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

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

Permit Number: MI-039-2R-0028

Facility Name: H.H. Joseph #2

BreitBurn Operating L.P. of Gaylord, Michigan, has applied for a U. S. Environmental Protection Agency (EPA) permit for the H.H. Joseph #2 injection well to be used for enhanced oil recovery in the Beaver Creek DRZ3 Unit, Crawford County, Michigan.

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

Area of Review (AOR) and Corrective Action: In accordance with 40 C.F.R. §§ 144.55, 146.6 and 146.7, this is the area surrounding the well within which the applicant must research wells which penetrate the injection zone. If any of these wells are improperly sealed, completed or abandoned, and might provide a conduit for fluid migration, the applicant must develop a corrective action plan as shown in Attachment C of the permit to address the deficiency. The applicant has provided documentation on the well population within 1/4 mile of the injection well (i.e., the AOR). There are 5 producing, 4 injection, 2 temporarily abandoned, and 1 plugged and abandoned wells within the 1/4 mile radius AOR which penetrate the injection zone. Based on current information, there are three inadequately constructed wells within the AOR and a required corrective action plan is detailed in Part III(C) of the draft permit.

Underground Sources of Drinking Water (USDWs): USDWs are defined by the UIC regulations as aquifers or portions thereof which contain less than 10,000 milligrams per liter of total dissolved solids and which are being or could be used as a source of drinking water. The base of the lowermost possible USDW in the vicinity of the injection well has been identified at approximately 430 feet below ground surface. This water-bearing formation is the Glacial Drift.

Injection and Confining Zone: Injection for enhanced oil recovery is limited by the permit to the Lucas Formation in the interval between 3,294 and 4,081 feet below ground surface. This injection zone is separated from the lowermost USDW by approximately 2,864 feet of rock strata. The confining zone is composed of the rocks of the Detroit River Group Anhydrite, with additional confining layers, including the Bell Shale, Sunbury Shale, and Coldwater Shale between the top of the Detroit River Group and the bottom of the Glacial Drift.

Construction Requirements: The proposed conversion of the well meets the regulatory criteria of 40 C.F.R. § 146.22. This requires that all converted wells which inject fluids which are brought to the surface in connection with oil or natural gas production, or for enhanced recovery of oil or natural gas, be sited so that they inject into a formation which is separated from any USDW by a confining zone free of known open faults or fractures within the AOR. All Class II wells must also be cased and cemented to prevent the movement of fluids into or between USDWs. The permittee shall not commence conversion, including drilling, of any well until a final permit has been issued.

Injection Fluid: The injected fluid is limited by the permit to fresh water and fluids brought to the surface in connection with oil or natural gas production or those fluids used in the enhancement of oil and gas production as specified in 40 C.F.R. § 146.5(b). The expected maximum daily volume of fluid to be injected is 1000 barrels.

Maximum Injection Pressure: The maximum injection pressure shall be limited to 2,000 pounds per square inch gauge (psig). EPA calculated this limit using the formula on page A-1 of the draft permit. This limitation will ensure that the pressure during injection does not initiate fractures in the confining zone adjacent to the lowermost USDW during injection operations. This in turn ensures that the injection pressure will not cause the movement of injection or formation fluids into a USDW as prohibited by 40 C.F.R. § 146.23(a)(1).

Monitoring and Reporting Requirements: In accordance with 40 C.F.R. §§ 144.54 and 146.23, the applicant will be responsible for observing and recording injection pressure, flow rate, annulus pressure, and cumulative volume on a weekly basis and reporting this to EPA on a monthly basis. The applicant will also be responsible for observing, recording and reporting annulus liquid loss on a quarterly basis. An analysis of the injected fluid must be submitted on an annual basis. In addition, the applicant is required to conduct and pass a two-part Mechanical Integrity Test (MIT), in accordance with 40 C.F.R. § 146.8, before authorization to inject is granted, and after the well is completed. The applicant is also required to repeat the annulus pressure test, which is the first part of the MIT, at least once every five (5) years thereafter. If a temperature or noise log or another method as approved by the Director is used to determine the second part of the MIT (i.e., the absence of fluid movement), then the applicant will be required to repeat this test at least once every five (5) years thereafter. These tests will provide EPA with an evaluation of the integrity of the tubular goods (casing, tubing and packer) as well as documentation as to the absence or presence of fluid movement behind the casing.

Plugging and Abandonment: In accordance with 40 C.F.R. §§ 146.10 and 146.24(d), the permit includes a plugging and abandonment plan for an environmentally protective well closure at the time of cessation of operations. BreitBurn Operating L.P. has demonstrated adequate

financial responsibilities to close, plug, and abandon this underground injection operation. A state bond in the amount of $2,730,000 has been established for this purpose with Argonaut Insurance Company.

Issuance and Effective Date of Permit: In accordance with 40 C.F.R. § 124.15, the permit will become effective immediately upon issuance if no public comments are received that request a change in the draft permit. However, in the event that public comments are received that requested 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 facility, unless it is otherwise modified, revoked and reissued, or terminated as provided at 40 C.F.R. §§ 144.39, 144.40, and 144.41. The permit will expire in one (1) year if the permittee fails to commence construction, unless a written request for an extension of this one (1) year period has been approved by the Director. The permit will be reviewed by EPA at least once every five (5) years from its effective date for consistency with new or revised Federal regulations.

Questions and requests for additional information may be submitted to Timothy Elkins at (312) 886-0263 or elkins.timothy@epa.gov via the internet. The date for closure of the comment period includes the required 30 days for public comment and an additional three days for the delay caused by mailing. The public comment period will close as described in the Public Notice. Requests for a hearing must be submitted in writing. If EPA determines that there is significant public interest in the draft permit, a public notice of a scheduled hearing will be published locally and mailed to interested parties.

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

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

Tinka G. Hyde 4/8/16

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

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

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
UNDERGROUND INJECTION CONTROL PERMIT: CLASS II

Permit Number: **MI-039-2R-0028**

Facility Name: **H.H. Joseph #2**

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 U.S. Environmental Protection Agency at Parts 124, 144, 146, and 147 of Title 40 of the Code of Federal Regulations (40 C.F.R.),

BreitBurn Operating L.P. of Gaylord, Michigan

is hereby authorized to convert and operate an injection well located in Michigan, Crawford County, T25N, R04W, Section 7, SW 1/4 Section, for injection into the Lucas Formation at depths between 3,294 and 4,081 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 enhanced oil recovery from production wells owned or operated by BreitBurn Operating L.P.

All references to Title 40 of the Code of Federal Regulations 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 implementing regulations at 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 well, unless this permit is otherwise revoked and reissued, terminated or modified pursuant to 40 C.F.R. §§ 144.39, 144.40, and 144.41. 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. The permit will expire in one (1) year if the permittee fails to commence construction, unless a written request for an extension of this one (1) year period has been approved by the Director. The permittee may request an expiration date sooner than the one (1) year period, provided no construction on the well has commenced. This permit will be reviewed at least every five (5) 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. The underground injection activity, otherwise authorized by this permit or rule, shall not allow the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any Primary Drinking Water Regulation pursuant to 40 C.F.R. Part 142 or may otherwise adversely affect the health of persons. Any underground injection activity not specifically authorized in this permit or otherwise authorized by permit or rule is prohibited. 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. Compliance with the terms of this permit does not constitute a defense to any action brought under Section 1431 of the Safe Drinking Water Act (SDWA), or any other law governing protection of public health or the environment.

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 § 144.5, any information submitted to 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 CFR 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 which 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 non-compliance 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, permit termination, revocation and reissuance or modification.

2. Penalties for Violations of Permit Conditions

Any person who operates this well in violation of permit conditions is subject to civil penalties, fines, 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 is 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 which 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 (3) 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 (3) years after the completion of plugging and abandonment 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 (3) year retention period unless he delivers the records to the Regional Administrator or obtains

written approval from the Regional Administrator 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 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 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 and obtain the Director's approval at least thirty (30) days prior to any planned physical alterations or additions to the permitted facility, or changes in the injection fluids. Within ten (10) days prior to injection, an analysis of new injection fluids shall be submitted to the Director for approval in accordance with Parts II(B)(2) and II(B)(3) of this permit.

b. **Anticipated Noncompliance** - The permittee shall give at least thirty (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 thirty (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 thirty (30) days following each schedule date.

e. **Twenty-Four Hour Reporting**

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

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

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

(ii) A written submission shall also be provided as soon as possible but no later than five (5) 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.

f. **Other Noncompliance** - All other instances of noncompliance shall be reported at the time when monthly reports are submitted under 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.

g. **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 in accordance with 40 C.F.R. § 144.51(l)(8).

h. **Report on Permit Review** - Within thirty (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 and injection fluid analysis have been submitted in accordance with Parts II(A)(6) and II(B)(2), respectively;

b. A report on any logs and tests required under Parts II(A)(5) and III(D) of this permit has been submitted;

c. Mechanical integrity of the well has been demonstrated in accordance with Part I(E)(17);

d . Any required corrective action has been performed in accordance with Parts I(E)(16) and III(C); and,

e. Construction is complete and the permittee has submitted to the Permit Writer, by certified mail with return receipt requested, a notice of completion of construction using EPA Form 7520-10 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 thirteen (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 and other information requested by the Director shall be signed and certified according to 40 CFR § 144.32.

12. **Notice of Plugging and Abandonment**

The permittee shall notify the Director at least forty-five (45) days before conversion or abandonment of the well.

13. **Plugging and Abandonment**

The permittee shall plug and abandon the well as provided in the plugging and abandonment plan contained in Part III(B) of this permit. Plugging shall occur as soon as practicable after operation ceases but not later than two (2) years

thereafter. During the period of non-operation, the well must be tested to ensure that it maintains mechanical integrity, unless the permittee fulfills the other requirements under 40 C.F.R. § 144.52(a)(6), prior to expiration of the two (2) year period. The permittee shall notify the Director of plugging and abandonment in accordance with the reporting procedures in Part I(E)(12) of this permit.

14. **Financial Responsibility**

The permittee shall maintain financial responsibility and resources to plug and abandon the underground injection well in accordance with 40 C.F.R. § 144.52(a)(7) as provided in Attachment R of the permit application 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.

15. **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 sixty (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 ten (10) business days after the commencement of the proceeding. A guarantor of a corporate guarantee must make such a notification if he/she is named as debtor, as required under the terms of the guarantee.

16. **Corrective Action**

The permittee shall shut in the injection well whenever he/she 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 he/she can to properly plug the offending well(s). Any

operation of the well which may cause upward fluid migration from an improperly plugged or unplugged well will be considered a violation of this permit. If the permittee or the EPA determines that the permitted well is not in compliance with 40 C.F.R. § 146.8, 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.

17. **Mechanical Integrity**

a. The permittee must establish (prior to receiving authorization to inject), and shall maintain mechanical integrity of this well, in accordance with 40 CFR § 146.8.

b. A demonstration of mechanical integrity, in accordance with 40 C.F.R. § 146.8, shall be performed at least every five (5) years from the date of the last approved demonstration. The permittee shall notify the Director of his/her intent to demonstrate mechanical integrity at least thirty (30) days prior to such demonstration.

c. The permittee shall demonstrate the mechanical integrity of the well by pressure testing whenever:

(i) the tubing is removed from the well or replaced;

(ii) the packer is reset; or,

(iii) a loss of mechanical integrity occurs. Operation shall cease whenever one of the aforementioned conditions occurs and not resume until the Director gives approval to recommence injection.

d. The Director may, by written notice, require the permittee to demonstrate mechanical integrity at any time.

e. The permittee shall cause all gauges used in mechanical integrity demonstrations to be calibrated prior to the demonstration.

f. The permittee shall cease injection 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. Operations shall not be resumed until the Director gives approval to recommence injection.

g. The permittee shall notify the Director of the loss of mechanical integrity, in accordance with the reporting procedures in Parts II(B)(3)(d) and

I(E)(9)(e) of this permit.

h. The permittee shall report the result of a satisfactory mechanical integrity demonstration as provided in Part II(B)(3)(d) of this permit, except the first such result after Permit issuance, which shall be sent to the Permit Writer.

18. **Restriction on Injected Substances**

The permittee shall be restricted to the injection of fluids brought to the surface in connection with oil or natural gas production or those fluids used in the enhancement of oil and gas production as specified in 40 C.F.R. § 146.5(b). Further, no fluids other than those from sources noted in the administrative record for this permit and approved by the Director shall be injected.

PART II

WELL SPECIFIC CONDITIONS FOR UNDERGROUND INJECTION CONTROL PERMITS

A. CONSTRUCTION REQUIREMENTS

1. Siting

Notwithstanding any other provision of this permit, the injection well shall inject only into a formation which 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 to be used in the construction of the well shall be as contained in Attachments L and M of the permit application corresponding to this permit action which is hereby incorporated by reference as if they appeared fully set forth herein.

3. Tubing and Packer Specifications

Injection shall only take place through tubing with a packer set in the long string casing within or below the nearest cemented and impermeable confining system immediately above the injection zone. Tubing and packer specifications shall be as represented in engineering drawings contained in Attachments L and M of the permit application corresponding to this permit action which are hereby incorporated by reference as if they appeared fully set forth herein. Any proposed changes shall be submitted by the permittee in accordance with Part I(E)(9)(a) and (b) of this permit.

4. Wellhead Specifications

For every injection well, the operator shall provide a female fitting, with a cutoff valve, to the tubing at the wellhead, so that the amount of injection pressure being used may be measured by a representative of EPA by attaching a gauge having a male fitting.

5. 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 a descriptive report prepared by a knowledgeable log analyst interpreting the results of those logs and tests to the Director for approval along with the notice of

completion required in Part I(E)(10) of this permit.

6. **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.

7. **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 the permit has been issued.

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 well, subject to the limitations and monitoring requirements set forth herein. The injection pressure and injected fluid shall be limited and monitored as specified in Parts I(E)(18) and III(A) of this permit.

b. Injection at a pressure which initiates fractures in the confining zone or causes the movement of injection or formation fluids into or between underground sources of drinking water is prohibited.

c. Injection between the outermost casing protecting underground sources of drinking water and the well bore is prohibited.

d. The annulus between the tubing and the long string casing shall be filled with a liquid designed to inhibit corrosion. The annulus liquid will be monitored in accordance with Parts II(B)(2)(d) and II(B)(3)(b) of this permit. Any specific annulus requirements are contained in Part III(A) of this permit.

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 in Appendix III of 40 CFR Part 261 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. An initial analysis of the injection fluid is contained in Attachment H of the permit application corresponding to this permit action which is hereby incorporated by reference as if it appeared fully set forth herein. The Director may, by written notice require the permittee to sample and analyze the injected fluid at any time.

d. **Injection Pressure, Annulus Pressure, Annulus Liquid Loss, Flow Rate and Cumulative Volume** - Injection pressure, annulus pressure, flow rate and cumulative volume shall be recorded at least weekly and shall be reported monthly as specified in Part III(A) of this permit. Annulus liquid loss shall be recorded at least quarterly and shall be reported in accordance with the provisions of Part II(B)(3)(b), as the volume of liquid added to the annulus to keep it filled in accordance with Part II(B)(1)(d). All gauges used in monitoring shall be calibrated in accordance with Part I(E)(17)(e) of this permit.

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. **Monthly Reports** - Monitoring results obtained during each week 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 postmarked no later than the 10th day of the month after authorization to inject has been granted.

Thereafter, forms shall be submitted at the end of each month and shall be postmarked no later than the 10th day of the month following the reporting period. This report shall include the weekly measurements of injection pressure, annulus pressure, flow rate and cumulative volume as required in Parts II(B)(2)(d) and III(A) of this permit.

b. **Quarterly Reports** - Monitoring results obtained each quarter shall include the measurement of annulus liquid loss as required in Parts II(B)(2)(d) and III(A) of this permit. Reports shall be submitted at the end of each quarter and shall be postmarked no later than the 10th day of the first month of the following quarter.

c. **Annual Reports** - Monitoring results obtained each year shall include the measurements of injected fluid characteristics as required in Part III(A) of this permit. Reports shall be submitted at the end of each anniversary year and shall be postmarked no later than the 10th day of the first month of the following year.

d. **Reports on Well Tests, Workovers, and Plugging and Abandonment** - The applicant shall provide the Director with the following reports and test results within sixty (60) days of completion of the activity:

(i) Mechanical integrity tests, except tests which the well fails in which case twenty-four (24) hour reporting under Part I(9)(e) is applicable;

(ii) Logging or other test data;

(iii) Well workovers (using EPA Form 7520-12); and

(iv) Plugging and abandonment.

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 (ATTACHED)

B. PLUGGING AND ABANDONMENT PLAN (ATTACHED)

C. CORRECTIVE ACTION PLAN (ATTACHED)

D. ADDITIONAL REQUIREMENTS (ATTACHED)

OPERATING, MONITORING AND REPORTING REQUIREMENTS

Characteristic	Limitation	Minimum Monitoring Requirements		Minimum Reporting Requirements
		Freq.	Type	Freq
*Injection Pressure	2,000 psig (maximum)	weekly		monthly
Annulus Pressure		weekly		monthly
Flow Rate		weekly		monthly
Cumulative Volume		weekly		monthly
Annulus Liquid Loss		quarterly		quarterly
**Chemical Composition of Injection Fluid		annually	grab	annually

SAMPLING LOCATION: The sample location is at the well head.

*The limitation on wellhead pressure serves to prevent confining-formation fracturing. This limitation was calculated using the following formula: [{1.07 *psi/ft* - (0.433 *psi/ft*)(specific gravity)} x depth] - 14.7 *psi*. The maximum injection pressure is dependent upon depth and specific gravity of the injected fluid. The Lucas Formation at 3,294 feet was used as the depth and a specific gravity of 1.058 was used for the injected fluid.

The fracture gradient (1.07 psi/ ft) was obtained from field rules published in the Federal Register/ Vol. 57, No. 247/ Wednesday, December 23, 1992/ Notices.

**Chemical composition analysis shall include, but not be limited to, the following: Sodium, Calcium, Magnesium, Barium, Total Iron, Chloride, Sulfate, Carbonate, Bicarbonate, Sulfide, Total Dissolved Solids, pH, Resistivity (ohm-meters @ 75°F), and Specific Gravity.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

PLUGGING AND ABANDONMENT PLAN

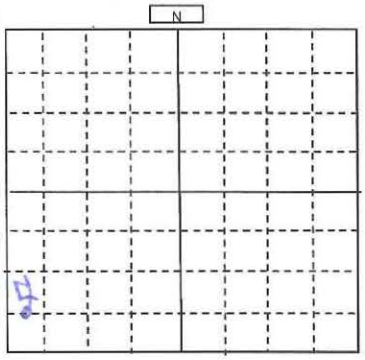
WELL NAME & NUMBER, FIELD NAME, LEASE NAME & NUMBER

H.H. JOSEPH 2

NAME, ADDRESS, & PHONE NUMBER OF OWNER / OPERATOR

BREITBURN OPERATING, L.P.
1165 ELKVIEW DRIVE
GAYLORD, MI 49735
(989) 732-0020

Locate Well and Outline Unit on Section Plat - 640 Acres



STATE	COUNTY	STATE PERMIT NUMBER
MI	CRAWFORD	14057

SURFACE LOCATION DESCRIPTION

W 1/2 of SW 1/4 of SW 1/4 of Section 7 Township 25N Range 04W

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT

Surface Location 660 ft. From (N/S) S Line of Quarter Section
And 330 ft. From (E/W) W Line of Quarter Section

TYPE OF AUTHORIZATION

- [x] Individual Permit
- [ ] Rule
- [ ] Area Permit

Number of Wells in Area Permit ____

US EPA Permit Number ____

WELL ACTIVITY

- [ ] Class I
  - [ ] Hazardous
  - [ ] Nonhazardous
- [x] Class II
  - [ ] Brine Disposal
  - [ ] Hydrocarbon Storage
  - [x] Enhanced Recovery
- [ ] Class III
- [ ] Class IV

CASING/TUBING/CEMENT RECORD AFTER PLUGGING AND ABANDONMENT

Size	Wt (lb/ft) TBG/CSG	Original Amount (CSG)	CSG to be Left in Well	Hole Size	Sacks Cement Used	Type
13 38"	48	212'	212'	Driven	NA	NA
8 5/8"	24	683'	683'	12 1/4"	40	Lite/Class A
5 1/2"	15.5 &14	4152'	1118'	7 7/8"	80	Lite/Class A

METHOD OF EMPLACEMENT OF CEMENT PLUGS

- [x] Balance Method
- [ ] Dump Bailer Method
- [ ] Two Plug Method
- [ ] Other

CEMENT TO PLUG AND ABANDON DATA	Plug # 1	Plug # 2	Plug # 3	Plug # 4	Plug # 5	Plug #6	Plug #7	Plug #8
Size of Hole or Pipe in Which Plug Will Be Placed (inches)	5 1/2	5 1/2& 7 7/8	7 7/8	7 7/8 & 8 5/8	8 5/8			
Calculated Top of Plug (ft.)	3701	2866	2112	380	4			
Measured Top of Plug (ft.)	N/A	N/A	N/A	N/A	N/A			
Depth to Bottom of Plug (ft.)	4081	3134	2312	783	54			
Sacks of Cement to be Used	50	80	70	130	20			
Slurry Volume to be Used (cu. Ft.)	59	94.4	82.6	153.4	23.6			
Slurry Weight (lb./gal.)	15.6	15.6	15.6	15.6	15.6			
Type of Cement, Spacer or Other Material Used	Class A	Class A	Class A	Class A	Class A			
Type of Preflush Used								

DESCRIPTION OF PLUGGING PROCEDURE

Procedure on Side 2

ESTIMATED COST OF PLUGGING AND ABANDONMENT

Cement	$	13,200.00	Tanks	$	2,000.00
Tools	$	2,100.00	Consultant	$	4,500.00
Rig or Pulling Unit	$	7,000.00	Miscellaneous	$	2,600.00
Water Hauling	$	- 1100	Total	$	32,500.00

CERTIFICATION

I certify under the penalty of law that I have 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	SIGNATURE	DATE SIGNED
Fred Harrison, Engineering Technician	Fred Harrison	12/3/14

EPA Form 7520-14

Original Well Construction During Operation

H.H. Joseph 2

Surface

Driven

Hole Size
12.250"

Top of cement
Surface

Top of Cement
TOC 3044'

Hole Size
7.875"

Packer
3951'

Cement Retainer
4127'

Conductor
13 3/8" @ 212', 48#

Base of Drift
430'

Surface Casing
8.625" @ 683', 24#

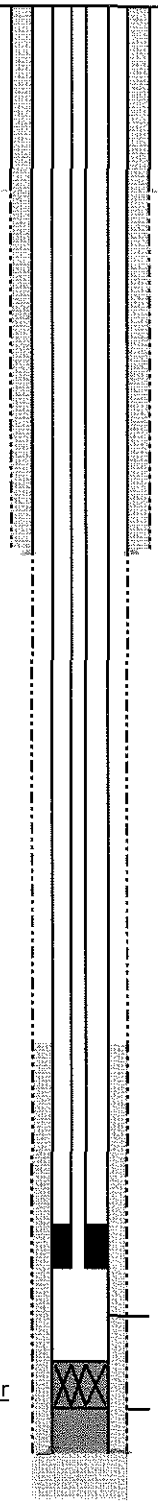
Production Tubing
2.375" @ 3951'

Production Casing
5.5" @ 4152', 15.5#
14#

DRZ Perfs
3976'-3984"

PBTD
4081'

TD
4450'



Plugging And Abandoment Construction

Surface

Plug 5
4'-54'

Plug 4
380'-783'

Plug 3
2112'-2312'

Plug 2
2866'-3134'

Cement Retainer
3951'

Plug 1
3701'-4081'

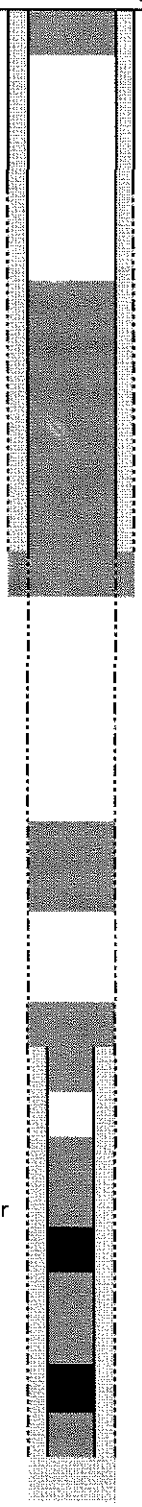
Base of Drift
430'

Traverse Formation
2212'

Dundee Formation
2966'

Cut & Rip Prod Csg
3034'

Cut & Rip Prod Csg
3034'



CORRECTIVE ACTION PLAN

Based on the information submitted with the permit application and additional well records, EPA has determined that there are three inadequately constructed wells within the area of review of the proposed H.H. Joseph #2 injection well. In order to ensure that the injection fluids from the H.H. Joseph #2 will not migrate upwards behind the long string casing of the inadequately constructed wells and into any underground sources of drinking water (USDWs), the permittee must meet the following corrective action plan requirements for the three wells listed below, prior to receiving authorization to commence injection into the H.H. Joseph #2:

1. H.H. Joseph #2 (MDEQ #14057):

The permittee is required to perforate and squeeze or use coiled tubing to cement behind the 8 ⅝" casing of the H.H. Joseph #2 in the interval between at least 595 feet to the surface. The permittee is also required to perforate and squeeze cement behind the 5 ½" casing of the H.H. Joseph #2 in the interval between at least 2,968 feet to 3,705 feet and run a cement bond log (CBL) over the total depth of the well. The corrective action must be performed on the H.H. Joseph #2 well prior to receiving authorization to commence injection into the H.H. Joseph #2.

In the event that the permittee attempts, and cannot circulate cement behind the 5 ½" casing and 8 ⅝" casing, the permittee will run one of the three mechanical integrity tests described below to demonstrate there is no significant movement of fluid outside of the injection zone and well bore of the H.H. Joseph #2. The selected test will be run consistently according to the following schedule: initial baseline run prior to receiving authorization to inject and commencing injection, 2nd run six months after injection commences with EPA approval, then subsequent runs every year thereafter for the life of the well. The permittee must submit logging procedures to the Director for approval before running logs for the purpose of meeting this requirement.

I. Run a temperature survey in from at least 4,081 feet to 380 feet

II. Run a noise log from at least 4,081 feet to 380 feet.

III. Run an oxygen activation log from at least 3,966 feet to surface, taking a set of 3 readings at each 50 foot interval.

All log data must be analyzed by a professional log analyst who must provide the data generated during the tests as well as written documentation of the conclusion reached, whether it shows fluid movement, no fluid movement, or is inconclusive and the reasons for the determination. As described in the above paragraph, the permittee is required to run one of the mechanical integrity test in the H.H. Joseph #2 six months after the baseline survey, and every year thereafter for the life of the well. If the temperature survey, a noise log, or oxygen activation logs are all inconclusive, injection into the H.H. Joseph #2 must stop immediately and may not resume until receiving authorization to recommence injection from EPA.

2. George Garden A-2 (MDEQ# 13895):

The permittee is required to perforate and squeeze cement behind the 5 ½" casing of the George Garden A-2 in the interval between at least 3,445 feet to 2,980 feet and run a CBL over the total depth of the well. The corrective action must be performed on the George Garden A-2 well prior to receiving authorization to commence injection into the H.H. Joseph #2.

In the event that the permittee attempts, and cannot circulate cement behind the 8 ⅝" casing, the permittee will run one of the three mechanical integrity tests described below to demonstrate there is no significant movement of fluid outside of the injection zone and well bore of the George Garden A- 2. The selected test will be run consistently according to the following schedule: initial baseline run prior to receiving authorization to inject and commencing injection into the H.H. Joseph #2, then subsequent runs every year thereafter for the life of the well. The permittee must submit logging procedures to the Director for approval before running logs for the purpose of meeting this requirement.

I. Run a temperature survey in from at least 4,260 feet to 380 feet.

II. Run a noise log from at least 4,260 feet to 380 feet.

III. Run an oxygen activation log from at least 4,150 feet to surface, taking a set of 3 readings at each 50 foot interval.

All log data must be analyzed by a professional log analyst who must provide the data generated during the tests as well as written documentation of the conclusion reached, whether it shows fluid movement, no fluid movement, or is inconclusive and the reasons for the determination. As described in the above paragraph, the permittee is required to run one of the mechanical integrity test in the George Garden A-2 and every year thereafter for the life of the well. If the temperature survey, a noise log, or oxygen activation logs are all inconclusive, injection into the H.H. Joseph #2 must stop immediately and may not resume until receiving authorization to recommence injection from EPA.

Alternatively, the permittee may plug and abandon the George Garden A-2 according to MDEQ and EPA requirements, and demonstrate that the well is adequately plugged with cement in a manner that prevents movement of fluids from the injection zone to the base of the lowermost USDW and into or between USDWs. Cementing records must also show that there is an adequate quantity of cement to prevent upward fluid movement within the borehole outside of the casing. All uncemented ("free") casing must be removed from the George Garden A-2 well. Where this is impossible because of deterioration of, or damage to casing, or collapsing of the hole, uncemented casing must be perforated as low as possible, but at least 100 feet below the base of the lowermost USDW; circulation must be established through the perforations with a preflush of fresh water, and the annulus must be circulated with at least one hole volume of preflush until the flush circulates clean. Cement must be squeezed through the perforations into the well bore-casing annulus and circulated to surface using at least 120 percent of the required volume, or greater if necessary to achieve circulation of cement.

Prior to receiving authorization to recommence injection into the H.H. Joseph #2, approval to either convert the George Garden A-2 to a production well or to plug and abandon the well will be required from the MDEQ, and all records must be submitted to the EPA. Should the George Garden A-2 be approved for conversion to a production well, the well will be plugged back with at least 250 feet of cement above the Detroit River Group injection zone prior to receiving authorization to recommence injection into the H.H. Joseph #2.

3. <u>H.H. Joseph #1 (MDEQ# 13932)</u>:

The permittee is required to perforate and squeeze cement behind the 5 ½" casing of the H.H. Joseph #1 in the interval between at least 3,908 feet to 2,962 feet and run a CBL over the total depth of the well. The corrective action must be performed on the H.H. Joseph #1 well prior to receiving authorization to commence injection into the H.H. Joseph #2.

In the event that the permittee attempts, and cannot circulate cement behind the 8 ⅝" casing, the permittee will run one of the three mechanical integrity tests described below to demonstrate there is no significant movement of fluid outside of the injection zone and well bore of the H.H. Joseph #1. The selected test will be run consistently according to the following schedule: initial baseline run prior to receiving authorization to inject and commencing injection into the H.H. Joseph #2, then subsequent runs every year thereafter for the life of the well. The permittee must submit logging procedures to the Director for approval before running logs for the purpose of meeting this requirement.

I. Run a temperature survey in from at least 4,250 feet to 380 feet.

II. Run a noise log from at least 4,250 feet to 380 feet.

III. Run an oxygen activation log from at least 4,140 feet to surface, taking a set of 3 readings at each 50 foot interval.

All log data must be analyzed by a professional log analyst who must provide the data generated during the tests as well as written documentation of the conclusion reached, whether it shows fluid movement, no fluid movement, or is inconclusive and the reasons for the determination. As described in the above paragraph, the permittee is required to run one of the mechanical integrity test in the H.H. Joseph #1 and every year thereafter for the life of the well. If the temperature survey, a noise log, or oxygen activation logs are all inconclusive, injection into the H.H. Joseph #2 must stop immediately and may not resume until receiving authorization to recommence injection from EPA.

Alternatively, the permittee may plug and abandon the H.H. Joseph #1 according to MDEQ and EPA requirements, and demonstrate that the well is adequately plugged with cement in a manner that prevents movement of fluids from the injection zone to the base of the lowermost USDW and into or between USDWs. Cementing records must also show that there is an adequate quantity of cement to prevent upward fluid movement within the borehole outside of the casing. All uncemented ("free") casing must be removed from the H.H. Joseph #1 well. Where this is impossible because of deterioration of, or damage to casing, or collapsing of the hole, uncemented casing must be perforated as low as possible, but at least 100 feet below the base of the lowermost USDW; circulation must be established through the perforations with a preflush of fresh water, and the annulus must be circulated with at least one hole volume of preflush until the flush circulates clean. Cement must be squeezed through the perforations into the well bore-casing annulus and circulated to surface using at least 120 percent of the required volume, or greater if necessary to achieve circulation of cement.

Prior to receiving authorization to recommence injection into the H.H. Joseph #2, approval to either convert the H.H. Joseph #1 to a production well or to plug and abandon the well will be required from the MDEQ, and all records must be submitted to the EPA. Should the H.H. Joseph #1 be approved for conversion to a production well, the well will be plugged back with at least 250 feet of cement above the Detroit River Group injection zone prior to receiving authorization to recommence injection into the H.H. Joseph #2.

ADDITIONAL REQUIREMENTS

During plugging and abandonment all uncemented ("free") casing must be removed from the H.H. Joseph #2 well. Where this is impossible because of deterioration of, or damage to casing, or collapsing of the hole, uncemented casing must be perforated as low as possible, but at least 100 feet below the base of the lowermost USDW; circulation must be established through the perforations with a preflush of fresh water, and the annulus must be circulated with at least one hole volume of preflush until the flush circulates clean. Cement must be squeezed through the perforations into the well bore-casing annulus and circulated to surface using at least 120 percent of the required volume, or greater if necessary to achieve circulation of cement.