

DEPARTMENT OF ENVIRONMENTAL QUALITY – OIL, GAS, AND MINERALS DIVISION

RESPONSE TO PUBLIC COMMENTS – MINERAL WELL SOLUTION MINING & DISPOSAL WELLS, MICHIGAN POTASH OPERATING, LLC, EVART TOWNSHIP, OSCEOLA COUNTY, MICHIGAN

INTRODUCTION

Michigan Potash Operating (Michigan Potash) has submitted applications for eight solution mining (artificial brine production) wells and three non-hazardous brine disposal wells to the Michigan Department of Environmental Quality (DEQ). These types of wells are dually permitted by the DEQ, Oil Gas, and Minerals Division (OGMD) and the United States Environmental Protection Agency (U.S. EPA). Under Michigan law, the permitting, construction, drilling, and operation of these wells are subject to the provisions of Michigan's Mineral Well program, Part 625 of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), and the administrative rules established under Part 625.

PROJECT INFORMATION AND BACKGROUND

The proposed well locations are approximately five miles southwest of the city of Evert in southern Osceola County. Two of the brine disposal wells are on a shared well pad with the eight solution mining wells, while a third brine disposal well is located roughly one-half mile to the south on a separate well pad. The well pad for the eight solution mining wells and two disposal wells comprises an area of approximately two acres and is located about 100 feet northeast of an unoccupied abandoned house. The well pad for the third brine disposal well comprises approximately one and one-half acres and is in a farm field just west of an existing pole barn. The present land use in the area is predominantly agricultural and the surrounding area consists of rolling terrain interspersed with farm fields, woods, and wetlands.

The solution mining wells are targeting potash and food grade salt production. Potash is a water-soluble compound that naturally occurs as Sylvite (KCl) in Michigan. Potash is primarily used as an agricultural fertilizer. In this area of Michigan, high quality zones of Sylvite and Sodium Chloride (NaCl) are found within the A1 Evaporite Formation of the Salina Group at depths of 7,500 to 7,800 feet below the ground surface. Michigan Potash proposes to extract potash salt through the process of solution mining. In doing so, water or brine is pumped downhole into targeted zones thereby dissolving the potash. The resulting dissolved, potash-rich brine is returned to surface where it is evaporated to recover potash and food grade salt. This process creates potash deficient brine and freshwater that is recycled in a closed loop system and reused. The three proposed non-hazardous disposal wells will handle the residual brine that is no longer useable for solution mining. The disposal wells target porous zones within the Sylvania and Bass Island Formations at depths of 5,100 to 5,600 feet below the ground surface.

Solution mining for potash and salt production is not new in this area. There is a facility presently operated by Cargill that is currently producing salt, but did produce potash until about five years ago. This facility has been in operation since the early 1980s and is located less than two miles Northwest of the proposed Michigan Potash well locations. Overall, there are currently 50 active Part 625 solution mining wells and 23 active Part 625 disposal wells in Michigan.

OTHER PERMITS AND APPROVALS ASSOCIATED WITH THIS PROJECT

As detailed above, the OGMD role in this project involves the permitting, construction, drilling, and operation of the Part 625 mineral wells. Such wells are also permitted by the U.S. EPA. On the federal level, Michigan Potash's proposed disposal wells are considered Class I wells and the proposed solution mining wells are considered Class III wells. These wells are managed pursuant to the U.S. EPA Underground Injection Control (UIC) program. Michigan Potash initiated the Class I and Class III permit applications with U.S. EPA prior to submitting their Michigan Part 625 applications. The U.S. EPA issued their UIC Class I and Class III permits to Michigan Potash in August 2017 and June 2017, respectively. On the state level, and in addition to the OGMD, there are other DEQ divisions that are involved in various aspects of this project. The remainder of this section highlights the other divisions within the DEQ that are involved in providing approvals and permits for this project.

Some of the source water needed in the dissolving process would be obtained from two water wells drilled in the area. Based upon the project proposed water needs, these are considered large quantity water withdrawals and are subject to the provisions of Part 327, Great Lakes Preservation, of the NREPA. This program is administered by the DEQ Water Resources Division. In accordance with Part 327, these proposed water withdrawals must be registered and approved within Michigan's Water Withdrawal Assessment Tool (WWAT). The WWAT is a conservative computer model used to determine if a proposed withdrawal is likely to cause an adverse resource impact. The WWAT authorizes a proposed withdrawal if it is not likely to cause an adverse impact to fish populations or stream flow based on the stream type. Large quantity withdrawals that pose higher risks for adverse resource impacts to stream flow and fish populations, based on the stream type, must be authorized by a site-specific review by the DEQ. Michigan Potash registered and was approved for two water well withdrawals within the WWAT (one for 1,000 gallons per minute (GPM) registered in October 2016 and another for 380 GPM registered in September 2017). Michigan Potash's proposed water withdrawals did not indicate an adverse resource impact or trigger a site specific review within the WWAT and do not exceed the threshold to require a permit under Part 327.

Michigan Potash has obtained a permit to install from the DEQ Air Quality Division pursuant to Part 55, Air Pollution Control, of the NREPA. This permit was approved in March 2016 and it applies to their proposed manufacturing site facility at the northeast corner of Scofield Road and 120th Avenue in Ewart Township. This permit addresses the air stripping of minor amounts hydrogen sulfide gas from the produced brine, the emissions from the proposed natural gas dryers and boilers, and salt and potash processing.

In accordance with Part 303, Wetlands Protection, of the NREPA, DEQ Water Resources Division staff conducted a Level 3 Wetland Identification Review for 106 acres associated with the proposed manufacturing site facility in July 2016. Based upon this review, approximately eight acres of regulated wetlands were highlighted which may require Part 303 permit actions, depending upon the future plans and the final disturbance related to the manufacturing site facility.

PUBLIC ENGAGEMENT

Due to the anticipated public interest regarding this proposed activity, the OGMD posted the details regarding the project on the DEQ calendar on February 9, 2018 and required Michigan Potash to place further notice of the project in two newspapers with a general circulation in the area. Notice was published in the *Big Rapids Pioneer* on February 13, 2018, and the *Evert/Reed City Herald Review* on February 14, 2018. The DEQ calendar and newspaper notices also detailed that the OGMD would be conducting an information session and public meeting to discuss specifics regarding these permit applications. This meeting was held on March 12, 2018, at the Evert Middle School Auditorium and was attended by an estimated 125 people. The purpose of this forum was to invite and record public comment, inform the area residents of the project, and answer questions regarding the proposed activities. Public comments on this project were accepted through March 19, 2018 and could be submitted via an OGMD email inbox or through the U.S. Mail. Some comments were received after the comment period expired but were still reviewed and considered in the final decision. The OGMD received over 200 comments related to this project. In addition to the public notice and meeting held by the OGMD, the U.S. EPA also noticed and held a public meeting on this proposed activity at the Reed City High School in January 2017.

RESPONSE TO COMMENTS

In preparing this response, the OGMD is not responding directly to individual comments either in support or in opposition to the proposal. For those in support for this project, the comments were generally centered around the benefits of a new potash source for the agricultural community, economics, and the potential for job creation. For those against the proposal, the concerns were generally focused on overall water use and the potential for impacts to the environment and natural resources. Concerns were also expressed regarding induced seismic (man-made earthquake) activity, impacts to threatened and endangered species, operator liability, subsurface trespass, and the identification and evaluation of existing well bores in the area.

PROTECTION OF THE ENVIRONMENT AND NATURAL RESOURCES

Many comments were provided regarding the overall water use proposed and associated with this project. As mentioned, the source water needs for this project are considered large volume water withdrawals and are subject to approval and registration through the WWAT. The WWAT model is considered conservative based upon how it evaluates certain parameters associated with water use. For instance, the WWAT initially uses a 50 percent safety factor to avoid authorizing too many withdrawals – this means that only one-half of the WWAT's stream index flow estimate is available to be depleted by a large quantity water withdrawal. The 50 percent safety factor is later removed when the DEQ conducts a stream index flow review as part of its site-specific review. This 50 percent safety factor is in effect for the water management areas involved with the Michigan Potash water withdrawals. Also, the WWAT assumes that there is no heterogeneity in aquifer characteristics and the stream flow index of available water is based upon a late summer or seasonal low flow setting. According to the proposed pumping rates, well depths, and distance to streams and rivers, the WWAT indicated that there would be no adverse resource impact from the Michigan Potash water withdrawals. Moreover, it is unlikely that Michigan Potash will need the prospective registered water volumes and withdrawal rates in the initial stages of development.

Overall water use will continue to be monitored by the DEQ and Michigan Potash will be required to annually report the actual water usage. Lastly, it should be noted that even though Michigan Potash has registered withdrawals based upon a 215-foot well depth, they do intend to drill deeper into a more confined portion of the area aquifer and they will also be deploying observation wells to analyze drawdown to further verify the effects of the water withdrawals in this area over time.

Concerns were also expressed regarding the potential for contamination of water resources. To protect water resources from contamination, Michigan's mineral well program has strict and robust casing and sealing requirements. These wells will be constructed with multiple concentric casing strings (steel pipes) with the uppermost two strings cemented over the entire length - back to the surface. By cementing these two casing strings to surface the freshwater zones are protected from fluid migration. These redundant protections also serve to protect any surface waters that may be in hydrologic connection to the groundwater. To further assure that no releases to the environment occur, Michigan Potash is required to have secondary containment placed around the well(s) and any future on-site tanks or surface facilities. During well drilling operations, above ground steel tanks will be used for the handling of drilling mud and cuttings. After the wells are drilled, and according to state and federal rules, mechanical integrity must be demonstrated prior to being approved for injection of fluid. The demonstration of mechanical integrity is required periodically over the life of the well. Also, Michigan Potash is required to monitor injection pressures, annulus pressures, flow rates, and cumulative volumes on a daily basis, and submit those reports to OGMD monthly. A ground water monitoring program and hydrogeologic investigation will be necessary in subsequent permitting associated with the surface facility approval. Finally, in the unlikely event of a spill or release, Michigan operators are required to promptly report the details of that spill or release and begin recovery and cleanup efforts immediately. While spills and releases are not common, they can and do occur. The bulk of spills and releases in Michigan are minor, discovered and reported quickly, and addressed in a timely manner.

Several commenters expressed concern regarding the potential for impacts to area wetlands. As mentioned, a Level 3 Wetland Identification Review was conducted for the proposed manufacturing site facility. While this review did not encompass the proposed well pad and access road, there will be no wetlands impacted by the development activities associated with the drilling and operation of the mineral wells. In fact, the northern edge of the proposed 10 well pad was shifted 40 feet south to avoid wetlands in that area. In addition, specific soil erosion and sedimentation control measures will be used to prevent off site erosion and sedimentation thereby protecting area wetlands from the upland well development activities.

INDUCED SEISMICITY (MAN-MADE EARTHQUAKES)

Some commenters raised concerns about possibility of an increase in earthquake potential from the injection activities associated with this project. It is well documented that under certain conditions there has been an increase in seismicity (earthquakes) in other areas of the United States associated with injection activities. The geologic settings and disposal activities where induced seismicity has occurred is very different from what is being proposed for this project and for injection wells in Michigan in general. Michigan has approximately 1,400 active injection wells and has had a long history of injection activity without induced seismicity. In fact, Michigan has never had an earthquake associated with an injection well. The OGMD is following the science

and studies in more seismically active states where induced seismicity from injection has occurred. Geologists in the OGMD are in contact with colleagues in other states and at the U.S. Geological Survey regarding induced seismicity and stay up-to-date on the most current research on this topic.

A related comment was made that a 2015 Michigan earthquake may have compromised the integrity of the confining strata for a 200-mile radius and thereby increases the risk of fluid migration associated with Michigan Potash's proposed activity. This earthquake was a 4.2 magnitude event that occurred about 100 miles to the south of this project. There is no factual basis for expecting any impacts to area confining strata from events such as this, and such impacts have not been observed in Michigan or in places where seismic events are more common.

IMPACTS TO THREATENED AND ENDANGERED SPECIES

A few commenters raised concerns about possible impacts to threatened and endangered species. To review for this potential, the OGMD compared the proposed well locations and the adjacent areas (contiguous square-mile sections) against the data within the Michigan Natural Resources Inventory (MNFI). The MNFI is a comprehensive source of existing data on Michigan's threatened and endangered species. Data from the MNFI is used to guide conservation and land management activities throughout Michigan. The MNFI review indicated that no threatened and endangered species have been documented in the project area. Michigan Potash also indicated that an endangered species review, including a bird survey, was conducted in 2016 for the project area. The OGMD determined that there will be no impacts to threatened and endangered species because the areas being disturbed for well development activities are limited in size, do not involve tree removal, and do not include habitat associated with any suspected protected species.

OPERATOR LIABILITY

Many commenters expressed concern that Michigan Potash was lacking in overall liability and financial assurance because they felt that the conformance bonding amounts are inadequate and the company is structured as a Limited Liability Company (LLC). Part 625 rules do not address company structure but do make requirements for conformance bonding. For all eleven permits, Michigan Potash has conformance bonding in the amount of \$388,600. This bonding is in place to cover the costs for plugging the wells and restoring the site locations, should that need arise. State regulations do not require that any additional bonding be imposed beyond the amounts defined in the rules. Michigan Potash has met those bonding requirements. Beyond conformance bonding, most prudent operators also carry liability insurance to cover unforeseen events and although it is beyond our purview, it is likely that this would be the case should this project move forward. Regarding the LLC company structure, this organization type is quite common for operators associated with activities permitted by the DEQ and the OGMD. Being a LLC does not mean that Michigan Potash can avoid paying for environmental liabilities. LLC organizations can and will be held liable for violations to DEQ programs. Moreover, pursuant to Part 625 and Part 201, Environmental Remediation of the NREPA, Michigan Potash would be required to clean up any contamination due to the activities associated with this project.

SUBSURFACE TRESPASS

Comments were provided from some area residents regarding concerns of subsurface trespass associated with the brine production and disposal activities. The OGMD role in this project involves the permitting, construction, drilling, and operation of the Part 625 mineral wells and to assure that those activities are protective of the environment and public health and safety. The Part 625 mineral well permit does not convey property rights in either real estate or material, neither does it authorize any injury to public or private property. It should be noted that Michigan Potash has affirmed in writing that they have obtained all the necessary legal and contractual rights to locate the wells and wellbores (surface and bottom hole locations, and the paths in between) where proposed.

IDENTIFICATION AND EVALUATION OF EXISTING WELL BORES IN THE AREA

Some commenters expressed concern regarding the identification and evaluation of existing and old abandoned well bores in the area. According to Part 625 rules, wells disposing of non-hazardous waste are subject to an Area of Review (AOR) evaluation of greater than one-quarter mile and no more than two miles. An AOR is done to identify any wells that penetrate the injection zone and may pose a risk in allowing fluid migration based upon how the wells were constructed and/or plugged. For this project the OGMD conducted an AOR which identified and evaluated all the existing wells and abandoned wellbores that penetrated the proposed injection zone within two miles of the proposed well locations. As part of this evaluation, the OGMD reviewed all well construction and plugging records within the AOR. This review indicated that the well construction and final plugging of those wells that penetrated the injection zone did not pose a risk and were sufficient to prevent fluid migration

OGMD DECISION

OGMD staff has conducted a thorough and intensive review of the proposed Michigan Potash Part 625 permit applications and has determined that the applications meet the applicable regulatory requirements. For that reason, we have made the decision to proceed with issuing permits to Michigan Potash. Of all the comments we received in opposition to the issuance of these permits, we did not receive any matters of fact that would require denial of these applications under Michigan statute or rules. We appreciate all the comments that were received and the passion of those who had taken an interest in this proposal. The OGMD's final decision must follow established legal principles and be based upon and whether an application adheres to statutes and rules. We recognize that this decision may not satisfy all parties; however, we are confident that the decision is the correct one, and we hope that this document adequately responds to the concerns of those who submitted comments. The DEQ and OGMD staff will monitor and oversee this project as it moves forward, and we will continue to hold the operator accountable and ensure that they adhere to Michigan regulations and requirements.