

**MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
OIL, GAS, AND MINERALS DIVISION**

RESPONSE TO PUBLIC COMMENTS
WASTE MANAGEMENT OF MICHIGAN, INC.
MINERAL WELL APPLICATION
NON-HAZARDOUS WASTE DISPOSAL WELL
ZEELAND TOWNSHIP, OTTAWA COUNTY, MICHIGAN

INTRODUCTION

Waste Management of Michigan, Inc. (WM) has submitted a permit application to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) to drill and operate a waste disposal well (IW-1). This well will be used for the disposal of non-hazardous landfill leachate generated on-site at the Autumn Hills Recycling and Disposal Facility (RDF). Under Michigan law, the permitting, construction, drilling, and operation of this well is 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.

Disposal wells of this type are dually permitted by both EGLE Oil, Gas, and Minerals Division (OGMD) and the U.S. Environmental Protection Agency (EPA), Underground Injection Control (UIC) Program. According to the EPA classification, this proposed well is considered a Class I disposal well. Class I disposal wells inject industrial and municipal liquid wastes into deep, porous formations far below and isolated from underground sources of drinking water (USDW).

Autumn Hills RDF is located in Ottawa County, east of the city Zeeland. WM proposes to dispose non-hazardous leachate generated from the landfill into deep, confined, porous rock formations between 3,800 and 6,600 feet below the ground surface. The target injection interval within these formations is the Mount Simon Sandstone at a depth of 5578 feet below ground surface at the site. The disposal rock formations naturally contain non-potable brine. The base of the lowest known freshwater aquifer is approximately 350 feet below the ground surface. The proposed IW-1 disposal well is designed to isolate the injection interval from the freshwater zones with multiple strings of casing (steel pipes) cemented to the surface. The disposal is through steel tubing within the casing strings. The top of the injection interval and the freshwater zone are separated vertically by more than 3,000 feet. The Utica Shale formation makes up the immediate confining zone above the injection interval. There are several confining rock formations in between which further serve to prevent fluid movement between rock layers. Under no circumstances would a disposal well be approved or allowed to operate if there were indications that the disposed fluids could migrate into freshwater zones.

PUBLIC ENGAGEMENT

During the permit application review process, EGLE staff participated in public engagement. WM held a public education event regarding the details of the proposed well on June 5, 2019. Staff from OGMD and EGLE-Materials Management Division (MMD) attended this meeting to provide details of the proposed project and landfill regulation. EGLE staff spoke to citizens attending, answered questions from a regulatory standpoint, and provided informational handouts at the meeting. At the time of this outreach event, OGMD posted the informational handout on its website, along with a digital copy of the permit application to drill and operate the proposed IW-1 well. This information has remained on the website since early June of 2019.

Additionally, OGMD held a formal public comment period from August 9, 2019 until September 9, 2019 to align with the EPA public comment period. EPA extended its comment period to September 24, 2019 after noting a printing error in its public notice, to allow at least 30 days for public comment. OGMD also extended the comment period to the same date, to be consistent. Deadlines for public comment were posted on the EGLE calendar on its website starting August 9, 2019. OGMD required WM to place notice of the project in a newspaper with general circulation in the area. Notice was published in *The Holland Sentinel* on August 13, 2019. The permit application and details regarding the project were available for the public to view on the OGMD website.

In total, the OGMD received comments related to the proposed well from four individual commenters during the formal comment period. Comments received before the formal comment period were also reviewed and considered in the final decision. Earlier in the application review process, one commenter wanted to know when a public hearing was scheduled and was informed a decision had not yet been made whether to hold a hearing. OGMD did not receive any requests for a public hearing during the formal comment period. Due to a lack of overall significant public interest in this project, OGMD determined a public hearing would not be held, as did the EPA.

RESPONSE TO COMMENTS

Comments received were mainly in opposition to the proposed well. One question arose from a commenter as to exactly what the impact of public comment would be on this proposal. It should be noted that OGMD staff reviews all comments and takes them into consideration as they pertain specifically to the administration of OGMD programs under the NREPA. Comments that included requests for data or information were addressed at the time the comment was submitted and are not included in this document. Comments relating to the proposed well are included in this response to comments document and are grouped into the following categories: Waste Characterization, Protection of the Environment and Freshwater, Operator Liability, Induced Seismicity, Leachate Treatment and Disposal Alternatives.

WASTE CHARACTERIZATION

WM proposes to use this well for the disposal of non-hazardous landfill leachate wastewater. Landfill leachate is the liquid generated within a landfill. It is created from moisture contained within the waste itself, and the precipitation that falls on the landfill, which moves through the waste. Modern landfills are constructed with impervious liners to prevent fluid movement and collect leachate at the bottom of the landfill. Leachate is primarily water, with low concentrations of dissolved compound. Landfill leachate generated at this landfill is classified as non-hazardous waste under Federal and Michigan law. Landfill gas condensate, well maintenance and testing fluids, and storm water generated on-site also make up part of this wastewater.

The leachate originates from non-hazardous landfill waste. The wastewater will be tested regularly to monitor for various parameters and assure that it remains classified as non-hazardous. The wastewater is not considered to be ignitable, reactive, or corrosive.

WM has provided a Waste Analysis Plan (WAP) which it will follow to meet the testing requirements. The sampling frequency is primarily quarterly, although there are a few parameters that will be sampled and tested annually. A copy of the WAP is available on the OGMD website.

PROTECTION OF THE ENVIRONMENT AND FRESHWATER

Commenters expressed concerns related to protection of the environment and freshwater. Michigan's mineral well regulations have redundant protections and strict requirements related to well location, design, construction, operation, monitoring, testing, reporting, and closure. The safeguards in place ensure protection to freshwater, the environment, and human health. Wells that meet design and operating requirements are very low risk. Permit holders must adhere to monitoring and reporting requirements when drilling, operating and plugging wells. To ensure regulations are followed, OGMD area geologists inspect well sites during the application review process, during drilling operations, regularly throughout the life of the well, and once a well is plugged and the site restored,

During well drilling operations, above ground steel tanks will be used for the handling of drilling mud and cuttings. To further assure that no releases to the environment occur, WM is required to have secondary containment placed around the well(s) and any future on-site tanks or surface facilities.

Injection wells are designed and constructed to allow disposal while preventing the movement of disposed wastewaters into shallower freshwater zones. Injection wells must be constructed with multiple concentric casing strings (steel pipes). When a casing string is seated in the wellbore, the space between the casing strings, or between the outermost casing and the borehole wall (termed the annulus), is then cemented to secure the casing into place and to seal off the drilled formations. This cement is initially pumped through the inside of the casing. As pumping continues, cement is circulated out and around the outside of the casing (through the annulus), up to the surface. To assure sufficient cementing amounts, the annulus volume is calculated and a certain volume in excess of that volume is required by permit. Once enough cement reaches the surface from the

annulus of the well, there is a required undisturbed wait time, to allow the cement to reach a specified compressive strength. By cementing the space between the rock formations and the outside of the casing strings from bottom to surface, potential fluid migration upward from the disposal zone into freshwater zones is prevented from occurring.

The proposed WM IW-1 well will have three concentric steel casings. Each interior casing will be set deeper than the previous and each annulus will be cemented to surface. Removable steel tubing is placed inside the innermost cemented casing. The tubing is held in place and sealed down-hole by a tool called a packer.

State and federal rules require mechanical integrity of the well be demonstrated once the well is drilled, before it can be approved for injection of fluid into the disposal well. Mechanical integrity tests ensure that there are no significant leaks or unwanted fluid movement associated with the well. WM will be required to demonstrate the internal and external mechanical integrity of the well. Internal mechanical integrity means the well has no significant leak in the casing, tubing, or packer. A pressure test of the annular space between the tubing and casing is performed to detect any changes in pressure. Changes in pressure would indicate whether there are leaks in the tubing, packer, or casing. External mechanical integrity means the well has no significant fluid movement through vertical channels adjacent to the wellbore. External mechanical integrity is determined using wireline logs, where measurement devices are lowered into the well on a cable. Most commonly, a log measuring temperature over the length of the wellbore is used to detect anomalous conditions, indicative of a potential leak or fluid movement outside of the casing. WM proposes to run a cement bond log to evaluate the cement seal after each of the three casings are cemented. Before the well can be confirmed for use, WM must also demonstrate to OGMD that the well and disposal formations are suitable for disposal and that the confining zone is adequate to confine disposed fluids

Throughout the life of the well, WM will be required to perform these mechanical integrity tests. The required testing frequency for internal mechanical integrity demonstration is annual, and for external mechanical integrity it is every 5 years. If a well does not pass a mechanical integrity test, injection must cease until the operator can correct the issue and demonstrate that mechanical integrity has been re-established. OGMD has the authority to require additional mechanical integrity testing if re-works are done on the well, or if there is reason to believe mechanical integrity has been lost.

WM is not allowed to dispose of the leachate fluids at pressures that would fracture the injection or disposal formations. A test to determine disposal zone fracture pressure must be run before the well can be confirmed for use. A maximum injection pressure will be assigned which cannot be exceeded during disposal operations. WM is required to continuously monitor and report monthly the daily maximum and average injection pressures, rates, and volumes, pressures in the annulus between the innermost casing and the tubing, and any changes to the annulus pressure system. By monitoring this information continuously any variations can be identified quickly. The well must cease injection immediately if there are indications of a problem.

Some commenters expressed concern regarding the possibility of unknown abandoned oil and gas wells in the vicinity that create a connection between the injection formation and freshwater zones.

Part 625 rules require an evaluation within an Area of Review (AOR) extending one-quarter mile to two miles from the proposed injection well. This is done to identify any wells that penetrate the injection zone that may allow upward fluid migration to occur based on how the wells were constructed and/or plugged.

In this two-mile AOR, OGMD identified a single existing plugged wellbore that penetrated the Utica Shale confining formation. The plugged well is located roughly one and three-quarters of a mile from the proposed WM IW-1 well. Its total depth was 4308 feet, which is over 1200 feet of vertical separation above the interval WM proposes to inject. OGMD reviewed well construction and plugging records in its files for this well. The well was drilled in 1959 and plugged to the standards existing at that time. WM demonstrated in their application that their proposed injection pressures at the WM IW-1 well will be sufficient to prevent upward fluid migration into this old plugged wellbore, over one and three-quarters of a mile away.

OPERATOR LIABILITY

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. The OGMD area geologist assigned to the county would be notified and would inspect the recovery and cleanup efforts to ensure compliance with the requirements, pursuant to Part 625 (Mineral Wells) and Part 201 (Environmental Remediation) of the NREPA.

Conformance bonding is financial assurance required for permits to cover the costs for plugging a well and restoring the site location, when that need arises. WM has met the bonding requirements by providing a conformance bond in the amount of \$109,500 for this well. This amount exceeds the required \$33,000 for financial assurance. State regulations do not require that any additional bonding be imposed beyond the amounts defined in the rules.

INDUCED SEISMICITY (EARTHQUAKES)

Concerns were expressed about injection operations contributing to earthquake potential, also known as induced seismic activity. Geologically, Michigan has very little natural seismicity. There have been a few small-scale recent earthquakes in southern Michigan which occurred near Galesburg and Union City. Both locations are greater than 70 miles from the proposed well location. In addition, the applicant has provided a table listing earthquakes within 200km of the proposed IW-1 well, all of which ranged from 3.0 to 4.2 in magnitude and were not near the IW-1 location.

There are several active disposal wells in southwest Michigan that have utilized the same proposed injection interval (Mount Simon Sandstone). No seismic events have been associated with these Mount Simon injection activities and there has not been an earthquake associated with an injection well anywhere in Michigan.

Structural lineaments or faults in the vicinity of the proposed well were mentioned in the public comments as a concern relating to seismicity. WM submitted a discussion of the regional geology, as required by the Part 625 rules. Geologic maps and stratigraphic cross-sections of the local and regional geology were provided by the applicant and reviewed by OGMD. Outside the prescribed AOR, there are localized oil and gas reservoirs found in structural traps within geologic formations approximately 1200 to 2000 feet above the confining formation. These structures, trending linearly in the Salina and Traverse formations, are thought to be controlled by dissolved salt layers above the confining formation. No faults are known to cut through the injection zone and confining zone in the local geology.

LEACHATE TREATMENT AND DISPOSAL ALTERNATIVES

OGMD received comments regarding the current disposal of the landfill leachate and other options for disposal. The leachate is currently transported by truck to a commercial waste facility that discharges combined wastes to the City of Grand Rapids Publicly Owned Treatment Works (POTW) for wastewater treatment. Trucking the leachate to an off-site wastewater treatment plant is a regulatory option that WM could continue to choose to exercise. By disposing of landfill leachate on-site in deep confined geologic formations, the environmental risk associated with waste transport is minimized and the waste product is effectively removed from any impact to freshwater or the environment. Disposal of non-hazardous liquids in a disposal well is a legal activity that is regulated with specific well construction requirements, on-site inspections, and regular monitoring and reporting requirements. The OGMD has determined the proposed injection well will be protective to the environment.

OGMD DECISION

OGMD staff has conducted a thorough and intensive review of the proposed WM Part 625 permit application and has determined that the application meets the applicable state regulatory requirements and that a permit can be issued. OGMD did not receive any comments identifying matters of fact that would dictate denial of a permit under Part 625 or its administrative rules. We appreciate all the comments that were submitted and the passion of those who have taken an interest in this proposal. The OGMD's final decision follows established legal principles and is based upon whether an application adheres to Michigan's statutes and rules. We recognize this decision may not satisfy all parties; however, we are confident that the decision is the correct one. OGMD trusts that this document adequately responds to the concerns of those who submitted comments. The OGMD staff will monitor and oversee this project as it moves forward, and we will continue to hold the operator accountable and ensure WM adheres to Part 625 regulations and requirements.