



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

STATEMENT OF BASIS FOR ISSUANCE OF DRAFT
UNDERGROUND INJECTION CONTROL (UIC) CLASS III AREA PERMIT

Permit Number: MI-133-3G-0028
Facility Name: Michigan Potash Operating

Michigan Potash Operating, L.L.C. of Denver, Colorado has applied to the U. S. Environmental Protection Agency (EPA) for an area permit to construct and operate eight injection wells to be used for solution mining in Osceola and Mecosta Counties, 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 eight injection wells in an area limited to that described in Part III(D) of this permit. Under the authority of Title 40, 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 sources 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 permit area within which the applicant must research wells that 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 to address the deficiency. The applicant has provided documentation on the well population within 1/4 mile of the permit area (i.e., the AOR). There are 2 producing, 0 injection, 0 temporarily abandoned, and 20 plugged and abandoned wells within the 1/4 mile radius AOR that penetrate the injection zone. EPA reviewed the construction or plugging of these wells. None require 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 wells has been identified at approximately 614 feet below ground surface. This water bearing formation is the Glacial Drift.

Injection and Confining Zones: Injection of fluids for solution mining is limited by the permit to the Salina A-1 Evaporite, the Ruff Formation (also known as the Salina A-1 Carbonate), and portions of the Salina A-2 Evaporite in the interval between 7180 and 7940 feet below ground surface. This injection zone is separated from the lowermost USDW by approximately 6566 feet of rock. The primary confining zone is the Salina A-2 Carbonate between 6920 and 7180 feet below ground surface.

Construction Requirements: Pursuant to 40 C.F.R. §146.32, all new Class III wells shall be cased and cemented to prevent the migration of fluids into or between USDWs. The permittee shall not commence construction, including drilling or conversion, of any injection well until a final permit has been issued.

Injection Fluid: The injected fluid composition shall be restricted to those fluids listed in Part III(A) of the permit. The monthly volume of injected fluid shall be no less than 91% of the volume extracted from the solution cavity in that month.

Maximum Injection Pressure: During the development of solution mining, the density of the injectate changes as the operation proceeds from initial injection to eventually creating a cavern and mining. Density is measured in terms of the ratio of the injectate density to the density of pure water. When a well is first drilled and injection starts, the injectate is almost fresh water, with a low specific gravity. The maximum wellhead injection pressure shall be limited to 2372 pounds per square inch gauge (psig) when the specific gravity of the injectate is no greater than 1.03. When the specific gravity of the injectate is greater than 1.03 (water), but no more than 1.20, the maximum injection pressure shall be 1843 psig. EPA calculated these limits in accordance with the formula in Part III(A) of the permit. These limitations will ensure that the pressure during injection does not initiate fractures or propagate existing fractures in the injection zone during injection operations. This helps to protect the integrity of the confining layer by ensuring that the injection pressure will not cause the movement of injection or formation fluids through the confining layer and into a USDW as prohibited by 40 C.F.R. §146.33(a)(1).

Operating, Monitoring, and Reporting Requirements: In accordance with 40 C.F.R. §§144.54 and 146.33, the applicant will be responsible for observing and recording injection pressure semi-monthly and reporting this to the EPA on a quarterly basis. The injected and produced volumes shall be monitored daily and shall be reported quarterly. The specific gravity of the injected fluid shall be monitored semi-monthly and shall be reported quarterly. An analysis of the injected fluid must be submitted on a quarterly basis. In addition, the applicant is required to conduct and pass two mechanical integrity (MI) tests and other well tests, in accordance with 40 C.F.R. §§146.8 and 146.33, after the well is completed and before authorization to inject is granted and every 60 months thereafter. If any question should arise about well integrity, the Director can require a MI test to check for fluid movement pursuant to Part I(E)(18) of the permit.

Cavern Monitoring: In accordance with 40 C.F.R. §144.52(a)(9), to ensure that solution mining activities do not harm the structural integrity of the confining layer, thus potentially leading to the migration of fluids out of the injection zone, sonar surveys of the solution mining cavity (or cavities) will be conducted routinely. (See Part III(A) for schedule.) Results of the sonar survey must include a diagram of the cavern. After the initial survey, dimensions from the previous survey must be shown on the diagram. Cross-sectional views shall also include a comparison to previous sonar results. The sonar survey results and interpretation must be submitted to the Director within 60 days of completing the survey.

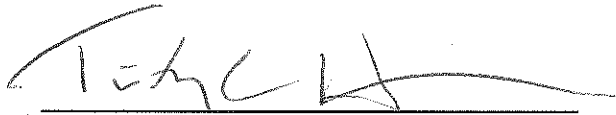
Plugging and Abandonment: In accordance with 40 C.F.R. §146.10 and §146.34(c), the permit includes a plugging and abandonment plan for environmentally protective well closure at the time of cessation of operations. Michigan Potash Operating L.L.C. has demonstrated adequate financial responsibility to close, plug, and abandon this underground injection operation. Michigan Potash Operating L.L.C. has provided cash bonding with the State of Michigan as financial assurance for the company's injection wells. This coverage must be updated periodically, upon request of EPA.

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 were received that requested a change in the draft permit. In the event that public comments are received and request a change in the draft permit, and EPA issues a final permit, then the 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 operation 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 the 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 Janette E. Hansen at (312) 886-0241 or hansen.janette@epa.gov via the Internet. The date for closure of the comment period includes three days for the delay caused by mailing and more than the required 30 days for public comment. The public comment period will close as described in the Public Notice.

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 the public hearing on the draft permit decision. 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.

**U.S. Environmental Protection Agency
Region 5 (WU-16J)
77 West Jackson Boulevard
Chicago, Illinois 60604-3590**



**Tinka G. Hyde
Director, Water Division**

ACTING
FOR



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

Page 1 of 13

UNDERGROUND INJECTION CONTROL CLASS III AREA PERMIT

Permit Number: MI-133-3G-0028
Facility Name: Michigan Potash

Pursuant to the provisions of the Safe Drinking Water Act, as amended (42 U.S.C. 300f *et seq.*, commonly known as the SDWA) and implementing regulations promulgated by the United States Environmental Protection Agency (EPA) at Parts 124, 144, 146 and 147 of Title 40 of the Code of Federal Regulations (40 C.F.R.),

Michigan Potash Operating, L.L.C. of Denver, Colorado

is authorized to construct and operate eight injection wells located in a permit area limited to that described in Part III(D) of this permit. Injection shall be limited to the Salina Group A-1 Evaporite, the Ruff Formation, and portions of the Salina A-2 Evaporite, between approximately 7180 and 7940 feet, upon the express condition that the permittee meet the restrictions set forth herein. Injection shall not commence until the operator has received authorization in accordance with Part I(E)(10) of this permit.

The injection shall be limited to solution mining.

All references to Title 40 of the Code of Federal Regulations (40 C.F.R.) are to all regulations that are in effect on the date that this permit is effective. All terms used in this permit shall have the meaning set forth in the SDWA and 40 C.F.R. Parts 124, 144, 146, and 147.

This permit shall become effective on _____ and shall remain in full force and effect during the operating life of the field, unless this permit is otherwise modified, revoked and reissued, or terminated pursuant to 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. This permit shall also remain in effect upon delegation of primary enforcement responsibility to the State of Michigan unless that State chooses to adopt this permit as a State permit. This permit will be reviewed at least every five years from the effective date specified above.

Signed and dated:

DRAFT

Tinka G. Hyde
Director, Water Division

PART I
GENERAL PERMIT COMPLIANCE

A. EFFECT OF PERMIT

The permittee is allowed to engage in underground injection in accordance with the conditions of this permit. Notwithstanding any other provisions of this permit, the permittee authorized by this permit shall not construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of injection, annulus or formation fluids into underground sources of drinking water (USDWs). The objective of this permit is to prevent the introduction of contaminants into USDWs if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 C.F.R. Part 141 or may otherwise adversely affect the health of persons. Any underground injection activity not specifically authorized in this permit is prohibited. For purposes of enforcement, compliance with this permit during its term constitutes compliance with Part C of the Safe Drinking Water Act (SDWA). Such compliance does not constitute a defense to any action brought under Section 1431 of the SDWA, or any other common or statutory law other than Part C of the SDWA. Issuance of this permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local law or regulations. Nothing in this permit shall be construed to relieve the permittee of any duties under applicable regulations.

B. PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated for cause as specified in 40 C.F.R. §§144.39, 144.40, and 144.41. The filing of a request for a permit modification, revocation and reissuance, termination, or the notification of planned changes or anticipated noncompliance on the part of the permittee does not stay the applicability or enforceability of any permit condition.

C. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

D. CONFIDENTIALITY

In accordance with 40 C.F.R. Part 2 and Section 144.5, any information submitted to the EPA pursuant to this permit may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice. If a claim is asserted, the validity of the claim will be assessed in accordance with the procedures in 40 C.F.R. Part 2 (Public Information). Claims of confidentiality for the following information will be denied:

- (1) The name and address of the permittee; and
- (2) Information that deals with the existence, absence or level of contaminants in drinking water.

E. DUTIES AND REQUIREMENTS

1. **Duty to Comply** - The permittee shall comply with all conditions of this permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit pursuant to 40 C.F.R. §144.34. Any permit noncompliance constitutes a violation of the SDWA and is grounds for enforcement action or permit termination, revocation and reissuance, or modification.
2. **Penalties for Violations of Permit Conditions** - Any person who operates wells in violation of permit conditions is subject to civil penalties and other enforcement action under the SDWA and may be subject to such actions under the Resource Conservation and Recovery Act. Any person who willfully violates a permit condition may be subject to criminal prosecution.
3. **Need to Halt or Reduce Activity not a Defense** - It shall not be a defense for a permittee in an enforcement action to state that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.
4. **Duty to Mitigate** - The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit.
5. **Proper Operation and Maintenance** - The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.
6. **Duty to Provide Information** - The permittee shall furnish to the Director, by the date specified by the Director, any information that the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required by this permit to be retained.
7. **Inspection and Entry** - The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law to:
 - (a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this permit;
 - (b) Have access to and copy, at reasonable times, any records that must be retained under the conditions of this permit;
 - (c) Inspect at reasonable times any facilities, equipment (including monitoring equipment) practices, or operations regulated or required under this permit; and
 - (d) Sample or monitor the injected fluids, at reasonable times, for the purposes of assuring permit compliance, or as otherwise authorized by the SDWA, at any location.

8. Records

(a) The permittee shall retain records of all monitoring information, including all calibration and maintenance records and copies of all records required by this permit, for a period of at least three years from the date of the sample, measurement or report. The permittee shall also maintain records of all data required to complete this permit application and any supplemental information submitted under 40 C.F.R. §§144.31 and 144.51. These periods may be extended by request of the Director at any time by written notice to the permittee.

(b) The permittee shall retain records concerning the nature and composition of all injected fluids until three years after the completion of plugging and abandonment of the last operating injection well covered under this permit. Such plugging and abandonment shall be conducted in accordance with the plugging and abandonment plan, contained in Part III(B) of this permit. The owner or operator shall continue to retain the records after the three year retention period unless he delivers the records to the Director or obtains written approval from the Director to discard the records.

(c) Records of monitoring information shall include:

- (i) The date, exact place, and the time of sampling or measurements;
- (ii) The name(s) of the individual(s) who performed the sampling or measurements;
- (iii) A precise description of both sampling methodology and the handling of samples;
- (iv) The date(s) analyses were performed;
- (v) The name(s) of the individual(s) who performed the analyses;
- (vi) The analytical techniques or methods used; and
- (vii) The results of such analyses.

9. Notification Requirements

(a) Planned Changes - The permittee shall notify the Director at least 30 days prior to any planned physical alterations or additions to the permitted facility.

(b) Anticipated Noncompliance - The permittee shall give at least 30 days advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

(c) Transfer of Permits - This permit is not transferable to any person except after notice is sent to the Director at least 30 days prior to transfer and the requirements of 40 C.F.R. §144.38 have been met. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the SDWA.

(d) Compliance Schedules - Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted to the Director no later than 30 days following each schedule date.

(e) Twenty-Four Hour Reporting - The permittee shall report to the Director any noncompliance which may endanger health or the environment. This information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances, and shall include the following information:

(i) Any monitoring or other information that indicates that any contaminant may cause an endangerment to an underground source of drinking water; or

(ii) Any noncompliance with a permit condition or malfunction of the injection system that may cause fluid migration into or between underground sources of drinking water.

(f) Five Day Written Reporting of Noncompliance - For any noncompliance identified under Part I(E)(9)(e), the permittee shall provide a written submission as soon as possible, but no later than five calendar days from the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

(g) Other Noncompliance - All other instances of noncompliance shall also be reported by the permittee in accordance with Part II(B)(3)(a) of this permit. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

(h) Other Information - If or when the permittee becomes aware that the permittee failed to submit any relevant facts in the permit application, or submitted incorrect information in a permit application or in any report to the Director, the permittee shall promptly submit such facts or corrected information.

(i) Report on Permit Review - Within 30 days of receipt of the final issued permit, the permittee shall report to the Director that the permittee has read and is personally familiar with all terms and conditions of this permit.

10. **Commencing Injection** - The permittee shall not commence injection into any newly drilled or converted well until:

- (a) Formation data has been submitted in accordance with Part II(A)(5) and II(B)(2)(c), respectively;
- (b) A report on any logs and tests required under Part II(A)(4) of this permit has been submitted;
- (c) Mechanical integrity of the well has been demonstrated in accordance with Part I(E)(18);
- (d) Any required corrective action has been performed in accordance with Parts I(E)(17) and III(C); and
- (e) Construction is complete and the permittee has submitted to the Director, by certified mail with return receipt requested, a notice of completion of construction using EPA Form 7520-09, a modified plugging and abandonment plan (if needed), a copy of the State permit, and either:
 - (i) The Director has inspected or otherwise reviewed the new injection well and finds it is in compliance with the conditions of the permit; or
 - (ii) The permittee has not received, within 13 days of the date of the Director's receipt of the report required above, notice from the Director of his or her intent to inspect or otherwise review the new injection well, in which case prior inspection or review is waived and the permittee may commence injection.

11. **Signatory Requirements** - All reports required by this permit or other information requested by the Director shall be signed and certified according to 40 C.F.R. §144.32.

12. **Notice of Plugging and Abandonment** - The permittee shall notify the Director at least 45 working days before conversion or abandonment of any injection well.

13. **Plugging and Abandonment** - The permittee shall plug and abandon each well as provided in the plugging and abandonment plan contained in Part III(B) of this permit. Within 60 working days after plugging a well, or at the time of the next quarterly report (whichever is later), the permittee shall submit a report to the Director. The report shall be certified as accurate by the person who performed the plugging operation and shall consist of either:

- (a) A statement that the well was plugged in accordance with the plan previously submitted to the Director; or
- (b) If the actual plugging differed from the approved plan, a statement defining the actual plugging and explaining why the Director should approve such deviation. Any deviation from a previously approved plan which may endanger underground sources of drinking water is cause for the Director to require the operator to replug the well.

14. **Inactive Wells** - After cessation of operations for a given well for two years the permittee shall plug and abandon a well in accordance with the plan and 40 C.F.R. §144.52 (a)(6) unless the permittee has:

- (a) Provided notice to the Director; and

(b) Described actions or procedures that are deemed satisfactory by the Director, which the permittee will take to ensure that the well will not endanger underground sources of drinking water during the period of temporary abandonment. These actions and procedures shall include compliance with the technical requirements applicable to active injection wells unless waived, in writing, by the Director.

15. **Financial Responsibility** - The permittee shall maintain financial responsibility and resources to plug and abandon all the underground injection wells in accordance with 40 C.F.R. §144.52(a)(7) as provided in the administrative record corresponding to this permit action which is hereby incorporated by reference as if it appeared fully set forth herein. The permittee shall not substitute an alternative demonstration of financial responsibility from that which the Director has approved unless the permittee has previously submitted evidence of that alternative demonstration to the Director and the Director has notified the permittee in writing that the alternative demonstration of financial responsibility is acceptable. The financial responsibility mechanism shall be updated periodically, upon request of the Director, except when Financial Statement Coverage is used as the financial mechanism; this coverage must be updated on an annual basis. If additional wells are to be constructed under the conditions of this permit, the permittee shall increase the amount of financial assurance to cover the additional cost of plugging and abandonment prior to requesting a minor modification to this permit.

16. **Insolvency**

(a) In the event of the bankruptcy of the trustee or issuing institution of the financial mechanism, or a suspension or revocation of the authority of the trustee institution to act as trustee or the institution issuing the financial mechanism to issue such an instrument, the permittee must submit an alternative demonstration of financial responsibility acceptable to the Director within 60 days after such event. Failure to do so will result in the termination of this permit pursuant to 40 C.F.R. §144.40(a)(1).

(b) An owner or operator must also notify the Director by certified mail of the commencement of voluntary or involuntary proceedings under Title 11 (Bankruptcy), U.S. Code, naming the owner or operator as debtor, within 10 business days after the commencement of the proceeding. A guarantor of a corporate guarantee must make such a notification if he or she is named as debtor, as required under the terms of the guarantee.

17. **Corrective Action** - The permittee shall shut-in an injection well whenever the permittee or EPA determines that operation thereof may be causing upward fluid migration through the well bore of any improperly plugged or unplugged well in the area of review and shall take such steps as the permittee can to properly plug the offending well(s). Any operation of a well that may cause upward fluid migration from an improperly plugged or unplugged well will be considered a violation of this permit. If the permittee or EPA determines that a permitted well is not in compliance with the mechanical integrity requirements of this permit, the permittee will immediately shut-in the well until such time as appropriate repairs can be effected and written approval to resume injection is given by the Director. In addition, the permittee shall not commence injection until any and all corrective action has been taken in accordance with any plan contained in Part III(C) of this permit and the requirements in Part I(E)(10) of this permit have been met.

18. **Mechanical Integrity (MI)** - The permittee must establish and shall maintain mechanical integrity of these wells in accordance with 40 C.F.R. §146.8. The mechanical integrity demonstration consists of two parts: Part 1 demonstrates no significant leaks in the casing, tubing, or packer and Part 2 demonstrates no significant fluid movement into an underground source of drinking water (USDW) through vertical channels adjacent to the wellbore. The permittee shall conduct the mechanical integrity testing as follows:
- (a) Pursuant to 40 C.F.R. §146.8(a)(1), long string casing, injection tubing and annular seal shall be tested by means of an approved pressure test in accordance with 40 C.F.R. § 146.8(b)(2). This test shall be performed upon completion of each well, and at least once every twelfth month beginning with the date of the last approved demonstration and whenever there has been a well workover in which tubing is removed from the well, when the packer is reset, when loss of mechanical integrity becomes suspected during operation, or when a well changes from production to injection.
 - (b) Pursuant to 40 C.F.R. §146.8(a)(2), an approved temperature, noise, oxygen activation, or other approved log shall be run upon completion of each well and at least once every 60 months from the date of the last approved demonstration to test for movement of fluid along the borehole. The Director may require such tests whenever a well is worked over. A descriptive report interpreting the results of such logs and tests shall be prepared by a knowledgeable log analyst and submitted to the Director with the test results. Should the nature of the casing preclude the use of a noise, temperature, or oxygen activation log, then pursuant to 40 C.F.R. §146.8(c)(3), cementing records may be used to demonstrate the presence of adequate cement to prevent fluid migration behind the outermost casing and the wellbore.
 - (c) The permittee shall notify the Director of his or her intent to perform any tests required by this permit and submit written procedures for the Director's approval at least 30 calendar days prior to such activities. If the proposed procedures are not appropriate for approval, EPA will require the permittee to submit new proposed test procedures for approval, or add appropriate conditions to the submitted procedures. At the discretion of the Director, a shorter time period may be allowed. The permittee must follow the procedures approved by the Director. If the permittee is unable to follow the EPA approved procedures, then the permittee must contact EPA to discuss the situation. When the test report is submitted, a full explanation must be provided as to why the approved procedures were not followed. If the approved procedures were not followed, EPA may require the permittee to re-run the test.
 - (d) The permittee shall cause all gauges used in mechanical integrity demonstrations to be calibrated to an accuracy of not less than one-half percent (0.5%) of full scale. A copy of the calibration certificate shall be submitted to the Director or his/her representative at the time of demonstration.
 - (e) The permittee shall cease injection in a well if a loss of mechanical integrity occurs or is discovered during a test, or a loss of mechanical integrity as defined by 40 C.F.R. §146.8 becomes evident during operation. Operation of the well shall not resume until the Director gives approval to recommence.
 - (f) The permittee shall notify the Director of the loss of mechanical integrity in accordance with the reporting procedures in Parts I (E)(9) and II (B)(3) of this permit.

- (g) The permittee shall report the results of a satisfactory mechanical integrity demonstration as provided in Part II (B)(3)(b) of this permit.
- (h) The permittee shall demonstrate mechanical integrity at any time upon written notice from the Director.

19. **Restriction on Injected Substances** - The permittee shall be restricted to the injection of those fluids listed in Part III(A). No fluids other than those from sources noted in the administrative record and approved by the Director shall be injected. Each year the permittee shall submit a certified statement attesting to compliance with this requirement.

PART II

WELL-SPECIFIC CONDITIONS FOR UNDERGROUND INJECTION CONTROL PERMITS

A. CONSTRUCTION REQUIREMENTS

1. **Siting** - Notwithstanding any other provision of this permit, the injection wells shall inject only into a formation that is separated from any USDW by a confining zone that is free of known open faults or fractures within the area of the review.
2. **Casing and Cementing** - Injection wells shall be cased and cemented to prevent the movement of fluids into or between underground sources of drinking water. The casing and cement used in the construction of each well shall be as contained in the administrative record corresponding to this permit action which are hereby incorporated by reference as if they appeared fully set forth herein.
3. **Wellhead Specifications** - A female coupling and valve shall be installed at each wellhead to be used for independent injection pressure readings.
4. **Logs and Tests** - Upon approval of the surface casing and cementation records by the Director, any logs and tests noted in Part III of this permit shall be performed, unless already provided. Prior to commencement of injection, the permittee shall submit to the Director for approval a descriptive report prepared by a knowledgeable log analyst interpreting the results of those logs and tests, along with the notice of completion required in Part I(E)(10) of this permit.
5. **Formation Data** - If not already provided, the permittee shall determine or calculate the following information concerning the injection formation and submit it to the Director for review and approval, prior to operation:
 - (a) Formation fluid pressure;
 - (b) Fracture pressure; and,
 - (c) Physical and chemical characteristics of the formation fluids.
6. **Prohibition of Unauthorized Injection** - Any underground injection, except as authorized by permit or rule issued under the UIC program, is prohibited. The construction, including drilling, of any well required to have a permit is prohibited until a permit has been issued and is effective.

B. OPERATING, MONITORING, AND REPORTING REQUIREMENTS

1. **Operating Requirements**
 - (a) Beginning on the effective date of this permit, the permittee is authorized to operate the injection wells, subject to the limitations and monitoring requirements set forth herein.
 - (b) **Injection Pressure Limitation** - Except during stimulation, injection pressure at each wellhead shall not exceed a maximum which shall be calculated so as to assure that the

pressure in the injection zone during injection does not initiate new fractures or propagate existing fractures in the injection zone. In no case shall injection pressure initiate fractures in the confining zone or cause the movement of injection or formation fluids into an underground source of drinking water. The injection pressure and injected fluid shall be limited and monitored as specified in Parts I(E)(19) and III(A) of this permit.

- (c) **Annulus Fluid** - The permittee shall fill the annulus between the tubing and the long string casing with a fluid approved by the Director and identified in the administrative record of this permit. Any change in the annulus fluid, except during workovers or times of annulus maintenance, shall be submitted by the permittee for the approval of the Director before replacement.

2. **Monitoring Requirements**

- (a) Samples and measurements taken for the purpose of monitoring as required in Part II(B)(3) shall be representative of the monitored activity. Grab samples shall be used to obtain a representative sample of the fluid to be analyzed. Part III(A) of this permit describes the sampling location and required parameters for injection fluid analysis. The permittee shall identify the types of tests and methods used to generate the monitoring data. The monitoring program shall conform to the one described in Part III(A) of this permit.
- (b) **Analytical Methods** - Monitoring of the nature of injected fluids shall comply with applicable analytical methods cited and described in Table I of 40 C.F.R. § 136.3 or by other methods that have been approved by the Director.
- (c) **Injection Fluid Analysis** - The nature of the injection fluids shall be monitored as specified in Part III(A) of this permit. Once the Director has given authorization to commence injection, within 30 days of starting injection an initial analysis of injection fluids shall be undertaken. The sample shall be analyzed for the chemical and physical parameters identified in Part III(A) of this permit. Results of the analysis must be submitted in the next report. The Director may, by written notice, require the permittee to sample and analyze the injection fluid at any time.
- (d) **Injection Pressure and Cumulative Volume** - The injection pressure shall be monitored semi-monthly and shall be reported quarterly as specified in Part III(A) of this permit. The injected and produced fluid volumes shall be monitored daily and shall be reported quarterly. All gauges used in monitoring shall be calibrated according to Part I E(18)(d) of this permit. If more than one solution cavity is active, volume data must be reported according to the respective cavity. If over a calendar month period the ratio of the volume of injected fluids to the volume of produced fluids is 1.1 or greater, the permittee must immediately cease injection into the cavity in question and report this condition to EPA within 24 hours. In this circumstance, the Permittee shall conduct an investigation to determine the cause of the ratio discrepancy. The permittee shall submit to EPA a report of the investigation within 15 days of cessation of injection into the well.

3. **Reporting Requirements** - Copies of the monitoring results and all other reports shall be submitted to the Director at the following address:

**U.S. Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3590
Attn: UIC Branch, (WU-16J)**

- (a) **Quarterly Reports** - The permittee shall submit the results of the injection fluid analyses specified in permit conditions in Part (II)(B)(2)(c) and in Part III(A) no later than the 10th day of the month following the end of the reporting period. Monitoring results shall be recorded on a form which has been signed and certified according to 40 C.F.R. §144.32. The first report shall be sent no later than the 10th day of the month following the quarter in which injection commences. This report shall include monthly average, maximum and minimum values for injection pressure, daily and monthly injected and produced volumes, and the specific gravity of the injected fluids.
- (b) **Reports on Well Tests, Workovers, Plugging and Abandonment, and Cavern Monitoring** - The applicant shall provide the Director with the following reports and test results within 60 days of completion of the activity:
- (i) Mechanical integrity tests, except tests which a well fails, in which case 24 hour oral and five-day written reporting under Part I(9)(e) is applicable;
 - (ii) Logging or other test data;
 - (iii) Well workovers (using EPA Form 7520-12);
 - (iv) Plugging and abandonment; and
 - (v) Cavern monitoring.

PART III**SPECIAL CONDITIONS**

These special conditions include, but are not limited to, plans for maintaining correct operating procedures, monitoring conditions, and reporting, as required by 40 C.F.R. Parts 144 and 146. These plans are described in detail in the permittee's application for a permit, and the permittee is required to adhere to these plans as approved by the Director, as follows:

A. OPERATING, MONITORING, AND REPORTING REQUIREMENTS**B. PLUGGING AND ABANDONMENT PLAN****C. CORRECTIVE ACTION PLAN****D. AREA PERMITTED**

PART III

A. OPERATING, MONITORING, AND REPORTING REQUIREMENTS

CHARACTERISTIC	LIMITATION (if appropriate)	Minimum Monitoring Requirements		Minimum Reporting Requirements
		Frequency	Type	Frequency
*Injection Pressure [☆]	2372/1843 psig (maximum)	Semi-monthly		quarterly
Specific Gravity [☆]	1.03/1.20 (maximum)	Semi-monthly	grab	quarterly
Injection Flow Rate	500 gpm maximum	Semi-monthly		quarterly
Monthly Injected Volume	N/A	daily		quarterly
Monthly Produced Volume	No less than 91% of the monthly injected volume	daily		quarterly
**Chemical and Physical Parameters of Injection Fluid	N/A	quarterly	grab	quarterly
Part 1 MIT	N/A	60 months		Per Part II (B)(3)(b) of this permit
Part 2 MIT	N/A	60 months		Per Part II (B)(3)(b) of this permit
Cavern Monitoring	Minimum cavern roof thickness 150 ft.	Every 3 years	sonar	Per Part II (B)(3)(b) of this permit

Sampling Location: Samples taken at the wellhead.

*The limitation on wellhead pressure serves to prevent injection formation fracturing. The maximum wellhead pressure is dependent upon injection formation fracture gradient, depth and specific gravity of the injected fluid. This limitation was calculated using the following formula:

$$[\{\text{fracture gradient psi/ft} - (0.433 \text{ psi/ft} \times \text{specific gravity})\} \times \text{depth}] - 14.7 \text{ psi} = \text{MIP}$$

The fracture gradient of 0.8 psi/ft (default value) was used. The top of the permitted injection zone at 7180 feet was used as the depth, a specific gravity (including a safety factor of 0.05) of 1.08 or 1.25 was used for the injected fluid. The specific gravity of 1.03 corresponds to a maximum injection pressure of 2372 psig while the specific gravity of 1.20 corresponds to a maximum injection pressure of 1843 psig. The specific gravity of the injectate shall not exceed 1.20.

** Chemical and physical analysis shall include, but not be limited to, the following: Specific Conductivity, Temperature, Total Dissolved Solids, pH, Specific Gravity, Carbonate, Bicarbonate, Chloride, Calcium, Magnesium, Potassium, and Sodium.

Maximum Injection Pressure and Maximum Specific Gravity

The injection fluid of each permitted well is limited as defined below.

Injection Fluid 1: Fluid 1 is a fluid that has a specific gravity less than or equal to 1.03. The maximum wellhead injection pressure for wells Zachary 1, Zachary 2, Samuel 1, Samuel 2, Zoe 1, Zoe 2, Starla Dawn 1, and Starla Dawn 2 will be limited to 2372 psig during injection of Fluid 1. Only wells Zachary 1, Zachary 2, Samuel 1, Samuel 2, Zoe 1, Zoe 2, Starla Dawn 1, and Starla Dawn 2 are authorized to receive Injection Fluid 1.

Injection Fluid 2: Fluid 2 is a fluid that has a specific gravity greater than 1.03 and less than or equal to 1.20. The corresponding wellhead maximum injection pressure will be limited to 1843 psig during injection of Fluid 2. Only wells approved by the Director are authorized to receive Injection Fluid 2.

** Chemical and physical analysis shall include, but not be limited to, the following: Specific Conductivity, Temperature, Total Dissolved Solids, pH, Specific Gravity, Carbonate, Bicarbonate, Chloride, Calcium, Magnesium, Potassium, and Sodium.

Composition of Injected Fluids

The injection fluid is a combination of the following fluids having a total column equal to the quantity needed to produce brine at the rates required by salt or potash production.

1. Depleted solution mining production fluid from which the salt or potash content has been mostly removed. This fluid is recycled back to the wells as part of the closed loop solution mining process.
2. Condensate water removed from the solution mining well brine by the evaporation process during production of salt or potash.
3. Wash down water used in the salt production areas to clean up equipment.
4. Overflow collection points from the brine processing operation.
5. Surface and roof runoff from the plant area.
6. Dust collection water used in scrubbing salt dust collection air.
7. Reject-salt product rebrining fluid.
8. Well water used to make up the difference between above volumes and required volume of injection fluid.
9. Fluids used to remove calcium carbonate scale in various parts of the solution mining and refining system.
10. Boiler blowdown.
11. Manufacturing area floor sweepings.

Each year, the permittee shall submit a certified statement attesting to compliance with the requirement of Part I (E)(19) of the permit.

Cavern Monitoring For Competence of Confining Layer

The Permittee shall maintain a salt cavern roof thickness of a minimum of 150 feet between the bottom of the overlying Salina A-2 Carbonate and the salt cavern ceiling. Measurement of the salt cavern roof thickness shall be taken once every three years, with an initial measurement taken before the solution mining commences. The initial measurements will be obtained from drilling logs, with subsequent measurements taken using sonar surveys of the solution cavity. After the initial sonar survey, dimensions from the previous survey must be shown on the diagram. Cross-sectional views shall also include a comparison to previous sonar results. The sonar survey results and interpretation must be submitted to the Director within 60 days of completing the survey.

B. PLUGGING AND ABANDONMENT PLAN

See Attached



United States Environmental Protection Agency
Washington, DC 20460

PLUGGING AND ABANDONMENT PLAN

Name and Address of Facility Michigan Potash Cluster 1	Name and Address of Owner/Operator Michigan Potash Operating, LLC c/o Fox Rothschild 1225 17th Street, Suite 2200, Denver, CO 80215
--	--

Locate Well and Outline Unit on Section Plat - 640 Acres 	State Michigan	County Osceola & Mecosta	Permit Number MI-133-3G-0028
Surface Location Description se 1/4 of SW 1/4 of NW 1/4 of NW 1/4 of Section 31 Township 17 Range 8			
Locate well in two directions from nearest lines of quarter section and drilling unit Surface Location ___ ft. frm (N/S) <u>N</u> Line of quarter section 1052' and ___ ft. from (E/W) <u>W</u> Line of quarter section. 216'			
TYPE OF AUTHORIZATION <input type="checkbox"/> Individual Permit <input checked="" type="checkbox"/> Area Permit <input type="checkbox"/> Rule Number of Wells <u>8</u> Lease Name Michigan Potash		WELL ACTIVITY <input type="checkbox"/> CLASS I <input type="checkbox"/> CLASS II <input type="checkbox"/> Brine Disposal <input type="checkbox"/> Enhanced Recovery <input type="checkbox"/> Hydrocarbon Storage <input checked="" type="checkbox"/> CLASS III Well Number	

CASING AND TUBING RECORD AFTER PLUGGING					METHOD OF EMPLACEMENT OF CEMENT PLUGS	
SIZE	WT (LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE		
7	23	0	8600	8 3/4	<input type="checkbox"/> The Balance Method <input type="checkbox"/> The Dump Bailer Method <input type="checkbox"/> The Two-Plug Method <input checked="" type="checkbox"/> Other	

CEMENTING TO PLUG AND ABANDON DATA:		PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (inches)	7"	7"						
Depth to Bottom of Tubing or Drill Pipe (ft)	8600	8050						
Sacks of Cement To Be Used (each plug)	100	1220						
Slurry Volume To Be Pumped (cu. ft.)	147	1793						
Calculated Top of Plug (ft.)	8050	0						
Measured Top of Plug (if tagged ft.)								
Slurry Wt. (Lb./Gal.)	14.2	14.2						
Type Cement or Other Material (Class III)	A	A						

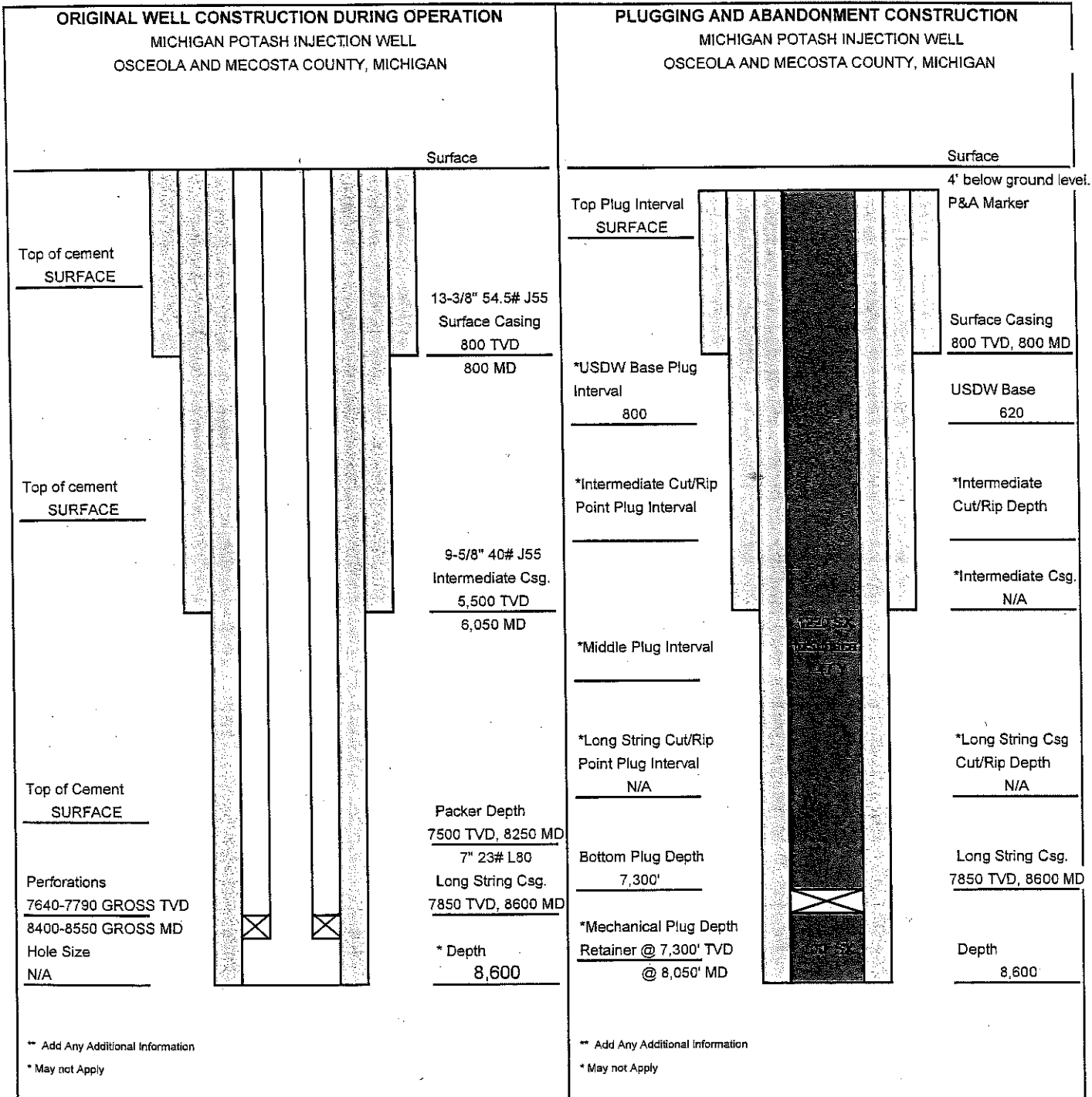
LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED (if any)			
From	To	From	To
Cement Retainer at 8,050'			
Perf 8400-8550 GROSS MD	8400	8550	

Estimated Cost to Plug Wells
\$ 289,600

Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

Name and Official Title (Please type or print) Theodore A. Pagano, P.E., P.G., General Manager	Signature 	Date Signed 07/27/2016
--	----------------------	----------------------------------



LIST OF ALL OPEN AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED

Specify Open Hole/ Perforations/ Varied Casing	From	To	Formation Name
Perfoated Interval	7640 TVD	7790 TVD	Salina A-1 Evaporate/Salt
	8400 MD	8550 MD	

C. CORRECTIVE ACTION PLAN

No corrective action is required at this time.

D. AREA PERMITTED

The Class III Area permitted is as follows, in Osceola and Mecosta County to wit:

Ewart Township: Section 30 and 31: ALL

Hersey Township: Section 25 and 36: ALL, Section 35: S/2, Section 34: E/2 SE/4

Grant Township: Section 6: ALL, Section 7: N/2

See Map

D. AREA PERMITTED

