

Attachment 6

Response to Comments
Michigan Potash Operating LLC
Draft Major Modification of Class I Underground Injection Permits
MI-133-11-0004, MI-133-11-0005, and MI-133-11-0006

Introduction

This response is issued in accordance with Section 124.17 of Title 40 of the Code of Federal Regulations (40 C.F.R. § 124.17), which requires the United States Environmental Protection Agency (EPA), at the time any final EPA permit decision is issued, to: (1) briefly describe and respond to all significant comments on the draft permit decision raised during the public comment period; (2) specify which provisions, if any, of the draft decision have been changed and the reasons for the change; (3) include in the administrative record any documents cited in the response to comments; and (4) make the response to comments available to the public.

Background

The Safe Drinking Water Act (SDWA) and its regulations prohibit all underground injections unless authorized by a permit or a rule. 42 U.S.C. § 300h(b)(1)(A); 40 C.F.R. § 144.11. EPA regulations at Title 40 of the Code of Federal Regulations (40 C.F.R.) Parts 144 and 146 state the technical criteria, requirements, and standards that a permit applicant must meet to have an Underground Injection Control (UIC) permit application approved. These regulations, along with Part 124, define the general scope of EPA's UIC permitting authority, prescribe the UIC permit application review process, and include requirements for plugging and abandonment of underground injection wells as well as standards for geologic siting, well engineering, operation, and monitoring of underground injection. Injections authorized by permit must comply with general permit conditions as well as those applicable to the type of injection well subject to the permit. 40 C.F.R. § 144.51.

On August 31, 2023, EPA published draft major modifications to three existing Class I permits (originally issued on August 28, 2017) to inject non-hazardous fluid for disposal (Permits Number MI-133-11-0004, MI-133-11-0005, and MI-133-11-0006) to Michigan Potash Operating LLC ("Michigan Potash") for its proposed MPC-1D, MPC-2D, and MPC-3D wells located at its facility in Osceola County, Michigan, and invited public comment for 30 days, ending on October 4, 2023. The modifications to the permits concerned the authorized injection zone, the maximum injection pressure, the Plugging and Abandonment Plan as well as the well construction diagram, and the mechanical integrity testing procedures. The public notice stated, consistent with 40 C.F.R. § 124.5(c)(2), that only those conditions proposed to be modified were open for comment. See the permits modification factsheet for more information.

The draft modified permits were published August 31, 2023. Many public comments were received from September 1 through October 4, 2023, indicative of significant interest in the draft permit modifications, and EPA scheduled and held a public meeting and a public hearing in Evart, Michigan on July 11, 2024. The public comment period was re-opened on June 6, 2024, and was extended to July 15, 2024, for an additional 40 days (70 days total). The comments

compiled include those received during the original comment period, the extended public comment period, and at the public hearing session. EPA received 33 comments.

General and Out-of-Scope Comments

Pursuant to 40 C.F.R. § 124.17(a)(2), EPA is required to briefly describe and respond to only significant comments on the draft permit raised during the public comment period. In the context of the UIC permit program, a comment may be considered out-of-scope if it raises an issue that is outside the scope of EPA's authority under the SDWA and the UIC permit program. EPA sometimes receives comments that are not on the draft permit and therefore are also considered out-of-scope. A comment is outside the scope of this permit decision if it does not relate to the UIC permit process for these Class I wells. Because the legal effect of issuing the final permit for the well is limited in scope, a permittee may have to obtain several other authorizations before it is allowed to construct the well and/or commence injection.

EPA sometimes receives comments that state general support and opposition to the permit or the well.¹ EPA notes and may consider these general statements but does not respond to them.

Some of the comments that EPA received during the public comment period for the Permits were directed at matters outside the scope of the UIC Program's purview. EPA is not responding to the out-of-scope comments because the issues they raise are not comments on the draft permit, meaning, they do not pertain to the draft permit's terms or conditions or this permitting process and decision. These comments are also out-of-scope because the issues they raise are not within the purview of EPA's authority over this permit decision under the SDWA and the UIC regulations. The comments EPA received do not relate to the UIC permit process, or the proposed permit modification of three Class I wells. EPA's UIC jurisdiction under the SDWA is limited to a determination that the proposed underground injection will not endanger USDWs and a determination that the injection, as permitted, will be compliant with the SDWA and all federal UIC regulations. *See generally* 42 U.S.C. § 300h; 40 C.F.R. § 144.1. Therefore, these concerns are outside of the scope of the UIC Program. To the extent these comments raised issues governed by other federal regulatory authorities, state law, and/or local law, EPA's UIC permitting action does not excuse the permittee from their responsibilities and obligations, if any, under those law(s).

In addition, pursuant to 40 C.F.R. §§ 124.5 and 144.39, only the conditions in the existing 2017 permits that were subject to modification were available for public comment. Permit conditions, comments, and issues raised previously during the 2017 public hearing and public comment period cannot be re-visited for these permit modifications. Therefore, any comments received that do not pertain to the modified permit conditions are considered out of scope.

The Out of Scope comments not requiring a response are summarized below:

¹ General statements of opposition consist of stand-alone statements that do not provide a basis for the position such as, "I oppose the wells" or "Do not issue the permit."

- Numerous commenters requested that Michigan Department of Environment, Great Lakes, and Energy (EGLE) hold a public hearing.
- A commenter stated that other larger, more established mining companies already decided to abandon this mining project, and Canadian potash is readily available.
- A commenter stated that the risks of the solution mining project outweighed the benefits, which amounts to about 129 permanent jobs.
- A commenter stated that alternatives to potash extraction must be found.
- A commenter stated that the water level in the lake nearby his property has drastically reduced in recent years, ruining swimming and fishing in the lake.
- A commenter stated that property owners had no say on how their property value would be affected by the potash mining operation.
- A commenter said the would-be operator lacks the experience and background for this type of operation.
- Comments that identified the proposed permit modifications in their subject line or topic, but the substance of the comment did not pertain to the modifications. These include comments that addressed the three permits as previously issued in 2017 and those that addressed three new separate proposed permits MI-133-1I-0007, MI-107-1I-0005, and MI-133-1I-0009 for Michigan Potash. EPA issued a separate response to comments for Permit Nos. MI-133-1I-0007, MI-107-1I-0005, and MI-133-1I-0009.
- A commenter stated that the impact of brine and other contaminants on aquifers and ecosystems has not been studied.
- Comments that there is insufficient groundwater available over the long term to support industrial projects such as the Michigan Potash solution mining project.
- A comment stated the State of Michigan's water usage permit was a giveaway to Michigan Potash
- A comment about a loophole in the permitting process for groundwater withdrawals
- A commenter stated the Area of Review (AOR) of these three Class I wells should be larger than three overlapping four-mile diameter AOR circles, one around each of the three proposed disposal wells.²

² Per 40 C.F.R. § 144.39, when a permit is modified, only the conditions subject to modification are reopened. Consistent with the Region 5 practice of setting the non-hazardous Class I well Area of Review (AOR) at a fixed radius of two miles, meaning a non-hazardous Class I well has the same fixed radius as a hazardous Class I well (see 40 C.F.R. §§ 146.6(b) and 146.63), the AOR was set as a fixed radius of two miles by the 2017 permits and none of the four proposed modifications are cause for reopening of the AOR determination; however, EPA will briefly respond. The concern that the incompressibility of brine would change the shape or expand the Area of Review (AoR) reflects a misunderstanding of subsurface pressure dynamics. Primary fluid migration requires a pressure gradient and sufficient permeability to allow flow (1,2). In this case, the pressure and injected fluid movement are reduced by the high-permeability geologic formation injection zone (3). As a result, pressure may propagate to some limited extent, but actual fluid movement remains near the point of injection, thus the 2-mile AoR is appropriate.

1. Bear, J. (1972). *Dynamics of Fluids in Porous Media*. Dover Publications.

2. Rinaldi, A. P., Cappa, F., & Rutqvist, J. (2019). Geomechanical effects on faulted caprock integrity during CO₂ storage: In situ field-scale numerical simulations. *Solid Earth*, 10(5), 1717–1731.

- A commenter stated that the State of Michigan encourages giveaways of natural resources for private gain.
- A commenter stated the location of this project and these wells could not be more poorly chosen, because of the likelihood of brine spills close to a nearby marsh.
- A commenter expressed concern about the location of a future surface plumbing network and increased truck traffic after the mining project proceeds.
- A commenter stated there is no such thing as “safe” deep well injection.
- One commenter expressed concern that the potash mining project will impact 15,000+ acres of pristine northern Michigan, requiring miles of pipelines which will traverse numerous streams, wetlands, and cross multiple roads, without knowing where these pipelines carrying hot toxic brine solutions will be located; a pipeline fracture could contaminate groundwater, drinking water wells and streams.
- A commenter expressed concern that the injection well might burst, or otherwise leak fluid upwards and out of the wellhead, causing contamination in a nearby marsh.
- Several commenters objected to the withdrawal of water by Michigan Potash and other entities such as Nestle.

EPA received general statements of opposition to and of support for the permits or the wells individually that do not require response but were reviewed in making the decision to issue the final permit.

Response to Comments

Below EPA has provided responses to the topics raised in the in-scope, significant comments EPA received during the comment period.

Comment #1: Many commenters expressed concern about the safety of drinking water.

Response #1: The SDWA prohibits all underground injections unless authorized by a permit or a rule, 42 U.S.C. § 300h(b)(1)(A); 40 C.F.R. § 144.11, and requires the UIC program to prevent underground injection which endangers drinking water sources. 42 U.S.C. § 300h.

The UIC regulations are designed to protect Underground Sources of Drinking Water (USDWs) from contamination by: (1) identifying drinking water sources for protection; (2) making sure the geological siting is suitable for injection; and (3) applying standards for well construction, operation, and reporting. See 40 C.F.R. § 144.1. EPA may not authorize an injection by permit or rule under the UIC program if the injection results in the movement of fluid containing any contaminant into USDWs, if the presence of that contaminant may cause a violation of any primary drinking water regulation or may adversely affect the health of persons. 42 U.S.C. § 300h(d)(2); 40 C.F.R. § 144.1(g).

3.Morris, J. P., Hao, Y., & Foxall, W. (2022). Numerical evaluation of fluid migration containment in low-permeability formations. *Frontiers in Environmental Science*, 10, 946112.

The UIC program protects current and future sources of drinking water by defining a USDW broadly. USDWs, by definition, include freshwater aquifers in current use as well as those that meet certain criteria indicating they could be used as drinking water, even if they are not currently used. USDWs are defined based on quantity, current usage, and the concentration of dissolved solids in the aquifer. The concentration of dissolved solids is an indicator as to whether an aquifer has the potential to be potable, even if it is not currently used for drinking water. An aquifer or portion of an aquifer that contains fewer than 10,000 milligrams per liter (mg/L) of total dissolved solids is considered a potential drinking water source and is therefore protected even if it is not in use (potable water generally contains less than 500 mg/L of total dissolved solids). See 40 C.F.R. §§ 144.3 and 146.3. By considering USDWs to include water supplies that have more dissolved solids than normal drinking water, the UIC program also protects USDWs that could be used in the future.

The modifications to the permits concerned the authorized injection zone, the maximum injection pressure, the Plugging and Abandonment Plan as well as the well construction diagram, and the mechanical integrity testing procedures. The newly authorized shallower injection zone is the Dundee Formation. Technical review confirms that the Dundee Formation is a suitable injection zone and has an overlying barrier formation called the Bell Shale to prevent upward migration of fluid. The Dundee Formation is the injection zone for hundreds of existing Class II-D permits issued by EPA since the 1980s for oilfield brine disposal wells. The shallower injection zone depth has accordingly reduced the calculated Maximum Injection Pressure. The modified permits contain updated well construction, plugging and abandonment plans, and mechanical integrity procedures. EPA has determined that the modified Permits for the Michigan Potash Operating Class I wells are sufficient to prevent injection which would endanger drinking water sources under the SDWA.

Comment #2: Comments that there should be an environmental impact statement prior to approving the permit modifications.

Response #2: EPA disagrees with this comment because, under 40 C.F.R. § 124.9(b)(6), UIC permits are not subject to the environmental impact statement requirements of section 102(2)(C) of the National Environmental Policy Act (NEPA). 42 U.S.C. § 4321. Courts that have considered whether NEPA applies to the UIC permitting process have concluded it does not. See, for example, Western Nebraska Resources Council v. United States EPA, 943 F.2d 868, 871-72 (8th Cir. 1991). See also a decision by the U.S. EPA Environmental Appeals Board: In re American Soda, LLP, 9 E.A.D. 280, 290-92 (EAB 2000). EPA Region 5 undertook an orderly review and considered the SDWA and UIC regulations involved for the permits with opportunities for public participation.

Comment #3: A commenter stated that Michigan Potash should identify a deeper, safer, more viable rock formation for injection of waste.

Response #3: The Dundee Formation is a safe injection zone when injection occurs under the conditions of an underground injection permit. The Dundee Formation is an approved injection

zone for hundreds of existing Class II-D permits that authorize injection of oil field brine for disposal, issued by EPA for the past four decades. The Dundee Formation is overlain by the Bell Shale, which acts as a confining rock layer to upward fluid migration from the injection zone. The deeper injection zone (Lucas Formation et al) was already approved in the existing permits. Technical review supports EPA's approval of the proposed permit modifications to add the shallower Dundee Formation injection zone and a lower Maximum Injection Pressure in the three permits.

Comment #4: The term "non-hazardous brine" is disingenuous. The energy industry won a critical change in the federal government's legal definition of waste. Since 1988, all material resulting from the oil and gas drilling process as well as solution mining is considered non-hazardous, regardless of its content or toxicity. EPA must know that brine solutions to be disposed of are toxic to most, if not all, life forms. After five years, Cargill Corporation is still purging two brine spills from its nearby salt mining operation. If the brine is non-toxic, why is there a need to purge spills? Just because the oil and gas and mining industries changed a definition in 1988, should not allow EPA or Michigan EGLE to downplay the very toxic nature of large quantities of brines produced during the solution mining process for potash.

Response #4: The term "brine" in general means salt water that contains more sodium chloride than an equal volume of seawater. Oilfield brine is a by-product of petroleum extraction and contains ancient seawater mixed with petroleum, which is a very different fluid than solution-mined brine that will be produced at the Michigan Potash site. Solution-mined brine is created by injecting water into a salt formation to dissolve the salt; this type of brine should not contain any substances defined as hazardous by EPA. Properly designed and constructed underground injection wells authorized by EPA permits have undergone and passed rigorous technical review of the well design, construction design, and plugging and abandonment plans, as well as the geological conditions underlying the well sites, prior to approval and issuance of Class I non-hazardous fluid injection disposal wells. Properly constructed and functioning wells should confine the injected fluid deep underground within the injection formation, and the wells should not experience any leaks that reach USDWs or the surface.

Class I wells are used to inject non-hazardous and hazardous wastes into deep, confined rock formations. The conditions of the three existing Class I permits expressly prohibit the injection of any "hazardous waste" as identified in 40 C.F.R. Part 261. Solution mining brine is mostly sodium chloride and potassium chloride; neither compound is classified as "hazardous waste" and is therefore "non-hazardous waste."

EPA in 2017 approved and issued three Class I injection wells for disposal of non-hazardous fluid for the proposed MPC 1D, MPD 2D, and MPC 3D wells, which are now proposed for permit modification. The original permit application from Michigan Potash requested both the shallower Dundee Formation and the deeper Lucas Formation et al injection zones, but Michigan Potash later requested only use of the deeper injection zone. Technical review of the well design, well construction, geological setting, and plugging and abandonment plans to both injection zones supported EPA's decision to issue the permits on August 28, 2017. Technical

review supports EPA's approval of the proposed permit modifications to add the shallower Dundee Formation injection zone and a lower Maximum Injection Pressure in the three permits.

Comment #5: Numerous commenters expressed concerns about "extending the injection zone upwards by 1,000 feet" and underground injection of wastewater into the "Dundee Formation aquifer." The commenters are concerned that the pressure from drilling and injection would "unplug" some abandoned wells, which they believe would lead to contamination of drinking water. Commenters claim that thorough study and research has not been done on this process, including what will happen to their wells and environment.

Response #5: Only the permit conditions proposed for modification are re-opened for comment. While the Dundee Formation is a rock formation that is porous and permeable enough to contain or transmit groundwater, it is not suitable as a drinking water aquifer because the Dundee Formation is a commonly used injection zone for the disposal of oilfield brine (a naturally occurring waste byproduct of oil and natural gas extraction) through both Class I and Class II wells permitted by EPA or the State of Michigan. There are hundreds of existing permitted Class II-D wells in Michigan that already use the Dundee Formation as the injection zone for oilfield brine disposal. Michigan Potash's permit application contained extensive research on old wells in the combined AOR to document that all deep wells that penetrated the injection zone were properly plugged and abandoned, mostly during the 1980s. EPA conducted independent research of the Michigan EGLE GeoWebFace and Data Explorer data bases to construct a combined AOR map and a list of all deep wells within the combined AOR, with detailed individual well records. Review of these well records indicate that each well was properly closed, plugged, and abandoned, with documentation of state approval of well closure. In conclusion, there is no evidence that injection into additional formations will "unplug" abandoned wells, which are plugged with cement after plugging and abandonment of the wells.

Comment #6: Numerous commenters claimed that not enough study and research has been done on this process, and what it can do to drinking water wells and the environment, for EGLE to allow for these permits at all, let alone these modifications.

Response #6: These are federal permits, and EPA is the permitting authority, not the Michigan EGLE. The modifications to the permits concern the authorized injection zone, the maximum injection pressure, the Plugging and Abandonment Plan as well as the well construction diagram, and the mechanical integrity testing procedures. The newly authorized injection zone is the Dundee Formation, a rock formation found suitable for hundreds of existing Class II-D injection disposal permits issued by EPA during the past forty years. Because the Dundee Formation is shallower than the Lucas Formation et al injection zone, a lower Maximum Injection Pressure was calculated for these permit modifications. The Plugging & Abandonment plans for each modified permit were changed to reflect the additional shallower injection zone. Michigan Potash advised EPA that their preferred injection zone is the deeper injection zone.

Technical review of the proposed changes to the injection well design supports EPA's approval of the proposed permit modifications.

Comment #7: A commenter expressed concern that the inclusion of the shallower Dundee Formation would be less protective of drinking water because the overlying Bell Shale confining layer is only 56 feet thick and may not be structurally sound enough to prevent upward migration of pressurized fluids.

Response #7: A natural migration barrier includes the 56-foot-thick overlying cap rock called the Bell Shale, which is composed of impermeable clay minerals that naturally impede the movement of groundwater. Permeability is a measure of the rate of water passage through a rock formation. The permeability of clay is extremely low, measured at 0.000000001 cm/sec, which translates to 1 foot/54,000 years. Significantly, clay-rich rocks such as shale have such low permeability rates that a 56-foot layer of shale will retard upward fluid movement for many thousands of years. Because the shale is overlain by the weight of thousands of feet of overlying sedimentary rock, the Bell Shale is structurally sound. For these reasons, the Bell Shale is an effective confining zone.

Comment #8: What steps have been taken by EPA and or Michigan Potash to find, identify, and verify the integrity of old wells which penetrated not only the Bell Shale formation but the company's planned injection zone (Dundee Formation) as well?

Response #8: All available data and records reviewed by EPA regarding wells within the AOR were part of the permit application documents submitted by Michigan Potash, including well data amalgamated by comprehensive inquiries by Michigan Potash, EPA, the Michigan Geological Survey, the Michigan Department of Natural Resources, the Michigan Department of Environmental Quality, and Western Michigan University's Michigan Geological Repository for Research and Education. Well records for all known wells drilled within the AOR have been comprehensively re-reviewed by independent third parties: the Michigan Geological Survey and Michigan Geological Repository for Research and Education. The Michigan Geological Survey prepared wellbore diagrams and compiled the plugging records and well histories. These documents were included in Michigan Potash's application and reviewed by EPA. Well histories are accompanied by all supporting documentation. EPA conducted its own independent review of deep wells located within the combined AOR, using Michigan EGLE's GeoWebFace and Data Explorer data bases. For each of the several dozen deep wells found within the combined AOR, individual well information included well bore diagrams, plugging and abandonment forms, and state approval records for construction and plugging.

Based upon the above technical reviews, it is clear that there are no wells that have been inadequately plugged and abandoned in the AOR. The supporting documentation has been included with each well that penetrates deeper than the Dundee formation and the confining layers above. The Dundee is the shallowest proposed injection horizon; however, it is not the preferred injection horizon. Shallow wells not penetrating any confining layer, typically targeting shallow gas in the Michigan Stray formation at approximately 1800' sub-surface, have not had

wellbore diagrams drawn, although their histories have been reviewed. All wells within the AOR have been thoroughly reviewed and re-reviewed under numerous permits, and re-permitting processes under Michigan Natural Resources and Environmental Protection Act (NREPA) Part 625 Class III, EPA Area Permit No. MI-133-3G-A0002, and NREPA Part 625 Class I, EPA Area Permit Nos. MI-133-1I-0002 and MI-133-1I-0001. No new wells have been drilled in the AOR since 2000, prior to the last permit re-review for Class I Non-Hazardous Permits No. MI-133-1I-0002 and MI-133-1I-0001. No wells have been historically identified as improperly completed or plugged and abandoned; the independent re-reviews by Michigan Potash and by EPA corroborates this conclusion. No wells have been identified as a potential cause of threat to any USDW.

Comment #9: Is the reason for lowering the maximum permitted injection pressure from 2,372 psig to 1,006 psig to reduce the risk of fracturing this new confining layer?

Response #9: To assure that injection pressure is not high enough to fracture the injection rock formation, EPA conservatively calculated the maximum injection pressure according to a mathematical formula where depth from the surface to the top of the injection zone is one of the variables. Because of the addition of a shallower injection zone, the resultant maximum injection pressure is now lower than was originally calculated in 2017 for the deeper injection zone.

Comment #10: A commenter noted that Michigan Potash had originally applied for their waste-wells to be located roughly a thousand feet deeper (at considerable added expense) into the Bois Blanc Formation (Lucas Formation et al) with a “dubious” reputation for accepting injected waste, instead of opting for the much shallower and more permeable Dundee formation (as they are now belatedly doing) and claimed that this was some kind of “bait and switch” strategy.

Response #10: Michigan Potash had originally intended for both injection zones to be included in their Class I permits, but for logistical reasons, had requested only the deeper Lucas Formation et al injection zone initially, with the option to later add the shallower Dundee Formation/Reed City Dolomite as an injection zone via major permit modification. The Dundee Formation and Lucas Formation et al do not have a “dubious” reputation for accepting injected waste. There are already hundreds of existing Class II-D injection wells in Michigan permitted by EPA³ that inject oilfield brine (a byproduct of oil and gas production) for disposal into these rock formations. These Class II wells have operated for many decades. In a review of all active Class II injection wells in Michigan over a five-year period, the failure rate has been no higher than 5% in any given year. (The well class for these MPO permits is Class I and construction requirements are more stringent for Class I than the more common Class II wells.) This very low failure rate is almost entirely limited to annulus fluid leaking into the tubing and then into the injection zone, and not injectate fluid passing through the casing into an area other than the intended injection

³ As of July 2022, the Class II permits program has since been delegated by EPA to the Michigan Department of Environment, Great Lakes and Energy (EGLE).

zone. Such casing leaks are extremely rare in Michigan; in the same five-year period the rate of casing needing repairs has ranged from 0 to 0.28% per year.

Comment #11: Does EPA's issuance of this draft decision indicate that you currently favor permitting these requested changes?

Response #11: Yes, at the time of public notice, EPA tentatively determined to issue the permit modifications and invited public comment.

Comment #12: In May of 2015, there was north of Kalamazoo, an earthquake registering 4.2 on the Richter scale. A 4.2 earthquake can affect the strata anywhere within a 200-mile radius of the epicenter. The proposed site for this injection well is approximately 100 to 105 miles from the epicenter of the 2015 earthquake. How many wells have been sunk to determine if the Dundee formation is still intact? EPA should know for certain whether the proposed Dundee formation is still intact or whether it has collapsed near the proposed amendment injection well site.

Response #12: There is no evidence of any structural damage to any UIC wells within a 200-mile radius from the epicenter of the May 2015 earthquake near Kalamazoo, Michigan, which is over 100 miles away from the AOR for the Class I wells. The Dundee Formation is a vast limestone rock formation that is hundreds of feet thick. The cited magnitude 4.2 earthquake is not powerful enough to cause any measurable changes to rock formations at the proposed Michigan Potash site, nor affect its structural integrity. The Dundee Formation has been and still is an injection zone for hundreds of existing Class II-D brine disposal wells regulated by permits issued by EPA since the mid-1980s.

Comment #13: The Dundee formation is 1,000 feet closer to the surface than the original proposal. The original proposal included 36 old well bores which were reportedly plugged and abandoned, though none were ever tested as to the integrity of the plugging. The new confining layer contains an additional 17 (possibly more) abandoned bore holes penetrating the original confining layer that would fall into the expanded AOR if fluid incompressibility were taken into account. It is unknown if any of these additional abandoned bore holes have been reviewed to determine if they were properly plugged. The newly proposed injection zone (Bell Shale) undoubtedly contains many more bore holes drilled during Michigan's "Oil Boom Days". These 60- to 80-year-old bore holes will need to be reviewed to determine if they were properly plugged and abandoned.

Response #13: Michigan Potash included as part of their permit application well records for all known wells drilled within the AOR; this data has been comprehensively re-reviewed by independent third parties, including the Michigan Geological Survey and the Michigan Geological Repository for Research and Education. The Michigan Geological Survey prepared wellbore diagrams and compiled the plugging records and well histories for all wells in the AOR for review by EPA. Well histories were accompanied by all supporting documentation. In addition, EPA conducted its own independent review of deep wells that penetrate the injection

zone within the AOR, using well records, rock formation records, plugging and abandonment records obtained from the Michigan EGLE's GeoWebFace and Data Explorer. The technical review has made it clear that there are no wells that have been inadequately plugged and abandoned. The supporting documentation has been included in the Administrative Record for each well that penetrates deeper than the Dundee formation and the confining layers above.

Comment #14: The proposed Combined AOR ignores additional possible breaches in the confining layer. The flawed "combined" AOR has been found to contain upwards of 36 "plugged and abandoned" well-bores that penetrated the original confining layer (Upper Detroit River Group) to reach the injection zone (Lucas Formation et al from 4,170 to 4,962 feet deep). While historical records (well logs) have purportedly been reviewed for 23 of these boreholes, suggesting that they were properly plugged, no physical integrity testing has been conducted. Each of these boreholes is a potential conduit for upward migration of high-pressure injected brines and constitutes a threat to potable water aquifers above. Those aquifers are the sole sources of potable water for the many farms and residences within the AOR. The threat of upward fluid migration is exacerbated by the presence of at least 17 additional abandoned boreholes penetrating the original confining layer (Upper Detroit River Group - 4,170 to 4,962 feet deep) that would fall within an expanded combined AOR if fluid incompressibility were properly taken into account. It is unknown if any of these have been reviewed or evaluated to determine if they were properly plugged. Also, with the top of the injection zone now proposed to move upward 1,000 feet to include the Dundee and Lucas et al formations, many more abandoned boreholes may exist that did not penetrate the original confining layer, but do penetrate the new (Bell Shale 3,889 to 3,942 feet deep). These will require review and evaluation to determine their integrity.

Response #14: The AOR discussion as well as proper well construction (to prevent future upward fluid migration) was part of the previous public comment period prior to the issuance of the final Class I permits on August 28, 2017, and the AOR is outside the scope of the proposed permit modifications for this public comment period.

Proper well design and construction provides engineered barriers against upward fluid migration to assure external mechanical integrity, and multiple steel casings with cement between casings and pressurized annulus fluid detects and captures internal well leaks (preserving internal mechanical integrity). Plugging and abandonment procedures after an injection well is closed involves installing thick cement plugs into the well borehole to prevent upward migration of fluid. The majority of these wells were abandoned during the 1980s. Tests performed to assure integrity of cement seals would have been done during the plugging and abandonment time frame, with the test results submitted to the State of Michigan prior to certifying that each well was plugged and abandoned. After wells are plugged with cement, they are inaccessible to any future mechanical integrity testing. EPA technical review and approval of the well design, well construction, and plugging and abandonment procedures supported the issuance of the Class I permits on August 28, 2017.

Comment #15: A commenter expressed concern that there has been no integrity test for old wells, especially for old surface well heads.

Response #15: After wells are plugged with cement and abandoned, they are inaccessible to any future mechanical integrity testing. Proper well design and construction provides engineered barriers against upward fluid migration to assure external mechanical integrity, and multiple steel casings with cement between casings and pressurized annulus fluid detects and captures internal well leaks (preserving internal mechanical integrity). Plugging and abandonment procedures after an injection well is closed involves installing thick cement plugs into the well borehole to prevent upward migration of fluid. Old abandoned deep wells that penetrate the injection zone, located within the combined AOR have been independently reviewed by EPA, including research of documentation of well plugging and abandonment. The majority of these wells were abandoned during the 1980s. Tests performed to assure integrity of cement seals would have been done during the plugging and abandonment time frame, with the test results submitted to the State of Michigan prior to certifying that each well was plugged and abandoned.

Comment #16: A commenter expressed concern for the presence of endangered species, including trumpeter swans, within the project area of the proposed injection wells.

Response #16: EPA's action is to modify previously-issued and effective permits. The effective permits authorize both construction and operation of the wells, the latter after EPA issues "authorization to inject" by letter, as provided in the permits. Consistent with 40 C.F.R. § 144.4 and part 124, EPA considered potential effects on threatened, endangered, and proposed endangered species, and documented its consideration in the record, prior to issuance of that final permit decision. The modifications authorize injection into subsurface geologic formations into which injection was not authorized by the original permits. To inject into the additional formations, Michigan Potash would create additional perforations in the wells. The modifications also adjust the prior permitted plans for future plugging and abandonment of the wells, the well construction diagrams, and mechanical integrity testing procedures. As stated in the public notice for the draft modifications and provided in 40 C.F.R. § 124.5(c)(2), only those conditions proposed for modification are subject to public comment and this response. It follows that EPA's review for potential effects of the modifications on threatened, endangered, or proposed endangered species is confined to the conditions proposed for modification.

The U.S. Fish and Wildlife Service (USFWS) maintains an Endangered Species Act "Information for Planning and Consultation" website (IPaC). IPaC indicates zero endangered, zero proposed endangered, and one threatened species, the Eastern Massasauga snake, may reside in an area around the place where the three permitted wells will be drilled. The snakes live in wet areas including wet prairies, marshes, fens, sedge meadows, peatlands, and low areas along rivers and lakes. The snakes use adjacent upland (shrubland, open woodlands, prairie) during part of the year. They often hibernate in crayfish burrows but may also be found under logs and tree roots or in small animal burrows. These features exist on the land surface. The creation of perforations and installation of bridge plugs in the wells and adjustment to plans for future

plugging and abandonment of the wells, affect the wells themselves and occur in the deep subsurface. The balance of incremental actions authorized by the modifications – changes to diagrams and procedures for testing -- have no effect on the surface or subsurface (diagrams) or are internal to the wells themselves (procedures). EPA concludes the permit modifications will have no effect on the Eastern Massasauga snake.

Comment #17: A commenter said the web docket form for commenting was very difficult to use.

Response #17: EPA uses regulations.gov for publicizing many permit actions. The Fact Sheet for the permit modifications was published by EPA on the internet, and invited people to contact the permit writer if a person does not have access to the internet. This option—of contacting the permit writer—was also available to anyone having difficulty posting a comment to regulations.gov. Furthermore, EPA invited persons to comment orally, or provide written comments directly, at the public hearing.

Determination

After considering all public comments, EPA has determined that none of the comments submitted have raised issues which alter EPA's basis for determining that it is appropriate to issue modified permits to Michigan Potash Operating LLC for its MPC 1D, MPC 2D, and MPC 3D wells at its facility in Osceola County, Michigan. Therefore, EPA is issuing three final modified permits to Michigan Potash Operating LLC. No changes have been made to the final modified permits from the draft modified permits.

Administrative Record

In accordance with 40 C.F.R. § 124.17, EPA has included any documents cited in this response to comments in the administrative record, including any new materials documenting EPA's response to new points raised or new material supplied during the public comment period. Pursuant to 40 C.F.R. § 124.18(c), the administrative record for this permit was finalized on the date of the final permit decision. To request a copy of any of the files in the administrative record, contact tong.william@epa.gov.

Appeal

In accordance with 40 C.F.R. § 124.19, any person who filed comments on the draft permits or participated in the public hearing may petition EPA's Environmental Appeals Board (EAB) to review any condition of the final permit decision. Such a petition shall include a statement of the reasons supporting review of the decision, including a demonstration that the issue(s) being raised for review were raised during the public comment period (including the public hearing) to the extent required by these regulations. The petition should, when appropriate, show that the permit condition(s) being appealed are based upon either, (1) a finding of fact or conclusion of law which is clearly erroneous, or (2) an exercise of discretion or an important policy consideration which the Environmental Appeals Board should, in its discretion, review. A

petition for review of any condition of a UIC permit decision must be filed with the EAB within 30 days after EPA serves notice of the issuance of the final permit decision. 40 C.F.R. § 124.19(a)(3). Additional information regarding petitions for review may be found in the Guide to the U.S. EPA's Environmental Appeals Board (March 2023), available at: https://yosemite.epa.gov/oa/EAB_Web_Docket.nsf/.

If you wish to request an administrative review, the EAB encourages you to utilize the EAB's electronic filing system accessible on the website: www.epa.gov/eab (Click on "Electronic Filing" Link in the left margin). If you must submit a document in hard copy form through the mail or by hand delivery, please specify the name of the permittee or facility and the permit number or correspondence you sent through the mail and the date it was sent.

All documents that are sent through the USPS, except by USPS Express Mail, must be addressed to the EAB's mailing address, which is: Clerk of the Board, U.S. Environmental Protection Agency, Environmental Appeals Board, 1200 Pennsylvania Avenue, NW, Mail Code 1103M, Washington, DC 20460-0001. Documents that are hand-carried in person, delivered via courier, mailed by Express Mail, or delivered by a non-USPS carrier such as UPS or Federal Express must be delivered to: Clerk of the Board, U.S. Environmental Protection Agency, Environmental Appeals Board, 1201 Constitution Avenue, NW, WJC East Building, Room 3332, Washington, D.C. 20004.

Please contact William Tong of my staff at tong.william@epa.gov if you have any questions about the Michigan Potash Operating LLC modified Class I injection well permits.

X

Tera L. Fong
Director, Water Division