REGION 5

CHICAGO, IL 60604

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
UNDERGROUND INJECTION CONTROL PERMIT: CLASS I NON-HAZARDOUS

Permit Number: MI-139-1I-0004
Facility Name: Injection Well IW-1

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 (EPA) at Parts 124, 144, 146, and 147 of Title 40 of the Code of Federal Regulations (40 C.F.R.),

Consumers Energy of Zeeland, Michigan

is hereby authorized to continue operation of an existing Class I non-hazardous injection well located in Michigan, Ottawa County, 5N, 14W, Section 17, NW Quarter Section, for injection into the Franconia Formation, Dresbach Formation, Eau Claire Formation, the Mount Simon Sandstone, and the upper portion of the Precambrian at depths between 5,052 and 6,775 feet relative to Kelly bushing, upon the express condition that the permittee meet the restrictions set forth herein. The injection of any hazardous waste as identified in 40 C.F.R. Part 261 is prohibited.

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 becomes effective. The following attachments are incorporated into this permit: A, B, C, D, E, F, G, and H.

This permit shall become effective on _____, and shall remain in full force and effect during the life of the permit, unless this permit is revoked and reissued, terminated, or modified pursuant to 40 C.F.R. §§144.39, 144.40, or 144.41.

This permit and authorization to inject shall expire at midnight on _____, unless terminated prior to the expiration date.

Signed and Dated: _____

DRAFT

_____

Tera L. Fong

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

1. **Modification, Revocation and Reissuance, and Termination** - The Director of the Water Division of the United States Environmental Protection Agency (EPA), hereinafter, the Director, may modify, revoke and reissue, or terminate this permit in accordance with 40 C.F.R. §§ 144.12, 144.39, and 144.40. Also, the permit is subject to minor modifications as specified in 40 C.F.R. § 144.41. The filing of a request for a permit modification, revocation and reissuance, or 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.

2. **Transfer of Permits** - This permit is not transferable to any person except in accordance with 40 C.F.R. §144.38.

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, Subpart B and 40 C.F.R. § 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, the EPA may make the information available to the public without further notice. If a claim is asserted, the information covered by such a claim will be disclosed by EPA only to the extent, and by means of the procedures set forth in 40 C.F.R. Part 2, Subpart B. 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 must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Safe Drinking Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application; except that the permittee need not comply with the provisions of this permit to the extent and for the duration such noncompliance is authorized by an emergency permit issued in accordance with 40 C.F.R. § 144.34.

2. **Penalties for Violations of Permit Conditions** - Any person who violates a permit requirement is subject to civil penalties, fines and other enforcement action under the SDWA. Any person who willfully violates permit conditions may be subject to criminal prosecution.

3. **Continuation of Expiring Permits**

   (a) **Duty to Reapply** - If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must submit a complete application for a new permit at least 180 calendar days before this permit expires.

   (b) **Permit Extensions** - The conditions of an expired permit may continue in force in accordance with 5 U.S.C. § 558(c) and 40 C.F.R. § 144.37.

   (c) **Effect** - Permits continued under 5 U.S.C. § 558(c) and 40 C.F.R. § 144.37 remain fully effective and enforceable.

(d) **Enforcement** - When the permittee is not in compliance with the conditions of the expiring or expired permit, the Director may choose to do any or all of the following:

(1) Initiate enforcement action based upon the permit which has been continued;

(2) Issue a notice of intent to deny the new permit. If the permit is denied, the owner or operator would then be required to cease the activities authorized by the continued permit or be subject to enforcement action for operation without a permit;

(3) Issue a new permit under 40 C.F.R. Part 124 with appropriate conditions; or

(4) Take other actions authorized by the UIC regulations.

(e) **State Continuation** - An EPA-issued permit does not continue in force beyond its expiration date under Federal law if at that time a State has primary enforcement responsibility under the SDWA. A State authorized to administer the UIC program may continue either EPA or State-issued permits until the effective date of the new permits, if State law allows. Otherwise, the facility or activity is operating without a permit from the time of expiration of the old permit to the effective date of the State-issued new permit. Furthermore, if the State does not continue the EPA permit upon obtaining primary enforcement responsibility, the permittee must obtain a new State permit or be authorized to inject by State rule. Failure to do so while continuing to operate the well constitutes unauthorized injection and is a violation subject to enforcement action.

4. **Need to Halt or Reduce Activity Not a Defense** - It shall not be a defense for the permittee in an enforcement action to claim that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

5. **Duty to Mitigate** - The permittee shall take all timely and reasonable steps necessary to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit.

6. **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 this permit.

7. **Duty to Provide Information** - The permittee shall furnish to the Director, within a time specified, 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 to be kept by this permit.

8. **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, at reasonable times, 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 are kept under the conditions of this permit;

   (c) Inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

   (d) Sample or monitor, at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the SDWA, any substances or parameters at any facilities, equipment or operations regulated or required under this permit.

9. **Records**

   (a) The permittee shall retain records and all monitoring information, including all calibration and maintenance records and all original chart recordings for continuous monitoring instrumentation and copies of all reports required by this permit for a period of at least three years from the date of the sample, measurement or report unless these materials are submitted to the Director as part of reporting requirements under this permit.

   (b) The permittee shall maintain records of all data required to complete the permit application form for this permit and any supplemental information submitted under 40 C.F.R. §§ 144.27, 144.28, and 144.31 for a period of at least three years from the date the permit application was signed.

(c) 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 this injection well.

(d) The retention period specified in Part I(E)(9)(a) through (c) of this permit may be extended by request of the Director at any time. The permittee shall continue to retain records after the retention period specified in Part I(E)(9)(a) through (c) of this permit or any requested extension thereof expires unless the permittee delivers the records to the Director or obtains written approval from the Director to discard the records.

(e) Records of monitoring information shall include:

(1) The date, exact place, and time of sampling or measurements;

(2) The name(s) of individual(s) who performed the sampling or measurements;

(3) A precise description of both sampling methodology and the handling of samples;

(4) The date(s) analyses were performed;

(5) The name(s) of individual(s) who performed the analyses;

(6) The analytical techniques or methods used; and

(7) The results of such analyses.

10. **Monitoring** - Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The permittee shall use the methods described in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods" (SW-846 available on EPA's website), or equivalent methods approved by the Director, to take representative samples. Monitoring results shall be reported at the intervals contained in Part II(D)(1) through (3) and Attachment A of this permit.

(a) 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 certain circumstances by other methods that have been approved by the Director.

(b) Sampling and analysis shall comply with the specifications of the Waste Analysis Plan required in Part II(C)(3) of this permit.

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

12. **Reporting Requirements**

(a) **Planned Changes** - The permittee shall give written notice to the Director, as soon as possible, of any planned physical alterations or additions to the permitted facility.

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

(c) **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 by the permittee no later than 30 calendar days following each schedule date.

(d) **Twenty-four Hour Reporting**

(1) The permittee shall report to the Director any permit noncompliance which may endanger human health or the environment. See, e.g., Part I(G)(5) of this permit. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. Such reports shall include, but not be limited to the following information:

(i) Any monitoring or other information which indicates that any contaminant may cause an endangerment to a USDW; and

(ii) Any noncompliance with a permit condition, or malfunction of the injection system, which may cause fluid migration into or between USDWs; and

(iii) Any failure to maintain mechanical integrity.

(2) A written submission shall also be provided within five working days of 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.

(e) **Other Noncompliance** - The permittee shall report all other instances of noncompliance not otherwise reported at the time monitoring reports are submitted. The reports shall contain the information listed in Part I(E)(12)(d)(2) of this permit.

(f) **Other Information** - When the permittee becomes aware of failure to submit any relevant facts in the permit application or that incorrect information was submitted in a permit application or in any report to the Director, the permittee shall submit such facts or corrected information within 10 calendar days.

(g) **Report on Permit Review** - Within 30 calendar days of receipt of this permit, the permittee shall certify to the Director that he or she has read and is personally familiar with all terms and conditions of this permit.

F. **PLUGGING AND ABANDONMENT**

1. **Notice of Plugging and Abandonment** - The permittee shall notify the Director at least 60 calendar days before conversion or abandonment of the well. At the discretion of the Director, a shorter notice period may be allowed.

2. **Plugging and Abandonment** - The permittee must receive the approval of the Director before plugging the well and shall plug and abandon the well consistent with 40 C.F.R. §§ 144.52(a)(6) and 146.10, as provided for in the Plugging and Abandonment Plan contained in Attachment B of this permit. Within 60 calendar days after plugging a well, the permittee shall submit a Plugging and Abandonment report to the Director. The report shall be certified as accurate by the permittee and by the person who performed the plugging operation (if other than the permittee), and shall consist of either:

   (a) A statement that the well was plugged in accordance with the Plugging and Abandonment Plan previously approved by the Director; or

   (b) If the actual plugging differed from the approved plan, a statement defining the actual plugging and explaining the reason for the difference.

3. **Temporary Abandonment** - If the permittee ceases injection into the well for more than 24 consecutive months, the well is considered to be in temporary abandoned status. The permittee shall plug and abandon the well in accordance with the approved plan and 40 C.F.R. § 144.52 (a)(6) unless the permittee:

   (a) Provides notice to the Director within 30 days of the end of the 24th consecutive month of temporary abandonment, and

   (b) Describes actions or procedures, satisfactory to the Director, that the owner or

operator will take to ensure that the well will not endanger USDWs during the period of temporary abandonment. These actions and procedures shall include compliance with the technical requirements applicable to active injection wells unless waived by the Director.

4. **Revision of Plugging and Abandonment Plan** - If the permittee finds it necessary to change a Plugging and Abandonment Plan, a revised plan shall be submitted to the Director for approval at the time of the next monthly report.

5. **Standards for Well Closure** - Prior to plugging and abandoning the well:

   (a) The permittee shall observe and record the pressure decay for a time specified by the Director and shall report this information to the Director.

   (b) The permittee shall conduct appropriate mechanical integrity testing to ensure the integrity of that portion of the long string casing and cement that will be left in the ground after closure. Testing methods must include:

      (1) Pressure tests with liquid;

      (2) Noise, temperature, or oxygen activation logs; or

      (3) Any other test required by the Director.

   (c) Prior to well closure, the well shall be flushed with a buffer fluid.

G. **MECHANICAL INTEGRITY**

1. **Standards** - The injection well must have and maintain mechanical integrity consistent with 40 C.F.R. § 146.8(a)(1) and (2). Mechanical integrity demonstrations must be witnessed by an authorized representative of the Director unless an authorized representative informs the permittee that it is not possible to witness the test.

2. **Periodic Mechanical Integrity Testing** - The permittee shall conduct the mechanical integrity testing as follows:

   (a) 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 this 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, the packer is reset, or when loss of mechanical integrity becomes suspected during operation;

(b) An approved temperature, noise, oxygen activation, or other approved log shall be run upon completion of this well and at least once every 60 months from the date of the last approved demonstration to test for movement of fluid along the bore hole. The Director may require such tests whenever the well is worked over.

(c) The permittee may request the Director to use any other test approved by the Director in accordance with the procedures in 40 C.F.R §146.8(d).

3. **Prior Notice and Reporting** - The permittee shall notify the Director of his or her intent to demonstrate mechanical integrity at least 30 calendar days prior to such demonstration. At the discretion of the Director a shorter time period may be allowed. Reports of mechanical integrity demonstrations which include logs must include an interpretation of results by a knowledgeable log analyst. The permittee shall report the results of a mechanical integrity demonstration within 45 calendar days after completion thereof.

4. **Gauges** - The permittee shall calibrate all gauges used in mechanical integrity demonstrations to an accuracy of not less than one-half percent of full scale, prior to each required test of mechanical integrity. A copy of the calibration certificate shall be submitted to the Director or his or her representative at the time of demonstration and every time the gauge is calibrated. The gauge shall be marked in no greater than five psi increments.

5. **Loss of Mechanical Integrity** - If the permittee or the Director finds that the well fails to demonstrate mechanical integrity during a test, or fails to maintain mechanical integrity during operation, or that a loss of mechanical integrity as defined by 40 C.F.R. §§ 146.8(a)(1) and (2) is suspected during operation, the permittee shall halt the operation immediately and follow the reporting requirements as directed in Part I(E)(12) of this permit. The permittee shall not resume operation until mechanical integrity is demonstrated and the Director gives approval to recommence injection.

6. **Mechanical Integrity Testing on Request From Director** - The permittee shall demonstrate mechanical integrity at any time upon written notice from the Director.

H. **FINANCIAL RESPONSIBILITY**

1. **Financial Responsibility** - The permittee shall maintain financial responsibility and resources to close, plug, and abandon the underground injection operation in a manner consistent with 40 C.F.R. § 144.52(a)(7). The approved financial assurance mechanism is found in Attachment C of this permit.

(a) The permittee must maintain a written cost estimate, in current dollars, for the Plugging and Abandonment Plan as specified in 40 C.F.R. § 146.10. The plugging

and abandonment cost estimate at any point in the life of the facility operation must equal the maximum cost of plugging and abandonment at that time.

(b) The permittee must adjust the cost estimate of plugging and abandonment for inflation within 30 calendar days after each anniversary of the first estimate. The inflation factor is the result of dividing the latest published annual Oil and Gas Field Equipment Cost Index by the index for the previous year.

(c) The permittee must revise the plugging and abandonment cost estimate whenever a change in the Plugging and Abandonment Plan increases the cost of plugging and abandonment.

(d) If the revised plugging and abandonment estimate exceeds the current amount of the financial assurance mechanism, the permittee shall submit a revised mechanism to cover the increased cost within 30 calendar days after the revision specified in Part I(H)(1)(b) and (c) of this permit.

(e) The permittee must keep on file at the facility a copy of the latest plugging and abandonment cost estimate prepared in accordance with 40 C.F.R. §144.52(a)(7), during the operating life of the facility.

2. **Insolvency** - The permittee must notify the Director within 10 business days of any of the following events:

(a) The bankruptcy of the trustee or issuing institution of the financial mechanism; or

(b) Suspension or revocation of the authority of the trustee institution to act as trustee; or

(c) The institution issuing the financial mechanism losing its authority to issue such an instrument.

3. **Notification** - The permittee must 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.

4. **Establishing Other Coverage** - The owner or operator must establish other financial assurance or liability coverage acceptable to the Director, within 60 calendar days of the occurrence of the events in Part I(H)(2) or (3) of this permit.

I. CORRECTIVE ACTION

1. **Compliance** - The permittee shall comply with 40 C.F.R. §§ 144.55 and 146.7.

2. **Corrective Action Plan** - The permittee shall file a Corrective Action Plan for approval by the Director within 30 days of a written determination by the Director that improperly plugged, completed, or abandoned wells, or wells for which plugging or completion information is unavailable, are present in the area of review and penetrate the confining zone of the permitted well, as defined in the administrative record for this permit.

3. **Prohibition of Movement of Fluids into USDWs** - Should upward migration of fluids through the confining zone of this permitted well be discovered within the two mile area of review due to injection activities at this facility, and should this migration of fluids cause the introduction of any contaminant into a USDW pursuant to 40 C.F.R. § 144.12, the permittee shall immediately cease injection into this well until the situation has been corrected and reauthorization to inject has been given by the Director.

PART II
WELL SPECIFIC CONDITIONS FOR UIC PERMITS

A. **CONSTRUCTION**

1. **Siting** – All Class I wells shall be sited in such a fashion that they inject into a formation which is beneath the lowermost formation containing, within one quarter mile of the well bore, an underground source of drinking water.

2. **Casing and Cementing** - Notwithstanding any other provisions of this permit, the permittee shall case and cement the well in such a manner so as to prevent the movement of fluids into or between USDWs for the expected life of the well. The casing and cement used in the construction of this well are shown in Attachment E of this permit and in the administrative record for this permit. Any change shall be submitted for approval by the Director before installation.

3. **Tubing and Packer Specifications** - The permittee shall inject only through tubing with a packer set within the long string casing at a point within or below the confining zone. The tubing and packer used in the well are represented in engineering drawings contained in Attachment E of this permit. Any changes shall be submitted by the permittee for the approval of the Director before installation.

4. **Wellhead Specification** - The permittee shall install and maintain a female coupling and valve on the wellhead, to be used for independent injection pressure readings. Further, the permittee shall install a sampling port for waste sampling consistent with the permittee's waste sampling procedures, if applicable.

B. **OPERATIONS**

1. **Injection Pressure Limitation** - Except during stimulation, the permittee shall not cause or permit the injection pressure at the wellhead to exceed the maximum limitation which is specified in Attachment A of this permit. In no case shall injection pressure initiate fractures or propagate existing fractures in the confining zone or cause the movement of injection or formation fluids into a USDW. Prior to performing any stimulation and /or fracturing of the well**,** the permittee is required to submit procedures to the Permits Branch for review and approval**.** A list of all products to be used for the test along with their chemical composition must also be submitted.

2. **Additional Injection Limitation** - No waste streams other than those identified in Attachment F of this permit shall be injected. Every twelfth month the permittee shall submit a certified statement attesting to compliance with this requirement.

3. **Annulus Fluid and Pressure** - 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. Except during workovers, the permittee shall maintain a positive pressure on the annulus as specified in Attachment A of this permit.

4. **Annulus/Tubing Pressure Differential** - Except during workovers or times of annulus maintenance, the permittee shall maintain, over the entire length of the tubing, a pressure differential between the tubing and annulus as specified in Attachment A of this permit.

5. **Automatic Warning and Automatic Shut-off System** - The permittee shall continuously operate and maintain an automatic warning and automatic shut-off system to stop injection in any of the following situations:

   (a) Pressure changes in the annulus or annulus/tubing differential signifying or identifying possible deficiencies in mechanical integrity; or

   (b) Injection pressure, annulus pressure, or annulus/tubing differential pressure reaches the pressure limits as specified in Attachment A of this permit.

   A trained operator must be on site and within perceptible distance of the alarm at all times when the well is operating. The permittee must test the automatic warning and automatic shut-off system at least every twelfth month. This test must involve subjecting the system to simulated failure conditions and must be witnessed by the Director or his or her representative unless the Director waives this requirement.

6. **Precautions to Prevent Well Blowouts** - In order to prevent the migration of fluids into underground sources of drinking water, the permittee shall maintain on the well at all times a pressure which will prevent the return of the injection fluid to the surface. The well bore must be filled with a high specific gravity fluid during workovers to maintain a positive (downward) gradient and/or a plug shall be installed which can resist the pressure differential. A blowout preventer must be kept in proper operational status during workovers. In cases where the injected wastes have the potential to react with the injection formation to generate gases, the permittee shall follow the procedures below to assure that a backflow or blowout does not occur:

   (1) Limit the temperature, pH or acidity of the injected waste; and

   (2) Develop procedures necessary to assure that pressure imbalances do not occur.

C. **TESTING AND MONITORING**

1. **Sampling Point** - The injection fluid samples shall be taken at the sampling location as specified in Attachment A of this permit.

2. **Continuous Monitoring Devices** - The permittee shall maintain continuous monitoring devices and use them to monitor injection pressure, flow rate, and the pressure on the annulus between the tubing and the long string of casing. If the well is equipped with a fluid level indicator, the permittee shall monitor the fluid level daily. The monitoring results shall be submitted to the Director as specified in Part II(D) of this permit. The permittee shall maintain for EPA's inspection at the facility an appropriately scaled, continuous record of these monitoring results as well as original copies of any digitally recorded information pertaining to these operations.

3. **Waste Analysis Plan** - The permittee shall comply with the written Waste Analysis Plan which describes the procedures used to monitor the nature of injected fluids and the procedures which will be carried out to comply with Part (I)(E)(10) of the permit. A copy of the approved plan shall also be kept at the facility.

4. **Prior Notice** - The permittee shall notify the Director of his or her intent to perform any tests required by this permit at least 30 calendar days prior to such activities. The permittee shall either follow the prescribed test procedures found in Attachment G of this permit or submit written procedures for approval at least 30 calendar days prior to the testing. If the submitted 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.

5. **Reporting** - All reports of well tests which include logs must include an interpretation of results by a knowledgeable log analyst. Reports on ambient reservoir pressure monitoring must include an interpretation of the results by a knowledgeable pressure transient test analyst. The reports should explain all anomalies in the data and variations in the procedures. The permittee shall report the results of any tests required by this permit within 45 calendar days after the tests are completed.

6. **Ambient Monitoring** - The permittee shall monitor the pressure buildup in the injection zone initially upon completion of the well, and at least once every twelfth month thereafter, including at a minimum, a shut down of the well for a time sufficient to conduct a valid observation of the pressure fall-off curve. From this observation, the permittee shall submit a report including at least a calculation of pressure build-up in the injection zone, injection zone transmissivity, and wellbore skin factor.

7. **Temperature Monitoring** – The permittee shall monitor injectate temperature at least once daily on each day during which injection occurs. If injection occurs during more

than one eight-hour period in a day, temperature must be recorded at least once every six hours. The monitoring results shall be submitted to the Director as specified in Part II(D)(1)(f) of this permit.

D. **REPORTING REQUIREMENTS**

The permittee shall submit all required reports to the Director at:

United States Environmental Protection Agency
Attn: Underground Injection Control (WP-16J)
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

1. **Monthly Reports** - The permittee shall submit monthly reports of the following information no later than the end of the month following the reporting period:

   (a) A tabulation of maximum injection pressure, a daily measurement of annulus tank fluid level, and minimum differential between simultaneous measurements of injection pressure and annulus pressure for each day of the month;

   (b) Appropriately scaled graphs showing injection pressure and flow rate and annulus tank fluid level. One graph must include, at a minimum, daily maximum injection pressure and daily average flow rate, on a single, monthly chart.

   (c) A statement of the total volumes of the fluid injected to date, in the current calendar year, and the current month;

   (d) A tabulation of the dates, amounts and types of liquid added to or removed from the annulus system during the month, and the cumulative additions and cumulative subtractions for the current month and each of the past 12 months;

   (e) Any noncompliance with conditions of this permit, including but not limited to:

      (1) Any event that exceeds operating parameters for annulus pressure or injection pressure or annulus/tubing differential as specified in the permit; or

      (2) Any event which triggers an alarm or shutdown device required in Part II(B)(5) of this permit.

   (f) The monthly average of the measured values of injectate temperature. If temperature measurements are recorded when the well is not injecting, those measurements will not be included in calculating the monthly average. Records of all temperature measurements must be maintained in accordance with Part I(E)(9)(a) of this permit.

2. **Quarterly Reports** – The permittee shall report at least every quarter the results of the injection fluid analyses specified in the Waste Analysis Plan attached to this permit. This report must include statements showing that the requirements of Part I(E)(10) and Part II(C)(3) have been met.

3. **Annual Reports** - The permittee shall report the following at least every twelfth month:

   (a) Results of ambient monitoring required by 40 C.F.R. § 146.13(d)(1) and Part II(C)(4) of this permit; and

   (b) A certified statement attesting that no waste streams other than those identified in Attachment F of this permit were injected into the well.

4. **Reports on Well Tests and Workovers** - Within 45 calendar days after the activity, the permittee shall report to the Director the results of demonstrations of mechanical integrity, any well workover, and/or results of other tests required by this permit.

PART III

ATTACHMENTS

These attachments include, but are not limited to, permit conditions and plans concerning operating procedures, monitoring and reporting, as required by 40 C.F.R. Parts 144 and 146. The permittee shall comply with these conditions and adhere to these plans as approved by the Director, as follows:

A. SUMMARY OF OPERATING, MONITORING AND REPORTING REQUIREMENTS (ATTACHED)

B. PLUGGING AND ABANDONMENT PLAN (ATTACHED)

C. FINANCIAL ASSURANCE MECHANISM (ATTACHED)

D. CONTINGENT CORRECTIVE ACTION (ATTACHED)

E. CONSTRUCTION DETAILS (ATTACHED)

F. SOURCE AND ANALYSIS OF WASTE (ATTACHED)

G. TESTING PROCEDURES (ATTACHED)

H. WASTE ANALYSIS PLAN (ATTACHED)

ATTACHMENT A

SUMMARY OF OPERATING, MONITORING AND REPORTING REQUIREMENTS

CHARACTERISTIC	LIMITATION	MINIMUM MONITORING FREQUENCY	MINIMUM REPORTING FREQUENCY
Injection Pressure	1352 psig maximum*	continuous	monthly
Annulus Pressure	100 psig minimum	continuous	monthly
Annulus/Tubing Differential	100 psig minimum above operating injection pressure	continuous	monthly
Injection Rate		continuous	monthly
Cumulative Volume		continuous	monthly
Temperature**		daily**	monthly
Annulus Fluid Level		daily	monthly
pH, Eh, and Specific Gravity		daily	monthly
Annulus Fluid Loss		monthly	monthly
Chemical Composition of Injected Fluids		***	quarterly
Physical Characteristics of Injected Fluids		***	quarterly

Sampling Location: Sampling port in the injection building (pumphouse) or suitable equivalent alternative location from the flow line downstream of any filtration.

* The maximum injection pressure was determined using the following formula:

[{fracture gradient - (0.433 psi/ft x specific gravity)} x depth] - 14.7 psi.

The maximum injection pressure is dependent upon depth, specific gravity of the injection fluid, and fracture gradient of the injection zone. The fracture gradient of 0.725 psi/ft was determined from a step rate test conducted at a nearby injection well owned and operated by H.J. Heinz CO.

The Franconia Formation at 5052 feet was used as the depth and a specific gravity of 1.05. The limitation on injection pressure will serve to prevent injection-formation fracturing.

** Frequency of temperature measurements will be in accordance with Section II(C)(5) of this permit. Reporting of injectate temperature will be in accordance with Section II(D)(1)(f) of this permit.

*** As specified in the Waste Analysis Plan attached to this permit.

ATTACHMENT B
PLUGGING AND ABANDONMENT PLAN

United States Environmental Protection Agency

EPA

WELL REWORK RECORD, PLUGGING AND ABANDONMENT PLAN, OR PLUGGING AND ABANDONMENT AFFIDAVIT

Name and Address, Phone Number and/or Email of Permittee

Consumers Energy Zeeland Generating Station
425 N. Fairview Rd
Zeeland, MI 49464
(616) 772-6641

Permit or EPA ID Number	API Number	Full Well Name
MI-139-1I-0004		Consumers Energy IW-1

State	County
Michigan	Ottawa

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface Location

SE 1/4 of NW 1/4 of Section 17 Township 5N Range 14W

Latitude 42.821736

Longitude -85.992549

1,830 ft. from (N/S) N Line of quarter section

1,898 ft. from (E/W) W Line of quarter section.

Well Class	Timing of Action (pick one)	Type of Action (pick one)
✓ Class I	✓ Notice Prior to Work	Well Rework
Class II	Date Expected to Commence	✓ Plugging and Abandonment
Class III	Report After Work	Conversion to a Non-Injection Well
Class V	Date Work Ended	

Provide a narrative description of the work planned to be performed, or that was performed. Use additional pages as necessary. See instructions.

Please see attached.

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)*	Signature	Date Signed
Jason L. Ricketts, Plant Manager		12/07/2022

EPA Form 7520-19 (Rev. 4-19)

IW-1 PLUGGING AND ABANDONMENT PLAN

The following is the proposed plan for plugging and abandonment of the ZGS Class I Non-Hazardous Well IW-1:

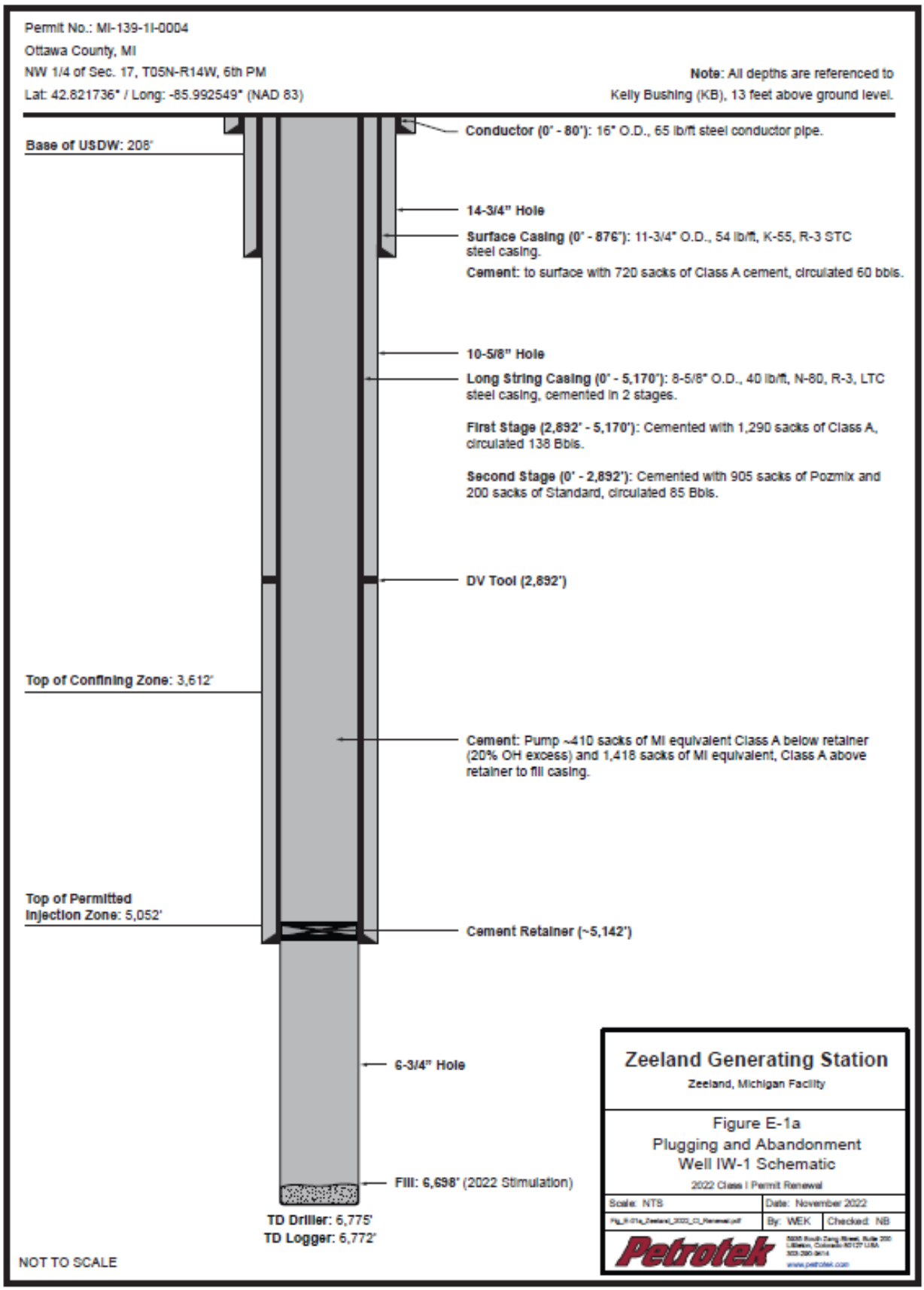
1. Notify EPA Region 5 a minimum of 60 days prior to commencement of plugging operations.
2. Install a calibrated test gauge to perform a static annulus pressure test. Ensure that the annulus is fluid filled and that the well has been shut-in for a minimum of 24 hours. Pressurize annulus to approximately 1,000 psig and isolate from the annulus system. Monitor annular pressure for one hour. Test is successful if the pressure change is less than 3% of the starting pressure.
3. Prepare well and location for plugging. Remove wellhouse, well monitoring equipment and wellhead injection piping.
4. Move in and rig up workover rig, mud pump, circulating pit and pipe racks. Unload workstring onto pipe racks and spot support equipment.
5. Remove tree and install blow out prevention equipment (BOP).
6. Release packer and displace annular fluid from well with freshwater.
7. Pull and lay down the injection tubing.
8. Make up workstring and 8-5/8 inch cement retainer. Tally tubing while running into the well.
9. Run workstring and cement retainer in protection casing to just above the packer setting depth (approximately 5,111 – 5,142 feet).
10. Move in cementing equipment and tie onto workstring. Establish injection below retainer. Mix and pump approximately 384 – 410 sacks (20% excess) of Class A or suitable equivalent cement (Yield 1.18 cuft/sack) below the cement retainer. Up to 4% bentonite may be used as needed.
11. Sting out of retainer and stage cement remainder of casing to surface in approximately 500 foot overlapping stages using the balanced plug method. An estimated 1,407 – 1,418 sacks of Class A or suitable equivalent cement (Yield 1.18 cuft/sack) will be required to complete the plugging of the protection casing.
12. Nipple down the blowout preventers and wash out cement 3 feet below ground surface. Cut off the casing 3 feet below ground level. Weld a 1/2-inch steel plate on the protection casing and inscribe with appropriate identifying information.
13. Rig down and move out pulling unit and equipment.
14. Clean and level location. Submit required plugging records.

PLUGGING AND ABANDONMENT COST

A cost of closure for minimum plugging and abandonment requirements, without testing, is presented for IW-1. I. A summary of the major cost elements for the well is presented below.

ZGS IW-1 Plugging Cost (2022)

Workover Rig and Associated Equipment	$ 51,200
Marker, Location Work/Welding and Clean-up	$ 8,000
Rental Tools	$ 12,500
Miscellaneous Equipment, and Service	$ 24,100
Cementing	$ 73,120
Supervision and Report	$ 20,000
Total	**$188,920**


Permit No.: MI-139-1I-0004
Ottawa County, MI
NW 1/4 of Sec. 17, T05N-R14W, 6th PM
Lat: 42.821736° / Long: -85.992549° (NAD 83)
Note: All depths are referenced to Kelly Bushing (KB), 13 feet above ground level.
Base of USDW: 208'
Conductor (0' - 80'): 16" O.D., 65 lb/ft steel conductor pipe.
14-3/4" Hole
Surface Casing (0' - 876'): 11-3/4" O.D., 54 lb/ft, K-55, R-3 STC steel casing.
Cement: to surface with 720 sacks of Class A cement, circulated 60 bbls.
10-5/8" Hole
Long String Casing (0' - 5,170'): 8-5/8" O.D., 40 lb/ft, N-80, R-3, LTC steel casing, cemented in 2 stages.
First Stage (2,892' - 5,170'): Cemented with 1,290 sacks of Class A, circulated 138 Bbls.
Second Stage (0' - 2,892'): Cemented with 905 sacks of Pozmix and 200 sacks of Standard, circulated 85 Bbls.
DV Tool (2,892')
Top of Confining Zone: 3,612'
Cement: Pump ~410 sacks of MI equivalent Class A below retainer (20% OH excess) and 1,418 sacks of MI equivalent, Class A above retainer to fill casing.
Top of Permitted Injection Zone: 5,052'
Cement Retainer (~5,142')
6-3/4" Hole
Fill: 6,698' (2022 Stimulation)
TD Driller: 6,775'
TD Logger: 6,772'
NOT TO SCALE
Zeeland Generating Station
Zeeland, Michigan Facility
Figure E-1a
Plugging and Abandonment
Well IW-1 Schematic
2022 Class I Permit Renewal
Scale: NTS
Date: November 2022
By: WEK
Checked: NB
Petrotek

ATTACHMENT C

FINANCIAL ASSURANCE MECHANISM

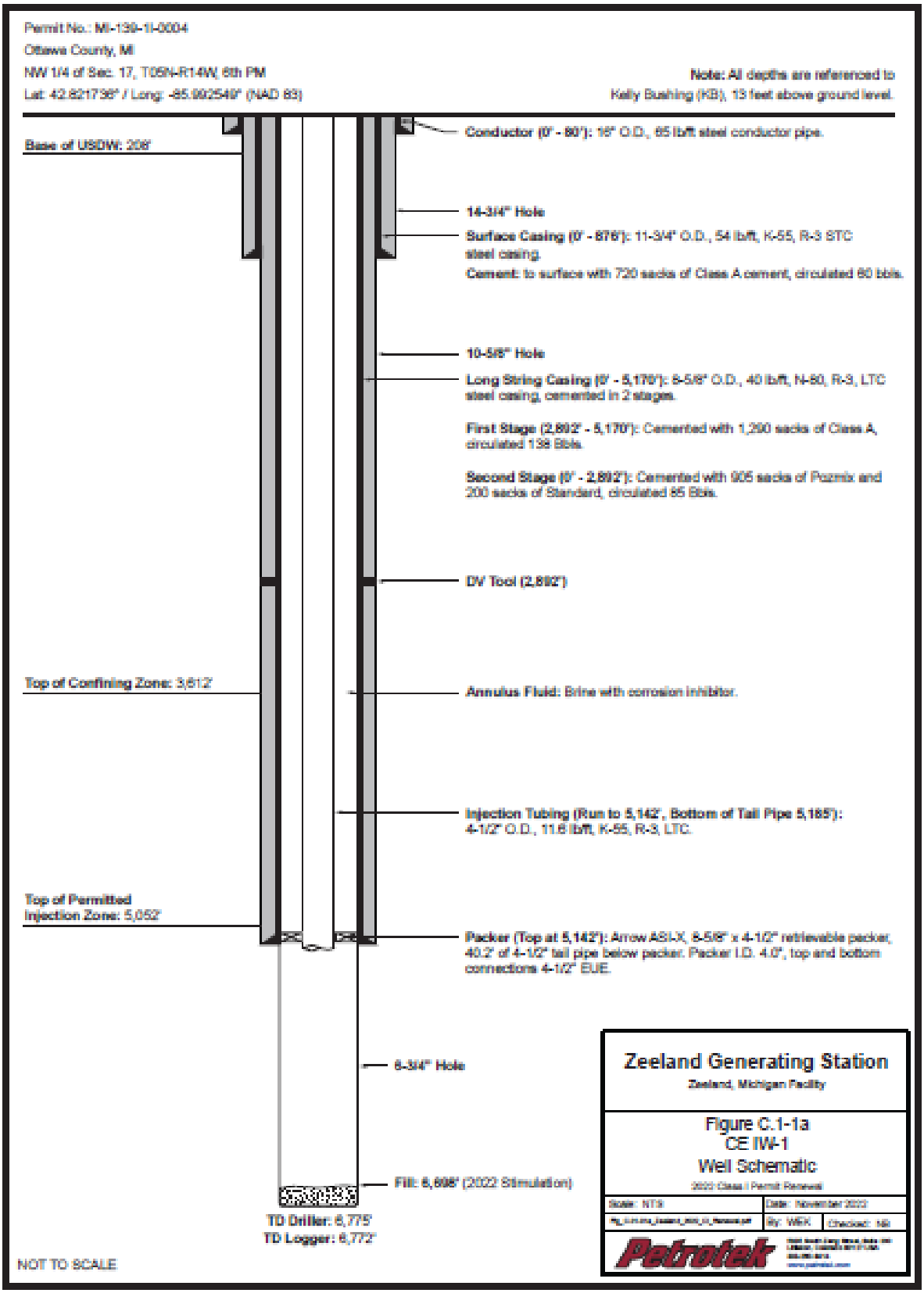
Consumer's Energy has demonstrated adequate financial responsibility to properly plug and abandon the Class I non-hazardous well. If Financial Statement Coverage is used as financial mechanism to cover the cost of plugging the injection well, this coverage must be updated and submitted to EPA on an annual basis.

ATTACHMENT D

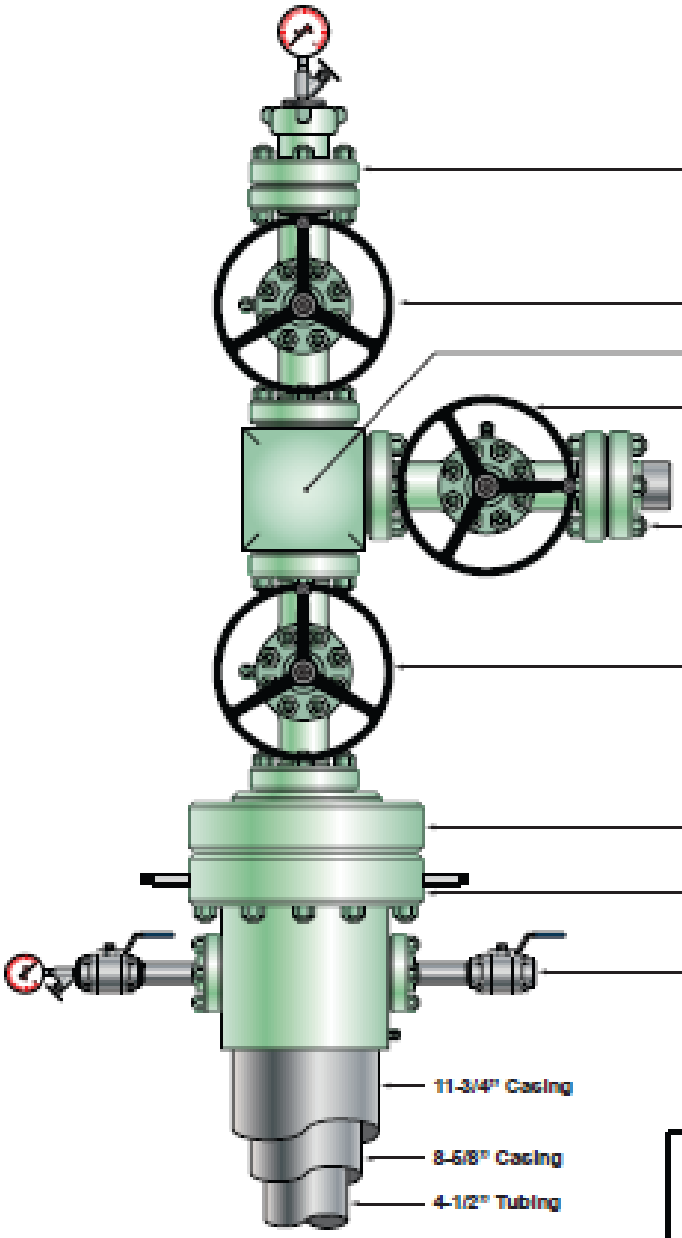
CONTINGENT CORRECTIVE ACTION

There are no corrective actions required at this time.

ATTACHMENT E
CONSTRUCTION DETAILS



Permit No.: MI-139-1I-0004
Ottawa County, MI
NW 1/4 of Sec. 17, T05N-R14W, 6th PM
Lat: 42.821736° / Long: -85.992546° (NAD 83)



NOT TO SCALE

Zeeland Generating Station
Zeeland, Michigan Facility

Figure C.1-2a
CE IW-1
Wellhead Schematic
2022 Class I Permit Renewal

Scale: NTS	Date: November 2022	
Fig_C-1-2a_Zeeland_CE_IW-1_Wellhead.pdf	By: WEK	Checked: NB

Petrotek

ATTACHMENT F

SOURCE AND ANALYSIS OF WASTE

The permittee is permitted to inject wastewater from power generation. The wastewater contains total dissolved solids produced during the evaporation process. The injectate is classified as non-hazardous waste and non-flammable. Biocides and scale inhibitors have been added, however they do not contain characteristic that would imply toxicity of hazardous waste.

ATTACHMENT G

TESTING PROCEDURES

Standard Annulus Pressure Test

1. Ensure the packer is set within 100 feet of the top of the injection zone. Packers not set within 100 feet of the top of the injection zone will be evaluated by EPA on a case-by-case basis. Note any approved deviations from previously reported well construction.

2. Document the test using a mechanical or digital device or a service company job record which records the value of the parameters of interest as measured during the test.

a. Submit along with the test results a gauge calibration certificate for the mechanical or digital device used to record test parameters. All calibration (for new or recalibrated gauges) must have been performed within a year prior to the test.

b. Place a gauge on the wellhead to measure pressure. If a recording device is used, the recording device serves to verify the data witnessed on the wellhead gauge.

c. Use an appropriately scaled mechanical gauge which has a measurement range that is 1.2 – 2 times the maximum pressure measured or a 1 psi resolution digital gauge with sufficient full scale.

d. Measure and document pressure using a gauge and/or a digital record and/or a chart record that can be read with sufficient accuracy to identify pressure change which would result in a failure of the test and to record accurate values during the test interval. For example, if the test pressure is 300 psig, the gauge and/or chart record should be marked in increments of 5 psi or less.

3. Verify that the tubing/casing annulus is full of liquid. No unapproved fluid or substance that may affect test outcomes are allowed. Measure and report the volume of liquid added to the annulus during pressurization (if any). If an annulus tank is pressurized with nitrogen to pressurize the well, record the liquid displaced from the tank into the well annulus.

4. Stabilize the temperature of the well and the annulus liquid, either by ceasing injection or injecting at a constant fixed rate. Ensure that the wellhead injection tubing pressure is at least 100 psi different from the annulus test pressure.

5. Pressurize the annulus to the greater of 300 psig or the maximum permitted injection pressure plus 100 psi. A positive pressure differential of greater than 100 psi should be maintained between the annulus and the injection tubing. If EPA does not approve any deviations from this criteria prior to testing, the test results might not be considered a sufficient demonstration of mechanical integrity and a new test would then be needed. A net gain or loss of more than 3% during the test indicates the well does not have mechanical integrity. Following pressurization, isolate the annular system from its pressure source and, if present, the sealpot or surge tank being sure to prevent any leaking across the shut-off valves.

6. Test for at least 60 minutes. Note the time, the annulus pressure, and the injection/tubing pressure at the start of the test and measure and note these same parameters at least every 10 minutes thereafter up to the end of the required test duration.
7. Send a report of the testing including any other data or documents available at the conclusion of the test which support the test results, such as gauge calibration certification, third-party service ticket, and/or original chart/digital recordings, to EPA per the reporting requirements of the permit.
8. If the tested well was reworked in association with the test, submit a rework record.
9. Include the certification statement and signature on the transmittal letter or on the individual MIT results form and, if submitted, the rework record to comply with the requirements of 40 CFR § 144.32(b).

Fall-Off Test

1. Injection of normal injectate at the normal rate is preferred.
2. The injection period should be at least 50% longer than the planned shutin time, or at minimum as long as operationally possible. During this time injection at a constant rate (+/- 10%) should be attempted.
3. The pressure gauge utilized for the pressure transient test shall have been calibrated no more than one year prior to the test date.
4. Place the pressure gauge downhole at approximately the top of the permitted injection zone at least one hour prior to ceasing injection.
5. Following at least one hour of pressure data collection during injection, shut-in the well as quickly as possible.
6. Collect data at a frequency of at least one data point every 10 seconds for at least the first five minutes after shut-in; between five and 30 minutes at no less than one reading every 30 seconds; and the operator can reduce frequency as required after 30 minutes.
7. End pressure measurements when pressure is relatively stable, when operational necessity dictates, when sufficient radial flow dominated data has been collected to allow evaluation of kh and extrapolation of pressure to infinite shut-in time is possible, or if boundary effects are observed.
8. The test shall include a written report by a knowledgeable well test analyst. Such report must explain any anomalies shown in the results.
9. The test report shall include an up-to-date well schematic, a copy of the dated calibration certificate for the gauge utilized, and digital pressure data on CD/flash drive/email in a spreadsheet format.
10. The test report shall include a tabulation of values for the following background parameters: EPA permit number, porosity, net thickness (ft), viscosity (cp), formation compressibility (per psi), long string casing inner diameter (in), open hole diameter (in), and Kelly bushing elevation (ft). The test report shall also include a tabulation of values for the following test specific parameters: test start date/time, test end date/time, test length (hr), depth reference (Kelly

bushing or ground level), specific gravity of test fluid, test fluid compressibility (per psi), gauge depth (ft), gauge calibration date, pressure required to maintain tubing fluid to the surface (psi), final tubing fluid level (ft), final flow rate immediately prior to shutin (gpm), cumulative volume injected since last pressure equalization (gal), permeability-thickness (md-ft), skin factor, radius of investigation (ft), final measured flowing pressure (psi), final measured shut-in pressure (psi), and p* pressure (psi). Pressure gauge units (psia or psig) shall be specified.

11. The test must conclusively demonstrate its objectives and satisfy the Director to be considered a completed test.

Temperature Log

1. To conduct a static temperature log, the well must be shut in for at least 36 hours, or longer if temperature stabilization based on previous logs requires more time.
2. If the well cannot be shut in for 36 hours, shut in for as long as possible and run two logs at least six hours apart.
3. Calibrate the temperature tool in a bucket of ambient temperature water and a bucket of ice water immediately prior to conducting the test.
4. Log from the top of the well to the bottom, recording both temperature and natural gamma ray activity.
5. Record log data at least once per foot.
6. Logging speed shall not exceed 30 feet per minute. Reduce speed to 20 feet per minute in air-filled well bores.
7. The test shall include a written report by a knowledgeable log analyst. Such report must explain any anomalies shown in the results.
8. The test report shall include an up-to-date well schematic, digital logging data on CD/flash drive/email in a spreadsheet format, and a plot of the logging activity.
9. The test report shall include a tabulation of values for the following background parameters: EPA permit number, long string casing length (ft), tubing and/or tail pipe lowermost depth (ft), top of open hole or uppermost perforation (ft), well total depth (ft), plugged back total depth or top of fill depth (ft), Kelly bushing elevation (ft), depth to top of confining zone (ft), and depth to top of permitted injection zone (ft). The test report shall also include a tabulation of values for the following test specific parameters: test date, depth reference (Kelly bushing or ground level), date of last injection, temperature of last injected fluid (F), elapsed time since last injection (hr), volume injected into the well in the past year (gal), names and depths of any other injection formations used at the site, temperatures logged by the tool and thermometer during calibration (F), depth to fluid level in the tubing (ft), depth to top of receptive strata (ft), and depth to bottom of receptive strata (ft).
10. The test must conclusively demonstrate its objectives and satisfy the Director to be considered a completed test.

ATTACHMENT H
WASTE ANALYSIS PLAN
CONSUMERS ENERGY, ZEELAND GENERATING STATION

The Consumers Energy Zeeland Generating Station (ZGS) will monitor the chemical quality of the injectate according to Sections P.1 through P.9 of this plan. This Waste Analysis Plan (WAP) has been revised from plans previously approved by USEPA and EGLE.

P.1 Wastewater Source Description

ZGS obtains municipal water originating from Lake Michigan, and uses municipal water for sanitary, process, and equipment maintenance purposes. Over 90 percent of total water feed to the facility is estimated to evaporate as a result of cooling operations for the combined cycle natural gas and steam turbine electrical power generation facility. Cooling tower operation, inlet air evaporative cooling, steam augmentation (injection) into the combustion turbines, and demineralization contribute to the evaporation and preconditioning of the process water. The evaporation and processing concentrates and increases the total dissolved solids (TDS) in the process water. The TDS is comprised of naturally occurring minerals from the Lake Michigan water supply and chemical additives (e.g., scale inhibitors, biocides, etc.) required for proper system operations. As is common with many evaporative and cooling processes, the combined-cycle power plant must blow down or discharge a portion of the circulating non-contact and contact process water to avoid excessive buildup of TDS in the system. ZGS injects this wastewater blowdown into two deep wells completed predominantly in the Mt. Simon Formation.

ZGS constructed a 500 MW combined cycle electrical power generation facility, but designed the critical support systems (i.e., the injection well system) for a future 1,000 MW build-out. Thus, the historical blowdown injection rates were based on the future 1,000 MW build-out.

P.2 Waste Characterization

The injectate is not a listed waste and the wastewater stream does not meet the definition of a characteristic hazardous waste (i.e., corrosivity, reactivity, ignitability, or toxicity) as found in 40 CFR 261 Subpart C. In terms of reactivity and ignitability, the wastewater is non-flammable and is a stable aqueous liquid, primarily consisting of elevated TDS levels of naturally occurring minerals found in Lake Michigan water. The pH of the wastewater is projected to remain between approximately 5 and 11 standard units (SU). The biocides and scale inhibitors added to the wastewater do not contain any constituents in concentrations that would cause the wastewater to meet the toxicity characteristic for hazardous waste. In fact, these ingredients are commonly added to similar systems that blowdown wastewater to surface water without adversely impacting aquatic life.

Table P-1 presents the maximum projected concentrations of various minerals found in the wastewater.

P.3 Wastewater Monitoring Parameters

Monitoring is performed according to USEPA Regional Guidance #8, Preparing a Waste Analysis Plan at Class I Facilities. Because of the type of process used at ZGS and the relatively clean composition of the wastewater, the injection fluid is characterized as non-hazardous. The proposed injection wells are non-commercial, and the quality of the wastewater injected has typically been consistent because the quality of the make-up supply water and the cooling operations generating the wastewater remain similar. Based on the knowledge of the process, Toxicity Characteristic Leaching Procedure (TCLP) analysis is not performed. The following analyses of the injection fluid are performed monthly:

- pH (field measured);
- temperature (field measured);
- specific conductance;
- specific gravity;
- TDS;
- total suspended Solids (TSS);
- total organic carbon (TOG);
- total alkalinity (as CaCo3); and
- all other constituents listed in Table P-1 constituting a percentage of the waste stream greater than 0.01 percent by mass (i.e., concentrations higher than 100 mg/L). These include TDS, TSS, TOC, total alkalinity, calcium, sodium, magnesium, chloride,andsulfate.

P.4 Wastewater Sample Collection Procedures

Injection well grab samples are collected from the valve port labeled “Deep well Building Sample Port”, located inside Deep Well Injection building pumphouse (Pumphouse). Samples are collected into pre-preserved containers provided by the analytical laboratory and placed into a shipping cooler containing a trip blank. After collection of the samples, ice sealed in plastic bags is placed over the samples to preserve the samples for transportation to the laboratory.

Samples are collected by personnel trained in the use the field instrument used to measure field pH and field temperature. The operating manuals for the field instrument are available in the ZGS Steam Turbine Building Chemistry Lab (Chemistry Lab). A back-up field instrument is also available in the Chemistry Lab in the event of instrument failure or damage.

Field instruments are calibrated as recommended by the device manufacturer. The calibration is conducted according to instrument manufacturer specifications and at the recommended frequency.

The following information will be recorded on the Chain-Of-Custody (COC) form that accompanies the deep well samples. Copies of the COC will be maintained to document

the field activities:

- Name and location of facility from which the samples are collected
- Name and signature of the sample collector
- Sample description and number of bottles filled
- Sample collection date, time, matrix, and preservative
- Field pH and Field Temperature

P.5 Sample Collection Quality Assurance/Quality Control (QA/QC)

To ensure that the analytical data gathered in the field are both valid and unbiased, the following QA/QC samples will be taken:

Equipment-Cleaning Blanks

Equipment blanks are taken for detecting cross-contamination due to improper decontamination of sampling equipment. All equipment utilized in the sampling process will be dedicated to the individual well will be disposable. Therefore, equipment-cleaning blanks will not be necessary for samples designated for laboratory analysis.

Trip Blanks

Trip blanks are sample containers filled with Type II reagent grade water at the laboratory, sealed at the laboratory, which accompany the sample containers used throughout the sampling event. The sample containers must be handled in the same manner as the samples. The trip blank will be returned to the laboratory for parameters listed in Section P.3. One (1) trip blank per sampling event will be analyzed.

Sample Duplicates

Sample duplicates are taken to check the quality assurance/quality control (QA/QC) of the laboratory conducting the analysis. The duplicate sample must be split from the original sample in a manner to emphasize sample representativeness. The duplicate must be labeled with a sample number which will not conflict with the other samples, but will not be discernible to the laboratory as a duplicate sample. One duplicate sample per sampling event will be taken and will be analyzed for parameters listed in Section P.3.

Table P-1. Major Constituents Managed in Injection System Consumers Energy, Zeeland Generating Station Zeeland, Michigan

Design Parameter	Typical Maximum Process Value[1]
Process Blowdown Temperature (°F)	80-90
pH	5-11
Blowdown Water Characteristics	Estimated Maximum Concentration (mg/L)[1]
General Water Quality:	
Total Dissolved Solids (TDS)	7,209
Total Suspended Solids (TSS)	167
Total Organic Carbon (TOC)	189
Total Alkalinity (as CaCO3)	251
Cations:	
Calcium	890
Magnesium	274
Sodium	244
Anions:	
Chloride	392
Sulfate	3,512

[1]Estimated maximum concentrations for operation at 20 COC. Concentration values represent design values November 7,2000 water balance for 1,000 MW combined-cycle facility at COC-12 multiplied by 1.67. These values are not intended to serve as permit limits.

In addition to the analytes listed in Table P-1, sampling and analysis to be conducted for Specific Gravity and Specific Conductance as part of the periodic waste characterization.

P.6 Sample Chain-of-Custody

The possession of samples must be traceable from the time of collection until laboratory delivery through COC procedures. Specific COC forms must accompany each shipping cooler to document the transfer of the samples from the field collection point to the laboratory that is receiving the samples for analysis. The following procedures will be implemented by the sample collector and analytical laboratory:

- Sample collector will properly identify and label each sample bottle.
- Sample collector will complete chain-of-custody forms indicating Sample Description, the number of sample bottles filled, sampling date, sampling time, preservative and sample collectors name and signature.
- Sample collector will pack the shipping cooler with the filled samples bottles and ice. Use of packing tape or similar will be used to secure the lid to the shipping cooler. Each shipping cooler will be accompanied with a COC form.
- The sample collector will personally transport the shipping cooler and COC to the analytical laboratory. Note: a COC Seal (Seal) will not be applied to the shipping cooler lid unless a common carrier or intermediate individual is used to transport the sample cooler to the analytical laboratory.
- If a common carrier or intermediate individual is used to transport the sample cooler to an analytical laboratory, the sample collector will affix a Seal to the sample cooler prior to the common carrier or intermediate individual taking possession of the shipping cooler. The Seal will contain the following information: Name and address of the Zeeland Generating Station; printed name and signature of the sample collector; date the sample collector applied the COC Seal to the shipping cooler. Common carriers or intermediate individuals shall he identified on the chain-of-custody form, and copies of all shipping documents will be retained, if applicable.
- Analytical Laboratory will receive and check the shipping containers for broken Seal(s) on the shipping cooler or damaged sample bottles.

If an error is discovered on a sample chain-of-custody form, the person who made the error will correct it when possible. Corrections or insertions are to be made by inserting the needed correction. No erroneous material is erased. Rather, a single line is drawn through mistakes. The date and the initials of the person making the correction is written beside the correction. If a chain-of-custody form is damaged in shipment, a written statement will be prepared by the sample collector detailing the pertinent information, including how the sample was collected.

P.7 Field Records

A copy of the COC will be maintained at Zeeland Generating Station to document field sample collection activities. Corrections or insertions on the COC are made by adding the needed modifications. No erroneous material is erased. Rather, a single line shall be drawn through mistakes. The date and the initials of the person making the correction is written beside the correction. This procedure applies to words or figures that are inserted or added to a previously recorded statement.

P.8 Laboratory Analysis Quality Assurance/Quality Control (QA/QC) Program.

A qualified independent laboratory using USEPA approved standard methods and detection limits (i.e., SW-846 or suitable equivalents that exceed these standards), conducts all of the sample analyses. The laboratory has a QA/QC program outlining their data reduction and validation processes. Laboratory QA/QC procedures are kept on file and will be made available upon request. The objectives of the laboratory QA/QC Program include:

- Ensure that all procedures are documented, including any changes in administrative and/or technical procedures.
- Ensure that all analytical procedures are conducted according to sound scientific principles and that they have been validated.
- Monitor the performance of the laboratory by a systematic inspection program and to provide for a corrective action as necessary.
- Collaborate with other laboratories in establishing quality levels, as appropriate.
- Ensure that all data are properly recorded and archived.

All of the laboratory procedures are documented in writing as standard operating procedures (SOPs), which are edited and controlled by the laboratory QA officer. Internal quality control procedures for analytical services are conducted in accordance with SOPs, and the individual method requirements are conducted in a manner consistent with the appropriate analytical methods. These specifications include the types of audits required (sample spikes, reference samples, controls, blanks, the specific calibration check standards, and laboratory duplicate analysis), the frequency of each audit, the compounds to be used for sample spikes, and the quality control acceptance criteria for these audits.

P.9 Reports to USEPA

As outlined in this permit application, data is reported to the USEPA on a routine basis. The report to USEPA contains all the results, data, and sampling description necessary to enable Region 5 to assess the accuracy, completeness, and repeatability of the reported analytical results. The report contains a table which specifies the type of sample (blank, waste, etc.), sampling date, sampling location, analytical method, method detection limit, validation result and analytical result. The results of analyses and all accompanying data, including COC forms, are reported to USEPA no later than the 30th day following the month in which the sample was collected, unless conditions beyond the control of CE prohibit such a reporting schedule.