it is otherwise modified, revoked and reissued, or terminated as provided at 40 C.F.R. §§144.39, 144.40, and

144.41. The permit will expire in one year if the permittee fails to commence construction, unless a written request for an extension of this one-year period has been approved by the Director. The permit will be reviewed by EPA at least once every five years from its effective date for consistency with new or revised Federal regulations.

Questions and requests for additional information may be submitted to Marc Fisher at (312) 8864240 or at fisher.marc@epa.gov. The date for closure of the comment period includes the required 30 days for public comment and an additional three days for the delay caused by mailing. The public comment period will close as described in the Public Notice. Requests for a hearing must be submitted in writing. If EPA determines that there is significant public interest in the draft permit, a public notice of a scheduled hearing will be published locally and mailed to interested parties.

To preserve your right to appeal any final permit decision that may be made in this matter under 40 C.F.R. Part 124, you must either send in written comments or participate in a public hearing on the draft permit decision. (A hearing is not planned at this time.) The first appeal must be made to the Environmental Appeals Board; only after all agency review procedures have been exhausted may you file an action in the appropriate Circuit Court of Appeals for review.

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Division Director, Water Division

Date