REGION 5
CHICAGO, IL 60604

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

Permit Number: IN-127-1W-0007
Facility Name: WAL3

Pursuant to the Underground Injection Control regulations of the United States Environmental Protection Agency codified at Title 40 of the Code of Federal Regulations (40 C.F.R.), Parts 124, 144, 146, 147, and 148,

Cleveland-Cliffs, LLC, of Burns Harbor, Indiana

hereinafter, the permittee, is hereby authorized to operate an existing Class I Hazardous Waste injection well WAL3 located in Indiana, Porter County, T37N, R6W, Section 29, SW Quarter Section subject to the conditions of this permit. The injection zone, or zone that will contain the hazardous constituents, for this well is the lower Eau Claire Formation, the Mt. Simon Sandstone, and the upper portion of the Precambrian Basement Complex between the depths of 2170 feet and 4286 feet below ground surface. Injection is permitted into the interval of the lower Mt. Simon Formation between the depths of 2722 feet and 4286 feet below ground surface upon the express condition that the permittee meet the restrictions set forth herein. The designated confining zone for this injection well is the upper Eau Claire Formation.

All references to 40 C.F.R. are to all regulations that are in effect on the date that this permit is effective. The following attachments are incorporated into this permit: A, B, C, D, E, F, G, H, I, J, K, and L.

This permit shall become effective on _____ and shall remain in full force and effect during the life of the permit, unless: 1) the statutory provisions of Section 3004(f), (g) or (m) of the Resource Conservation and Recovery Act ban or otherwise condition the authorization in this permit; 2) the Agency promulgates rules pursuant to these sections that withdraw or otherwise condition the authorization in this permit; or 3) 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 and the authorization to inject shall expire at midnight, _____ unless terminated prior to the expiration date.

Signed and dated:

DRAFT

X _____

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 (USDW). The objective of this permit is to prevent the introduction of contaminants into USDW 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 or otherwise authorized by the U. S. Environmental Protection Agency (EPA) is prohibited. Compliance with this permit during its term constitutes compliance, for purposes of enforcement, 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.

This permit does not relieve owners and operators of hazardous waste injection wells of their obligation to comply with any additional regulations or requirements under the Resource Conservation and Recovery Act (RCRA). This permit does not authorize any above ground generating, handling, storage, treatment, or disposal facilities. Such activities must receive authorization under the regulations promulgated pursuant to Part C of RCRA, if required.

B. PERMIT ACTIONS

1. Modification, Revocation and Reissuance, and Termination - The Director of the Water Division of Region 5 of the United States Environmental Protection Agency, hereinafter the Director, may, for cause or upon request from the permittee, 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 for cause 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 and Section 144.5, any information submitted to the EPA pursuant to this permit may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice. If a claim is asserted, the validity of the claim will be assessed in accordance with the procedures in 40 C.F.R. Part 2 (Public Information). Claims of confidentiality for the following information will be denied:

1. The name and address of the permittee; and

2. Information that deals with the existence, absence, or level of contaminants in drinking water.

E. DUTIES AND REQUIREMENTS

1. Duty to Comply - The permittee shall comply with all applicable Underground Injection Control (UIC) Program regulations and conditions of this permit, except 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. Any permit noncompliance constitutes a violation of the SDWA and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or for denial of a permit renewal application. Such noncompliance may also be grounds for enforcement action under RCRA.

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 and may be subject to such actions pursuant to the RCRA. 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 that has been continued;

(2) Issue a notice of intent to deny the new permit. If the permit application 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 expired EPA permit upon obtaining primary enforcement responsibility, the permittee must obtain a new State permit or be authorized to inject by State rule and failure to do so will result in unauthorized injection.

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 that the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required 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 or 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 data records of all monitoring information, including all calibration and maintenance records and all original data recordings for continuous monitoring instrumentation and copies of all reports required by this permit for a period of at least five 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 five years from the date the 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.

   (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 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 the time of sampling or measurements;

(2) The name(s) of the 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 the 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 Appendix I of 40 C.F.R. Part 261, or an equivalent method 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 Part III (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 Appendix III of Part 261 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 required by the permit, and other information when so 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 other than minor repair/replacement maintenance activities.

(b) Anticipated Noncompliance - The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity that 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 that may endanger health or the environment. 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 a USDW 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, unless a longer time period is approved by the Director.

(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.

13. Waste Minimization

(a) The permittee must have a program in place to reduce the volume or quantity and toxicity of the injected hazardous waste, to the degree determined by the permittee to be economically practicable; and

(b) The certification of the waste minimization statement submitted by the permittee is listed in Part III (G) of this permit. In addition, at least every twelfth month, the permittee shall report in writing to the EPA regarding the efforts that have been made toward reducing the volume or quantity and toxicity of injected hazardous waste during the previous year.

F. CLOSURE

1. Closure Plan - A plan for closure of the well that includes assurance of financial responsibility as required in 40 C.F.R. § 144.52(a)(7), and includes the information, relating to plugging and abandonment, required under 40 C.F.R. § 146.71(a)(4), is found in Part III(B) of this permit. The implementation of the Closure Plan is a condition of this permit; however, the permittee must receive the approval of the Director to proceed before implementing this plan. The obligation to implement the Closure Plan survives the termination of this permit or the cessation of injection activities.

2. Revision of Closure Plan - The permittee shall submit any proposed significant revision to the method of closure reflected in the Closure Plan for approval by the Director no later than 60 calendar days before closure, unless a shorter period of time is approved by the Director.

3. Notice of Intent to Close - The permittee shall notify the Director at least 60 calendar days before closure of the well, unless a shorter notice period is approved by the Director.

4. Temporary Disuse - A permittee who wishes to cease injection for longer than 24 months may keep the well open only if he or she:

(a) Has received authorization from the Director; and

(b) Has described actions or procedures, satisfactory to the Director, that he or she will take to ensure that the well will not endanger USDWs during this period. These actions or procedures shall include compliance with the technical requirements applicable to active injection wells unless waived by the Director.

5. Closure Report - The permittee shall submit a closure report to the Director which meets the requirements of 40 C.F.R. § 146.71(c), within the time frame specified in 40 C.F.R. §

146.71(c).

6. Standards for Well Closure - Prior to closing the well, the permittee shall:

   (a) Observe and record the pressure decay for a time specified by the Director and report this information to the Director;

   (b) Conduct mechanical integrity tests as requested by the Director to ensure integrity of casing and cement left in the ground after closure. Required testing methods may include any or all of those listed in Part III(H) or 40 C.F.R. § 146.71(d)(2); and

   (c) Flush the well with a buffer fluid.

G. POST-CLOSURE CARE

The permittee shall comply with the requirements for post-closure care and financial responsibility for post-closure care found at 40 C.F.R. §§ 146.72 and 146.73.

1. Post-Closure Plan - The permittee shall follow the plan for post-closure maintenance and monitoring that has been submitted to the Director. This plan includes the information required by 40 C.F.R. § 146.72(a) and demonstrates how each of the applicable requirements of 40 C.F.R. § 146.72(b) will be met. The approved post-closure plan is part of Part III(K and L) of this permit and the permittee shall maintain and comply with this plan as if it were fully set forth herein. The obligation to implement the post-closure plan survives the termination of this permit or the cessation of injection activities.

2. Duration of Post-Closure Period - The Post-Closure Care Period shall continue at least until all of the requirements of the approved post-closure plan and of 40 C.F.R. § 146.72 have been met. Prior to the time that the post-closure care period is due to expire, the Director may extend the post-closure care period if he or she finds that the extended period is necessary to protect the health of persons or to protect a USDW.

3. Post-Closure Corrective Action - The permittee shall continue and complete any cleanup action required under 40 C.F.R. § 146.64.

4. Post-Closure Groundwater Monitoring - The permittee shall continue to conduct any groundwater monitoring if required under this permit until pressure in the injection zone decays to the point that the well's cone of influence no longer intersects the hydrostatic head of the lowermost USDW, as identified in the Administrative Record for this permit. The permittee shall estimate the time for pressure in the injection zone to decay to this point and shall include this estimate in the Post-Closure Plan. The Director may extend the period of post-closure monitoring if he or she determines that it is necessary to protect the health of persons or to protect a USDW.

5. Survey Plat - The permittee shall submit a survey plat to the local zoning authority designated by the Director as required by 40 C.F.R. § 146.72(b)(3) and submit a copy to the EPA Region 5 Regional Administrator.

6. Notification to State and Local Authority - The permittee shall provide notification and information to State and local authorities as required by 40 C.F.R. § 146.72(b)(4).

7. Retention of Records - The permittee shall retain, for a period of three years following well closure, the records specified by 40 C.F.R. § 146.72(b)(5), and shall deliver those records to the Director at the end of the retention period.

8. Notice in Deed to Property - The permittee must record, in accordance with State law, a notation on the deed to the facility property, or on some other instrument which is normally examined during title search, that will in perpetuity provide any potential purchaser of the property with the information listed in 40 C.F.R. § 146.72(c).

9. Financial Responsibility for Post-Closure Care - The permittee shall submit a demonstration of financial responsibility for post-closure care, as required in 40 C.F.R. § 146.73, at the time of the next annual update of the financial assurance mechanism after the effective date of this permit, for approval by the Director. The obligation to maintain financial responsibility for post-closure care survives the termination of this permit or the cessation of injection.

H. 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 to meet the requirement of 40 C.F.R. § 146.8(b) 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 Part III(H) of this permit and 40 C.F.R. § 146.8(a)(1) 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. The pressure test shall be run at least 100 pounds per square inch (psi) above the maximum injection pressure as shown in Part III(A) of this permit;

   (b) The bottom-hole cement shall be tested by means of an approved radioactive tracer survey at least once every twelfth month beginning with the date of the last approved demonstration;

(c) An approved temperature, noise, or other approved log, shall be run at least once every 60 months. The Director may require such tests whenever the well is worked over. Any procedures not described in Part III(H) must be submitted to the Director 30 calendar days prior to commencing logging for approval for the purpose of meeting this requirement;

(d) Casing inspection logs shall be run whenever the owner or operator conducts a workover in which the injection string is pulled, unless the Director waives this requirement due to well construction or other factors which limit the test's reliability, or based upon the satisfactory results of a casing inspection log run within the previous five years. The Director may require that a casing inspection log be run every five years, if the Director has reason to believe that the integrity of the long string casing of the well may be adversely affected by naturally occurring or human-induced events;

(e) In addition to test methods described in Part III(H) of this permit, the permittee may use any other test approved in advance 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 that include logs must include an interpretation of results by a knowledgeable log analyst. The permittee shall report the results of a mechanical integrity demonstration or testing within 45 calendar days after completion thereof and the results must be retained on site in accordance with Part I(E)(9)(a) of this permit.

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.

I. FINANCIAL RESPONSIBILITY

1. Financial Responsibility - The permittee shall maintain financial responsibility and resources to comply with closure and post-closure requirements of this permit, in a manner consistent with 40 C.F.R. §§ 144.52 (a)(7), 144.60 through 144.70, and 146.73. The approved financial assurance mechanism for closure costs is found in Part III(J) of this permit.

   (a) Pursuant to 40 C.F.R. §§ 144.62(a) and 146.73, the permittee must maintain a written cost estimate, in current dollars, for the Closure Plan and Post-Closure Plan as specified in 40 C.F.R. §§ 146.10 and 146.72. The closure and post-closure cost estimate at any point in the life of the facility operation must equal the maximum cost of closure and post-closure at that time.

   (b) Pursuant to 40 C.F.R. §§ 144.62(b) and 146.73, the permittee must adjust the cost estimate of closure and post-closure for inflation within 30 calendar days after each anniversary of the first estimate. The inflation factor is prescribed in 40 C.F.R. § 144.62(b).

   (c) The permittee must revise the closure and post-closure cost estimate whenever a change in the Closure Plan or Post-Closure Plan increases the cost of closure.

   (d) If the revised closure and post-closure cost estimate exceeds the current amount of the financial assurance mechanism, the permittee shall submit a revised mechanism to cover the increased cost within 90 calendar days after the revision specified in Part I(I)(1)(b) and (c) of this permit.

   (e) The permittee must keep on file at the facility a copy of the latest closure and post-closure cost estimate prepared in accordance with 40 C.F.R. § 144.62, during the operating life of the facility.

2. Insolvency - The permittee must notify the Director by mail and email 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 mail and email of the commencement of voluntary or involuntary proceedings under Title 11 (Bankruptcy), U.S. Code, naming the permittee 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 permittee 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(I)(2) or (I)(3) of this permit.

J. CORRECTIVE ACTION

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

2. Corrective Action under 40 C.F.R. § 146.64 - A plan for corrective action under 40 C.F.R. § 146.64 is not necessary at this time because no improperly plugged, completed, or abandoned wells are known to be present in the Area of Review (AOR). The permittee shall file a Corrective Action Plan for approval by the Director within 60 days of a written determination by the Director that improperly plugged, completed, or abandoned wells are present in the AOR. The AOR is specified 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 area of review for this well, which is recorded in the administrative record, 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 has been given by the Director.

4. Corrective action under § 3004(u) of the Resource Conservation and Recovery Act - The permittee shall comply with corrective action requirements for all solid waste management units at this facility, as required by the Resource Conservation and Recovery Act Permit issued to this facility. Requirements can be found in Part III(F) of this permit.

K. INJECTION OF RESTRICTED HAZARDOUS WASTES

1. Compliance - The permittee shall comply with all regulations set forth under 40 C.F.R. Part 148. The permittee may continue to inject the restricted hazardous wastes specified in Part III(D) of this permit as long as all other requirements of this permit and applicable regulations are met and at least one of the following remains in effect:

   (a) an extension from the effective date of a prohibition has been granted pursuant to 40 C.F.R. § 148.4 with respect to such waste; or

   (b) the exemption granted in response to a petition filed under 40 C.F.R. § 148.20 to allow injection of restricted wastes, with respect to those wastes and wells covered by the exemption, remains in effect, and all conditions of the exemption are met.

2. Injection Limitations - Characteristics and concentrations of hazardous constituents of

injected waste shall not exceed any limits listed in Part III(D) of this permit. The monthly average injection rate for the permitted well shall not exceed the limitation listed in Part III(A) of this permit.

3. Petition Modification and Update - The permittee may inject restricted wastes other than those listed in Part III(D) of this permit or wastes in concentrations in excess of those listed in Part III(F) of this permit only after he or she has (1) submitted a modified petition to the Director and received a final Agency approval of the modification(s), and (2) this permit has been modified accordingly. The permittee shall notify the Director within 48 hours upon obtaining knowledge that information submitted in support of a petition in accordance with 40 C.F.R. § 148.20 is false, inaccurate, or incomplete.

4. Petition Termination - Upon written notification from the Director that an exemption granted under 40 C.F.R. § 148.20 has been terminated, the permittee shall immediately cease injection of all prohibited hazardous wastes.

5. Petition Review - When considering whether to reissue this permit upon expiration, the Director may require a new or updated petition demonstration if information shows that the basis for granting the exemption may no longer be valid.

PART II
WELL-SPECIFIC CONDITIONS

A. CONSTRUCTION

1. Siting - The injection well shall inject only into the formation and depths listed on the cover page of this permit. At no time shall injection occur into a formation which is or is above the lowermost formation containing 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 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 Part III(C) of this permit.

3. Tubing and Packer Specifications - The permittee shall inject only through tubing with a packer set in the long string casing at a depth within or below the nearest cemented and impermeable confining zone no more than 100 feet above the injection zone. The tubing and packer used in the well are represented in engineering drawings contained in Part III(C) of this permit.

4. Wellhead Specification - The permittee shall maintain a female coupling and valve on the wellhead, to be used for independent injection pressure readings.

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 that is specified in Part III(A) of this permit. In no case shall injection pressure initiate fractures or propagate existing fractures in the injection zone or confining zone or cause the movement of injection or formation fluids into a USDW.

2. Additional Injection Limitation - Only wastes generated by the company at their facility shall be injected into the well. No hazardous wastes other than those corresponding to the listed hazardous waste codes in Part III(D) of this permit shall be injected. The permittee shall submit a certified statement attesting to compliance with this requirement at the time of the annual report.

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 shall be submitted by the permittee for the approval of the Director before replacement. The permittee shall maintain a positive pressure on the annulus as specified in Part III(A) of this permit, except during workovers or times of annulus maintenance.

4. Annulus/Tubing Pressure Differential - Except during workovers, the permittee shall maintain, over the entire length of the tubing, a pressure differential between the tubing and annulus as specified in Part III(A) of this permit.

5. Warning and Shut-off System - The permittee shall continuously operate and maintain an automatic warning and automatic shut-off system to immediately 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 Part III(A) of this permit.

   The permittee must test the warning system and shut-off system at least once every twelfth month after the effective date of this permit. These tests must involve subjecting the system to simulated failure conditions and must be witnessed by the Director or his or her representative.

6. Precautions to Prevent Well Blowouts

   (a) The permittee shall maintain a pressure on the well at all times that will prevent the return of the injection fluid to the surface. If there is gas formation in the injection zone near the well bore, such gas must be prevented from entering the casing or tubing. 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 which involve tubing or packer removal.

   (b) 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 and pH of the injected waste; and

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

C. MONITORING

1. Sampling Point - The injection fluid samples shall be taken at the sampling location as specified in Part III(A) of this permit.

2. Continuous Monitoring Devices - The permittee shall install continuous monitoring devices and use them to monitor injection pressure, injection volume, flow rate and the pressure on the annulus between the tubing and the long string of casing. The monitoring results shall be submitted to the Director as specified in Part II(D) of this permit.

3. Waste Analysis Plan - The permittee shall comply with the Waste Analysis Plan which is attached to this permit. A copy of the approved plan shall be kept at the facility. The permittee shall assure that the plan remains accurate and the analyses remain

representative by so certifying at the time of the annual report.

4. Ambient Monitoring - At least every twelfth month, the permittee shall, pursuant to 40 C.F.R. § 146.68(e), monitor the pressure buildup in the injection interval, 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. If the permittee chooses, the ambient monitoring may be performed on only one of the four wells at the facility during each twelfth month monitor event. In this case, the permittee shall alternate the twelve-month testing between the four wells on site.

5. Compatibility of Well Material - The permittee shall continuously monitor corrosion of the construction material(s) by a method approved by the Director. The approved corrosion monitoring plan is part of the permit file for this permit and the permittee shall maintain and comply with the plan as if it were fully set forth herein. The permittee shall report loss of mass, thickness, cracking, pitting and other signs of corrosion at least annually.

6. 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 Part III(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.

7. 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 any anomalies in the data and explanation of any 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.

D. REPORTING REQUIREMENTS

The permittee shall submit all required reports to the Director at the following address, or by another manner approved by the Director, no later than the end of the month following the reporting period:

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:

(a) Results of the injection fluid analyses specified in the approved Waste Analysis Plan, as recorded in the administrative record for this permit. In reporting fluid analyses,

the permittee shall identify the waste components of the waste stream by their common name, chemical name, structure and concentration, or as approved by the Director;

(b) Daily average and monthly average values for injection pressure, flow rate and volume, annulus pressure, and pH;

(c) Daily maximum and minimum values for injection pressure, injection volume, flow rate, and annulus pressure;

(d) A graph or chart representation of the continuous monitoring as required in Part II(C)(2) of this permit, or of daily average values of these parameters. The injection pressure, injection volume, flow rate, and annulus pressure shall be submitted on a single graph, using contrasting symbols or colors, or in another manner approved by the Director;

(e) Total volume of fluid injected;

(f) Monthly volumes of annulus liquid loss and/or gain, including additions by the permittee; and

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

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

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

2. Annual Reports - The permittee shall report the following at least every twelfth month from the effective date of this permit

(a) The permittee shall report the results of the continuous corrosion monitoring as stipulated in Part II(C)(5) of this permit at least annually, if required.

(b) Results of pressure fall-off testing required by 40 C.F.R. § 146.68(e) and Part II(C)(4) of this permit.

(c) Progress made during the previous year toward waste minimization.

3. 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, or results of other tests required by this permit. If reports cited in this paragraph are not made within this time period, the Director may consider the tests to have been failed.

PART III

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, 146, and 148. The permittee shall comply with these conditions and adhere to these plans as approved by the Director, as follows:

A. OPERATING, MONITORING, AND REPORTING REQUIREMENTS

B. PLUGGING AND ABANDONMENT AND SITE-CLOSURE PLAN

C. CONSTRUCTION DETAILS

D. WASTE ANALYSIS PLAN

E. GROUNDWATER MONITORING REQUIREMENT

F. CORRECTIVE ACTION UNDER THE RESOURCE CONSERVATION AND RECOVERY ACT

G. WASTE MINIMIZATION CERTIFICATION

H. TESTING PROCEDURES

I. SEISMICITY RESPONSE

J. FINANCIAL ASSURANCE MECHANISM

K. POST-CLOSURE CARE PLAN

L. POST-CLOSURE CARE PLAN TABLES AND FIGURES

PART III(A)
OPERATING, MONITORING, AND REPORTING REQUIREMENTS

CHARACTERISTIC	LIMITATION	MINIMUM MONITORING FREQUENCY	MINIMUM REPORTING FREQUENCY
Maximum Injection Pressure[1]	792 psig	continuous	monthly
Annulus Pressure	100 psig minimum	continuous	monthly
Annulus Pressure Differential	100 psig above injection pressure	continuous	monthly
Injection Rate (monthly average)[2]	300 gallons per minute cumulative for all WAL wells	continuous	monthly
Cumulative Volume		continuous	monthly
Annulus Fluid Loss or Gain		monthly	monthly
Chemical Composition of Injected Fluids[3]		monthly	monthly
Physical Characteristics of Injected Fluids[3]	pH 0.0 minimum	daily	monthly

[1] The maximum injection pressure (MIP) for this permit is dependent upon depth and specific gravity(water) of the injected fluid. The value was calculated using the following formula:

MIP = [{0.809 *psi/ft* – (0.433 *psi/ft*)(specific gravity(water))} x depth in *ft*] – 14.7 *psi*

The value for the fracture gradient (0.809 psi/ft) is based on site-specific measurements. The value for specific gravity is 1.010 and the value for depth is the top of the injection zone at 2170 feet.

[2] The rate limit is based on modeling presented in the *Petition for an Exemption to the Hazardous Waste Injection Restriction Program,* original dated 2007.

[3] As specified in the approved Waste Analysis Plan, found attached to this permit.

PART III(B)
PLUGGING AND ABANDONMENT AND SITE-CLOSURE PLAN

OMB No. 2040-0042 Approval Expires 4/30/2022

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

Cleveland-Cliffs Burns Harbor
250 W US Highway 12. Burns Harbor, Indiana 46304
219-787-2712

Permit or EPA ID Number	API Number	Full Well Name
IN-127-1W-0007		WAL-3

State	County
Indiana	Porter

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

Latitude:

Longitude:

Surface Location

NW 1/4 of NW 1/4 of Section 29 Township 37N Range 6W

88 ft. from (N/S) N Line of quarter section

3 ft. from (E/W) E 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.

See attached procedures and cost estimate for details for work to be performed

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
Mark Dutler, Senior General Manager, Burns Harbor	Mark Dutler	9/13/24

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

PART III(B)

WASTE AMMONIA LIQUOR WELL NO. 3 PERMIT NO: IN-127-1W-0007 SITE-CLOSURE PLAN

1. Obtain approval from the regulatory agency prior to commencing operations. Conduct the required mechanical integrity testing which will include a demonstration of both Parts I and 2 or the requirements of the 40 CFR 146.8. The testing will include an Annulus Pressure test, a Radioactive Tracer Survey, and a Temperature Survey. Data will be submitted to the regulatory agency.

2. Conduct the required ambient monitoring testing. The testing will include a recording of the static bottomhole pressure.

3. Move in and rig up a workover rig.

4. Flush the wellbore with water. The total flush volume will be a minimum of three wellbore volumes.

5. Dismantle the wellhead and install blowout preventers.

6. Remove the injection tubing and seal assembly.

7. Set a cement retainer in the 9-5/8-inch casing at 2,700 feet. Squeeze 225 sacks of Class A cement mixed at 15.6 pounds per a gallon (ppg) below the cement retainer (calculated plug depth approximately 2,700 feet to 3,200 feet). Pull out of the cement retainer and spot 36 sacks of Class A cement mixed at 15.6 ppg on top of the cement retainer (calculated plug depth approximately 2,600 feet to 2,700 feet).

8. Wait on cement for 12 hours. Tag the cement plug and test for stability.

9. Fill the remainder of the 9-5/8-inch casing from top of the cement (~2,600 feet) to 3 feet below the surface with Class A cement. The planned balanced cement plugs are included below:

    a. 370 sacks Class “A” balanced plug from 1,600 feet to 2,600 feet

    b. 290 sacks Class “A” balanced plug from 800 feet to 1,600 feet

    c. 287 sacks Class “A” balanced plug from 3 feet below surface to 800 feet

10. An appropriate length of the workstring for the calculated cement column will be pulled and laid down following each plug. The workstring will be reversed circulated to confirm the removal of the cement from the previous stage and the process will be repeated until the cement is at surface.

11. Rig down and move out workover equipment.

12. Wait on cement for at least eight hours.

GEOSTOCK SANDIA LLC
10930 W. Sam Houston Pkwy N., Suite 100 – Houston, TX 77064 – USA
Phone: +1 (346) 314-4347
www.geostocksandia.com

PART III(B)

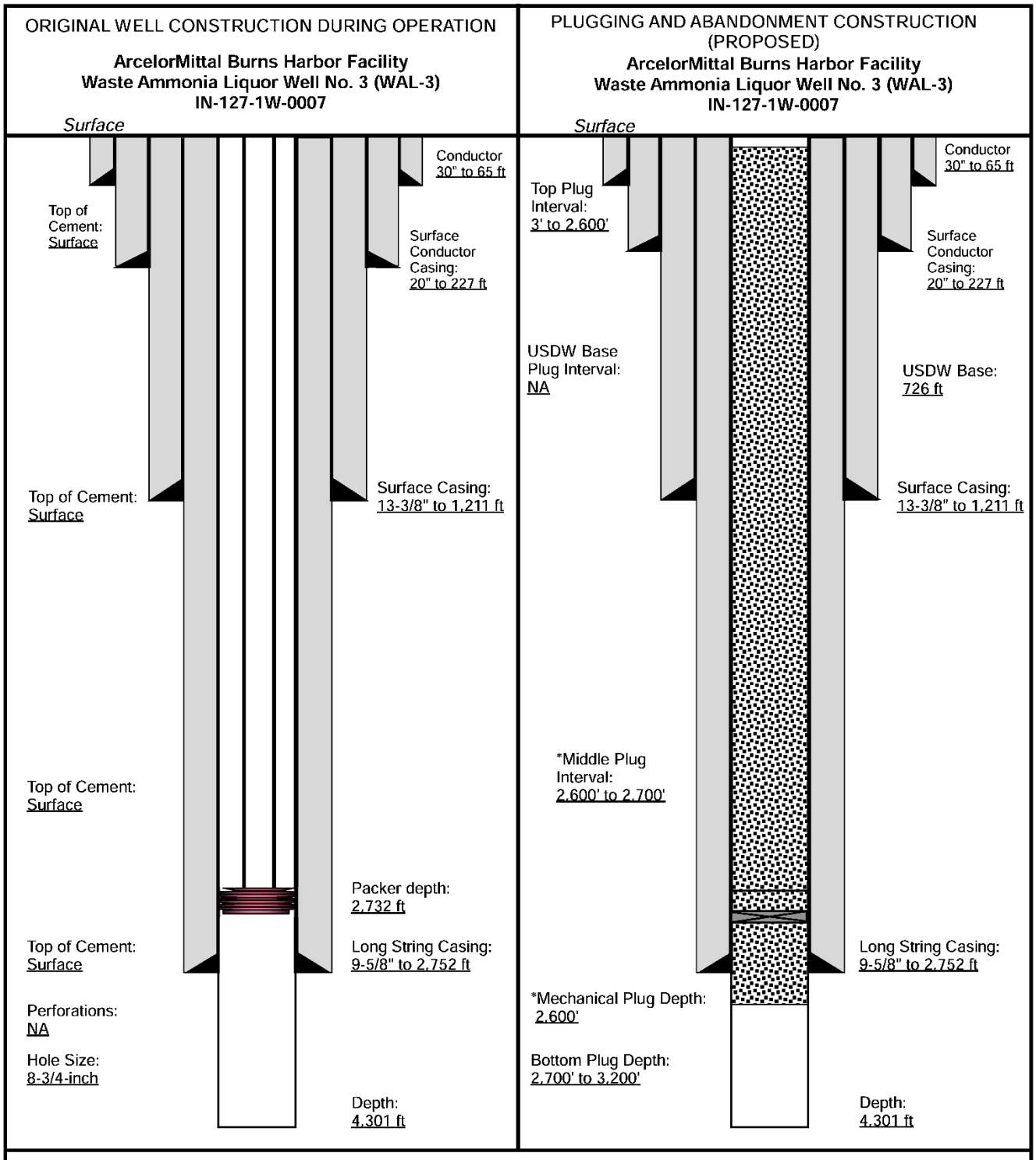
13. Cut off casing 3 feet below ground level. Weld a steel plate on top of the casing. The steel plate should be inscribed with the following information.

Cleveland-Cliffs, Inc. Burns Harbor
Waste Ammonia Liquor Well No.3
Permit No. IN-127-1W-0007
P&A: Date of Plugging

Plug And Abandonment Cement Data	Plug No. 1	Plug No. 2	Plug No. 3	Plug No. 4
Size of Each Hole or Pipe in which Plug Will Be Placed (inches)	9-5/8	9-5/8	9-5/8	
Depth to Bottom of Tubing or Drill Pipe (ft)	3200	2700	2600	
Sacks of Cement To Be Used (each plug)	225	36	947	
Slurry Volume To Be Pumped (cu. ft.)	265	42	1118	
Calculated Top of Plug (ft)	2700	2600	3	
Slurry Wt. (lb/gallon)	15.6	15.6	15.6	
Type of Cement or Other Material	Class A	Class A	Class A	

Estimated Cost to Plug Well	
Cementing Services	$69,100
Cement Retainer	$7,500
Service Rig	$42,000
Rental Tools	$10,000
Trucking And Misc.	$15,000
Engineering Services	$30,000
Estimated Total	**$173,600**

PART III(B)



Open Hole (8-3/4") from 2,752 feet to 4,301 feet.

Proposed Plugging and Abandonment Schematic for WAL-3

All Depths Referenced from RKB = 14.9'

PART III (C)
CONSTRUCTION DETAILS

A Waste Ammonia Liquor (WAL) Well at the Cleveland-Cliffs Burns Harbor Facility was originally permitted by the Indiana Stream Pollution Control Board and was constructed in 1968 with a total depth of 3,944 feet. The open-hole injection interval was extended to a total depth of 4,298 feet in the Mt. Simon Sandstone during the October 1970 recompletion. A 17-1/2-inch surface hole was drilled to 227 feet and 13-3/8-inch surface casing was set. A
12-1/4-inch diameter hole was drilled to 1,437 feet and 9-5/8-inch intermediate casing was set. An 8-3/4-inch hole was then drilled, and 7-inch protection casing was set at 2,530 feet. A 6-1/4-inch hole was then drilled to 3,944 feet, into the Mt. Simon Sandstone. Well construction operations were completed in May 1968 (American Industrial Disposal Systems, 1968). All casing strings are cemented to surface.

Well Construction

The current completion consists of an open-hole completion into the lower Mt. Simon Sandstone from 2,730 to 4,298 feet. Well completion details for WAL3 are contained in the following Table.

Surface casing (13-3/8-inch, 48-lb/ft, H-40 ST&C) was set to 215 feet and was cemented to the surface with 300 sacks of Class "A" cement, effectively sealing off the near-surface formations from the wellbore. The cement was circulated through a float shoe on the bottom of the casing. The surface casing and cement are assumed to be compatible with the freshwater formation fluids, as the construction materials are similar to those used in most wells drilled in the area.

Intermediate casing (9-5/8-inch, 36 lb/ft, J-55, carbon steel) was set to 1,437 feet and was cemented to the surface through a float shoe on the bottom of the string using 600 sacks of Pozmix cement with additives, and good cement returns were noted at the surface. The cementing slurry was used to seal off the wellbore from the subsurface formations and provide a primary seal between the wellbore and the Underground Sources of Drinking Water (USDWs), the lowermost of which is located at approximately 798 feet beneath the site.

Protection casing (7-inch, 23 lb/ft, J-55, carbon steel) was set to 2,530 feet and was cemented to the surface through a float shoe on the bottom of the string using 525 sacks of Pozmix cement with additives, and good cement returns were noted at the surface. Gamma Ray, density, neutron, and caliper logs were run for formation evaluation.

The well completion was modified in 1990 by underreaming the 6-1/4-inch open hole interval to 12-inches from 2,760 feet to 4,256 feet and installing a 5-1/2-inch protection casing liner from 2,730 feet to surface. The flush joint casing liner (5-1/2-inch, 15.5 lb/ft, J-55, carbon steel) was installed during remedial operations in May 1990. The liner was cemented in place with 210 sacks of Premium cement plus additives, mixed at 15.9 lb/gal.

A flush joint casing liner (4-1/2-inch, 11.60 lb/ft, HC P-110, carbon steel) was installed during February-March 2012 remedial operations. The 4-1/2-inch flush joint liner with a TIW expandable liner

hanger was installed from 1,913 feet to 2,719 feet. The liner was cemented with 37 sacks of HalCem cement with additives, mixed to 16.4 lb/gal.

The injection tubing in the well consists of a string of 4-1/2-inch, 11.6 lb/ft ,HC P-110 Ultra FJ tubing set from surface to 1,897.5 feet, with a crossover to 3-1/2-inch, 9.2 lb/ft, J-55 Ultra FJ tubing from 1,898.5 feet to 2,691.5 feet. Installed on the bottom of the 3-1/2-inch tubing is a 3-1/2-inch seal assembly, dressed with three 3.625 inch seal stacks from 2,691.5 feet to 2,711 feet and a 3-1/2-inch, 9.2 lb/ft, J-55, Ultra FJ tail pipe joint from 2,711 feet to 2,743 feet. The annular fluid used in the tubing-to-casing annulus is 9.8 lb/gal brine with 1% corrosion inhibitor.

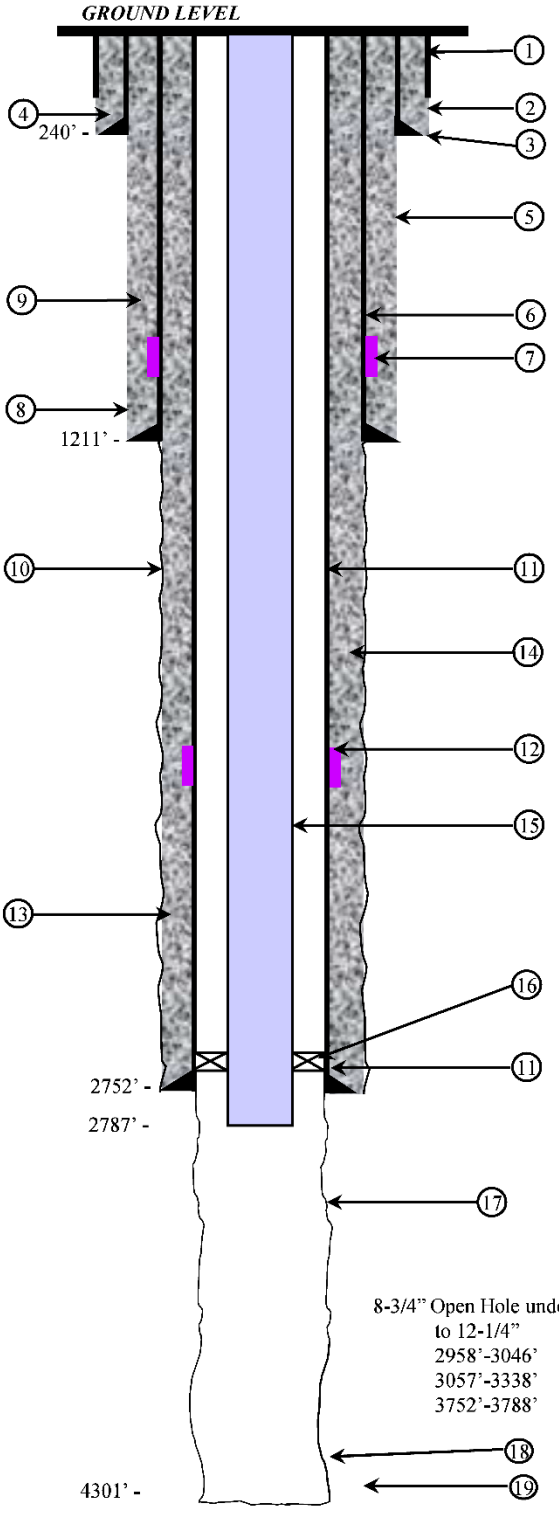
WELL COMPLETION DETAILS

COMPLETION DATA	DEPTH FROM KELLEY BUSHING (ft)	DEPTH FROM GROUND LEVEL (ft)
13 3/8 inch, 48 lb/ft, H-40, ST&C Surface Casing	0 – 215	0 – 204
9 5/8-inch, 36 lb/ft, J-55 casing	0 – 1,437	0 - 1,426
7-inch, 23 lb/ft, J-55 casing	0-2,530	0 - 2,519
5 ½ inch, 15 lb/ft, J-55 casing	0-2,530	0 - 2,519
5 ½ inch Protection Casing & OLD 4 ¾ inch PBR	0-2,718	0 – 2,707
5 ½ inch casing DV Tool & TAM ECP	2,718 – 2,730	2,707 – 2,719
4 ½ inch Expandable Liner Hanger Assembly	1,913.5 -1,930.0	1,902.5 – 1,919.0
4 ½ inch Liner	1,920.5 – 2,693.5	1,909.5 – 2,682.5
3.625 inch PBR	2,693.5 – 2,713.5	2,682.5 – 2,702.5
12 inch Open Hole Injection Interval	2,760 – 4,256	2,749 – 4,245
TAM Jay Bridge Plug (Top)	4,274	4.263
Total Well Depth	4,298	4,287

For Schematic, see next page.

Cleveland-Cliffs Burns Harbor

Waste Ammonia Liquor Well No. 3



COMPLETION DETAIL All Depths Referenced from RKB = 14.9' (~629' MSL)

1) 30" x ½" wall Conductor Pipe driven to 65'
2) 26" Hole drilled to 240'
3) 20" Surface Conductor Pipe, 94 lb/ft, J-55, Buttress casing set to 227'
4) 620 sxs HALCEM Cement (15.6 lb/gal,1.20 ft3/sx, 5.2 gal H2O/sx), 132 bbl of cement slurry
5) 17-1/2" Surface Hole drilled to 1212'
6) 13-3/8" Surface Casing, 54.5 lb/ft, J-55, 8rd, ST&C casing set to 1211'
7) 13-3/8" External Casing Packer and 13-3/8" Cementing Stage tool set from 806' to 825'
8) 1st Stage – Lead Slurry -130 sxs ExtendaCmt (13.2 lb/gal, 1.72 ft3/sx, 8.8 gal H2O/sx), 40 bbl; Tail Slurry – 200 sx Class "A" (15.6 lb/gal, 1.20 ft3/ft, 5.2 gal H2O/sx), 42 bbl
9) 2nd Stage – Lead Slurry -530 sxs ExtendaCmt (13.2 lb/gal, 1.72 ft3/sx, 8.8 gal H2O/sx), 162 bbl; Tail Slurry – 100 sx Class "A" (15.7 lb/gal, 1.20 ft3/ft, 5.2 gal H2O/sx), 21 bbl
10) 12-1/4" Protection Hole drilled from 1212' to 2752' with cored interval in Eau Claire Shale Fm from 2094'to 2123'
11) 9-5/8" Protection Casing, 40 lb/ft, N-80, 8rd, ST&C Casing set to 2752'
12) 9-5/8" Cementing Stage Tool set from 2067' to 2071'
13) 1st Stage – 265 sxs Class "A" Cement with 1% $CaCl_2$ (15.6 lb/gal, 1.20 ft3/sx, 5.2 gal H2O/sx) 56 bbl of slurry
14) 2nd Stage – Lead Slurry - 400 sx 65/35 Poxmix + 1% CaCl2 (13.1 lb/gal, 1.69 ft3/sx, 8.8 gal H2O/sx) 120 bbl; Tail Slurry - 100 sxs Class "A" Cement with 1% CaCl2 (15.6 lb/gal, 1.20 ft3/sx, 5.2 gal H2O/sx) 21 bbl of slurry
15) 5-1/2", 17.0 lb/ft, N-80, 8rd, LT&C Injection Tubing with On-Off from surface to 2732'
16) ASI-X Production Packer set and pressure tested with top of packer at 2,732', element at 2,736', and entry guide on the bottom of 5-1/2" tailpipe extension at 2787'
17) 8-3/4" Open Hole Completion Interval from 2752'to 4301'
18) 4137' – Top of Fill in Openhole (05/14/19)
19) Total Depth 4301'

All Depths Referenced from RKB = 14.9' (~629' MSL)

Drawing not to scale

PART III(D)
WASTE ANALYSIS PLAN

Waste Ammonia Liquor (WAL)

WAL is generated at the Coke Oven Coal Chemical plant, which is located in the southwest corner of the Burns Harbor. WAL from coking operations (a coal carbonization process) is a wastewater that is generated from the ". . . extraction, beneficiation and processing of ores and minerals (including coal)" [40 C.F.R. 261.4(b) (7)]. WAL primarily consists of water (roughly 99%) that contains high concentrations of organic contaminants. The primary contaminant, as the waste name implies, is ammonia (2019 average concentration of 4,000 milligrams per liter). The WAL also contains phenols (2019 average concentration of 1804 mg/L), cyanide (2019 average concentration of 42 mg/L), and several other organic contaminants, such as aniline, benzene, and naphthalene, at lesser concentrations.

Coal is the principal input into the coking operation and coke, coal tar and coke oven gas are the principal outputs. Ammonia liquor is recirculated in a closed loop recycle system to cool and cleanse the coke oven gas produced by the coking process. The water, tars and solids are scrubbed from the gas flow to one of three decanters where phase separation is allowed to occur. The water phase (ammonia liquor) floats on top of the coal tar and overflows a fixed weir that discharges to a holding tank. The majority of ammonia liquor is recirculated from the holding tank to the coke oven gas main as flushing liquor for further gas cooling and cleansing.

Excess water is introduced into the closed-loop system primarily as a result of the liberation of moisture, which is contained within the coal, during the coking process. In order to maintain proper liquid equilibrium within the closed-loop system, the excess or WAL is discharged to the WAL system for processing and disposal.

The WAL is initially processed through the WAL Clarifier for tar and sediment removal through gravimetric settling. The overflow from the clarifier is discharged to spiral cooler heat exchangers in order to lower the temperature of the WAL. After cooling, the WAL then is pumped to one of three pressure filters for initial filtration. Following this initial filtration, the WAL is directed to one of four polishing filters for the removal of fine particulates. After final filtering, the WAL is directed to one of the three injection wells for final disposal.

The waste may be generated by any facility owned by Cleveland-Cliffs Burns Harbor's parent company, Cleveland-Cliffs USA, Inc.

The full Waste Analysis Plan (WAP) is attached to this permit. Should any monitoring parameters and/or reporting frequencies differ between the WAP and Part III(A) of the permit, the permittee shall adhere to the requirements in Part III(A).

PART III(D)

SECTION I - SCOPE AND APPLICABILITY

As required by Federal Regulation 40 C.F.R. 146.13(b)(1) and 146.68(a), this waste analysis plan describes the wastes that are disposed via deep well injection as well as the procedures that will be periodically followed to obtain a detailed chemical and physical analysis of the waste streams.

SECTION II - RESPONSIBLE CHARGE AND PLAN ADMINISTRATION

The Manager of the Environmental Management Department is in charge of this Waste Analysis Plan (WAP). Their responsibilities, which may be carried out by qualified persons under their supervision, include the following:

1. Periodic review of the WAP in order to ensure its continued applicability.
2. Ensure that all required analyses are performed.
3. Record keeping of analytical results and quality assurance.

SECTION III - DESCRIPTION OF WASTE STREAMS

Cleveland-Cliffs Burns Harbor currently operates four Class I deep wells for the disposal of two hazardous waste streams. Three of the wells (Permit Nos. IN-127-1W-0003, and IN-127-1W-0004 and IN-127-1W-0007) dispose of Waste Ammonia Liquor (WAL), which is characteristically hazardous (toxicity characteristic) for the selenium, benzene and pyridine. One of the wells (Permit No. IN-127-1W-0001) disposes of Spent Pickle Liquor, which is a listed hazardous waste (K062). The following provides a description of how each waste stream is generated, stored and transported prior to disposal.

A. Waste Ammonia Liquor (WAL)

WAL is generated at the Coke Oven Coal Chemical plant, which is located in the southwest corner of the Burns Harbor (See Attachment 1 - Facility Map). WAL from coking operations (a coal carbonization process) is a wastewater that is generated from the ". . . extraction, beneficiation and processing of ores and minerals (including coal)" [40 C.F.R. 261.4(b) (7)]. WAL primarily consists of water (roughly 99%) that contains high concentrations of organic contaminants. The primary contaminant, as the waste name implies, is ammonia (2019 average concentration of 4,000 milligrams per liter). The WAL also contains phenols (2019 average concentration of 1804 mg/L), cyanide (2019 average concentration of 42 mg/L), and several other organic contaminants, such as aniline, benzene and naphthalene, at lesser concentrations.

Coal is the principal input into the coking operation and coke, coal tar and coke oven gas are the principal outputs. Ammonia liquor is recirculated in a closed loop recycle system to cool and cleanse the coke oven gas produced by the coking process. The water, tars, and solids are scrubbed from the gas flow to one of three decanters where phase separation is allowed to occur. The water phase (ammonia liquor) floats on top of the coal tar and overflows a fixed weir that discharges to a holding tank. The majority of ammonia liquor is recirculated from the holding tank to the coke oven gas main as flushing liquor for further gas cooling and cleansing.

Excess water is introduced into the closed-loop system primarily as a result of the liberation of

moisture, which is contained within the coal, during the coking process. In order to maintain proper liquid equilibrium within the closed-loop system, the excess or waste ammonia liquor (WAL) is discharged to the WAL system for processing and disposal.

The WAL is initially processed through the WAL Clarifier for tar and sediment removal through gravimetric settling. The overflow from the clarifier is discharged to spiral cooler heat exchangers in order to lower the temperature of the WAL. After cooling, the WAL is pumped to one of three pressure filters for initial filtration.
Following this initial filtration, the WAL is directed to one of four polishing filters for the removal of fine particulates. After final filtering, the WAL is directed to one of the three injection wells for final disposal.

SECTION IV – DESCRIPTION OF GROUNDWATER MONITORING WELL

On August 1, 1990, the United States Environmental Protection Agency granted Burns Harbor a Final exemption for Continued Injection of Hazardous Waste Subject to the Land Disposal Restrictions of the Hazardous and Solid Waste Amendments of 1984. This exemption, which was subsequently modified on March 17 and April 7, 1998, required Burns Harbor to install a groundwater monitoring well in the Galesville Sandstone Formation, which is the lower most formation located immediately above the confinement formation for deep well injection activities.

The operational plan for this well requires continuous pressure monitoring to confirm that the pressurization of the subsurface formations is consistent with the no-migration model simulation submitted in support of the exemption as well as to provide early detection of anomalous activity within the injection zone. In addition, the well is sampled quarterly, and the groundwater is analyzed in order to confirm that waste is not migrating out of the injection zone.

SECTION V - WASTE CHARACTERIZATION

A. Waste Ammonia Liquor (WAL)

Attachment 2 contains a copy of an Appendix IX analysis performed on WAL in October 1993, August 2004, and October 2019. Based on this analysis as well as other hazardous waste analyses performed, WAL periodically exceeds the Toxicity Characteristic Leaching Procedure (TCLP) maximum concentration specified in 40 C.F.R. 261.24, Table 1 for Selenium, Benzene and Pyridine. In addition, the WAL injected contains less than one percent suspended solids. Therefore, under the TCLP procedure, the WAL is analyzed on a total constituent basis. Based on this information and EPA's Regional Guidance #8 for "Preparing a Waste Analysis Plan at Class I Injection Well Facilities" (January 21, 1994), the following parameters will be analyzed under this WAP at the frequency indicated.

Parameter	Frequency of Analysis
Selenium, Total	Monthly
Benzene, Total	Monthly
Pyridine, Total	Monthly
Toluene	Monthly*
Phenols (4AAP)	Monthly
Nitrogen-Ammonia	Monthly

Specific Gravity	Monthly
Total Cyanide	Monthly
Napthalene	Monthly
pH	Continuous**
Temperature	Continuous**
Sulfide	Monthly

* This constituent has been added to the list because it was present in the waste analysis provided in Attachment 2 at a concentration greater than 0.01%. After one year of sampling for this constituent, Burns Harbor may petition to remove this constituent from the monthly monitoring list if it is not consistently present above this 0.01% threshold.
**Temperature and pH are monitored continuously, except during periods of instrument maintenance and calibration and recorded on digital plcs at the Waste Ammonia Liquor Pump Station. Grab samples are obtained three days per week (*i.e.,* Monday, Wednesday, and Friday) to verify calibration of the instruments.

SECTION VI – GROUNDWATER CHARACTERIZATION

As of February 2020, Burns Harbor has sampled the Galesville formation 105 times. The following lists the constituents that will continue to be sampled under this WAP. A brief rationale why the constituent will be sampled is also provided.

Parameter	Frequency of Analysis	Rationale
Acidity	Quarterly	Historical*, Waste Character**
Ammonia as N	Quarterly	Historical, Waste Character
Chloride	Quarterly	Historical, Waste Character, Guidance***
Cyanide	Quarterly	Historical, Waste Character
Phenols (4AAP)	Quarterly	Historical, Waste Character
Sulfate	Quarterly	Historical, Guidance
Iron, Total	Quarterly	Historical, Waste Character
Sodium	Quarterly	Historical, Guidance
Calcium	Quarterly	Historical, Waste Character

* Historical constituents are those constituents that have been analyzed for during each of the previous sample events.
**Waste Character constituents are those constituents in the waste streams that are either known to be present or routinely analyzed under this WAP.
***Guidance constituents are those constituents in groundwater that EPA's regional guidance specifies be analyzed.

SECTION VII - WASTE ANALYSIS PLAN QUALITY ASSURANCE/QUALITY CONTROL

A. Description of Sampling

1. Sampling Methods for Waste Ammonia Liquor (WAL)
   Samples of WAL will be obtained at the frequency specified in Section V of this WAP.

Samples will be obtained from the sample tap located at the Waste Ammonia Liquor Pump Station. This line taps off of the main injection line after all filter devices and immediately prior to the valve that directs the WAL to one of the three well heads for injection.

The samples will be collected into clean, pre-preserved, labeled sample bottles supplied by the analytical laboratory. In order to obtain the samples, the sample collector will open the sample tap and allow WAL to flow from the tap for at least 30 seconds. The Field technician will fill each of the supplied sample bottles with WAL without immersing the sample tap line into the sample. When each bottle is full, the sample collector will seal that bottle, place it into the sample cooler, and begin to fill the next bottle. This will continue until all of the sample bottles have been filled. The sample collector will then place sample into the cooler and transport the cooler to the designated pick-up location for the analytical laboratory. At the designated pick-up location, the sample collector will record the sample date, time, and his initials on the chain of custody.

2. Sampling Methods for Galesville Sandstone Groundwater

Samples of the groundwater in the Galesville Sandstone Formation will be obtained quarterly, as specified in Section VI of this WAP. Samples will be obtained from the well using the dedicated pump system.

In accordance with the "Drilling, Testing and Operational Plan" for the Galesville Sandstone Groundwater Monitoring Well (February, 1991), the sampler will arrive at the well site and determine the static water level within the well. Upon obtaining the static water level, the sampler will turn on the dedicated pump. The sampler will continue pumping, with periodic monitoring for flow rate, pH, temperature, reduction/oxidation potential and conductivity, until a minimum of three well volumes have been evacuated from the well. Once three well volumes have been evacuated and at least three of the four monitored parameters (pH, temperature, reduction/oxidation potential and conductivity) have stabilized, the field technician will begin to collect the samples by directing the pump discharge into clean, pre-preserved, labeled sample bottles supplied by the analytical laboratory. When each sample bottle is full, the sample collector place it into the sample cooler and begin to fill the next bottle. This will continue until all sample bottles have been filled. Upon completion of sampling, the sample collector will; complete the chain of custody form. The sample collector will then place the completed chain of custody form into the cooler and transport the cooler to a designated pickup location for the analytical laboratory.

Results of analyses performed in accordance with this plan will be kept on file by the Environmental Management Department for a minimum of five (5) years.

3. Sampling Information Summary

i. Sample Collector – Cleveland-Cliffs Burns Harbor Representative or contract employee.
ii. Sample Collection Method - Refer to Sections VII.A.1, 2 & 3
iii. Sample Collection Point - Refer to Sections VII.A.1, 2 & 3
iv. Sample Preservation - Parameter specific. To be provided by the analytical laboratory, as needed.
v. Sample Frequency - Refer to Sections V & VI.
vi. Analytical Method for Parameter Detection/Quantification - Refer to Table 2

vii. Anticipated Analytical Method Accuracy - Refer to Table 1
viii. Anticipated Analytical Method Quantification Limit - Refer to Table 3
ix. Field Documentation of Sampling - Refer to Section VII.B.4

B. Description of Analytical Methods

1. Equipment Cleaning Blanks

The WAL samples will be collected directly from a sample tap into clean, pre-preserved and labeled sample bottles supplied by the analytical laboratory. The SPL will be collected from a drainpipe using a dedicated long handled polyethylene dipper. The Galesville groundwater will be collected from the pump discharge that is dedicated to this well. Therefore, the risk of cross-contamination is eliminated and no field equipment will require decontamination.

2. Trip Blanks

Each time a group of sample bottles is prepared for volatile organics analysis (*e.g.,* benzene and toluene analysis) during a sampling event at the WAL or Galesville well, a 40- milliliter Volatile Organics Analysis (VOA) trip blank bottle will be included in each shipping container that contains VOA sample bottles. The VOA trip blank bottles are filled with deionized analyte free water by the laboratory. The trip blanks will be transported to the sampling location and returned (unopened) to the laboratory in a manner identical to the handling procedure used for the environmental samples. These trip blanks will be analyzed for the same VOA parameters identified in Sections V and VI. If contaminants are found in the blanks, the source of the contamination will be identified, and corrective action will be initiated.

3. Duplicate Samples and Field Blanks

- Duplicate Analysis: Duplicate samples will be obtained during each quarterly sampling event of the Galesville groundwater monitoring well. One duplicate sample of either the WAL or SPL during each monthly sampling event will be collected. The duplicate samples will be analyzed for the same source-specific parameters identified in Sections V and VI.

- Field Blanks: Field blanks will be obtained during each quarterly sampling event of the Galesville groundwater monitoring well. These blanks will be analyzed for the same constituents as the groundwater samples. Field blanks will not be obtained during the routine sampling of the waste streams due to the potential for contamination.

4. Sample Chain of Custody Protocol

Samples will be collected following the above sampling procedures. The sampling times and dates, sample description, volume and number of containers will be noted. Sample identification will be assigned prior to sample collection.

Samples will be accompanied by a properly completed chain of custody form. The sample identification and locations will be listed on the chain of custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record.

Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis, with a signed chain of custody record enclosed in each sample box or cooler.

5. Equipment Calibration

Calibration of laboratory equipment will be based on written procedures. Records of calibration, repairs, or replacement will be filed and maintained by laboratory personnel performing quality control activities. These records will be filed at the location where the work is performed. For all instruments, the laboratory will maintain a factory trained repair staff with in-house spare parts or will maintain service contracts with vendors.

Calibration of the field instruments at the Galesville sample station will be evaluated quarterly by on-site instrument personnel. The field sampler will verify calibration of the instruments prior to beginning the sample event and will note the results in the field logbook.

6. Data Reduction/Data Validation

The laboratory will perform analytical data reduction and validation under the direction of the Laboratory QA Officer. The Laboratory QA officer is responsible for assessing data quality and advising of any data which were rated "preliminary" or "unacceptable" or other notations which would caution the data user of possible unreliability. Data reduction, validation, and reporting by the laboratory will be conducted following the general procedures below, although internal laboratory procedural documentation will take precedence.

- Raw data produced by the analyst is turned over to the respective area supervisor.
- The area supervisor reviews the data for attainment of quality control criteria as outlined in the project guidelines and/or established U.S. EPA methods, and for overall reasonableness.
- Upon acceptance of the raw data by the area supervisor, a computerized report is generated and sent to the Laboratory QA Officer.
- The Laboratory QA Officer will complete an audit of reports at a frequency of at least one in twenty, and an audit of every report for consistency.
- The QA officer and area supervisors will decide whether any sample reanalysis is required.
- Upon acceptance of the preliminary reports by the QA Officer, final reports will be generated.

Data reduction reporting procedures will be those specified in the SW- 846 method for inorganic and organic analyses.

The laboratory will prepare and retain full analytical and QC documentation. Such documentation need not be hard (paper) copy, but may be issued electronically. As needed, the laboratory will supply a hard copy of the retained information.

Laboratory detection limits and/or quantitation limits for analytical data produced are contained in Table 3. Data on reporting limits and method detection limits can be found in the individual Standard Operating Procedures (SOPs) in Appendix 1. The reporting

limit for each chemical parameter will also be indicated on the analytical reports provided to Burns Harbor and regulatory agencies by the laboratory conducting the analysis. The data in Table 3 assumes that there are no severe interferences, and that sample dilutions are not required due to excessive concentrations of target analytes.

7. Internal Quality Control

There will be two types of quality assurance used to ensure the production of analytical data of known documented usable quality: program quality assurance and analytical method quality control.

The analytical laboratory will have a written Quality Assurance / Quality Control program, which provides rules and guidelines to ensure the reliability and validity of work conducted at the laboratory. Compliance with the QA/QC program will be coordinated and monitored by the laboratory's Quality Assurance Department, which is independent of the operating departments.

The objectives of the laboratory QA/QC program are to:

- 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 have been validated.
- Monitor the performance of the laboratory by a systemic inspection program and provide for corrective action as necessary.
- Collaborate with other laboratories in establishing quality levels, as appropriate.
- Ensure that all data are properly recorded and archived.

All procedures are documented in writing as either Standard Operating Procedures (SOPs) or Methods of Procedures (MP) which are audited and controlled by the QA Department. Internal quality control procedures for analytical services will be conducted by the laboratory in accordance with their SOP and the individual method requirements in a manner consistent with appropriate SW-846, 40 C.F.R. Part 136, or other validated analytical methods. These specifications include the types of audits required (sample spikes, surrogate spikes, reference samples, controls, blanks), the frequency of each audit, the compounds to be used for sample spikes and surrogate spikes, and the quality control acceptance criteria for these audits.

The laboratory will document, in each data package provided, that both initial and ongoing instrument and analytical QC functions have been met. Any samples analyzed in non-conformance with the QC criteria will be reanalyzed by the laboratory, if sufficient sample volume is available.

8. Laboratory Audits

The QA Manager will perform internal laboratory audits. The system audits will include an examination of laboratory documentation on sample receiving, sample log-in, sample storage, chain of custody procedures, sample preparation and analysis, instrument operating records, etc. The performance will be conducted on an annual basis.

9. Corrective Actions

Corrective actions will be implemented when any aspect of the analytical or sampling method does not achieve the project objectives. This may entail re-sampling and/or reanalyzing (for a particular parameter) the waste streams, re-calibrating an analytical device, or any such action. The action level for each such process will be shown in tabular form.

Table 1 - Historic Waste Analytical Results

CONSTITUENTS	WASTE	MINIMUM	MAXIMUM	UNITS
Chromium	SPL	36	89.7	mg/L
Lead	SPL	<0.0032	22.5	mg/L
Selenium	WAL	<0.0053	3.03	mg/L
Benzene	WAL	0.0019	24	ug/L
Pyridine	WAL	0.6	120	mg/L
Specific Gravity	SPL/WAL	0.99/0.99	1.32/1.27	G/cc
Sulfide	WAL	14	260	mg/L

Table 2 - Analytical Methods

Constituent	Waste Ammonia Liquor Analytical Method	Galesville Sandstone Groundwater Analytical Method
Total Selenium	200 series	NA
Total Benzene	SW8260B	NA
Total Pyridine	SW8270C	NA
Toluene	SW8260B	NA
Specific Gravity	M2710 F	NA
pH	SW4500-H B	NA
Temperature	NA	NA
Total Chromium	NA	NA
Acidity	NA	E305.1
Ammonia as N	E350.1	E350.2
Chloride	NA	M4500-C1 B
Cyanide	E4500	SW9012
Phenol (4AAP)	E420.4	SW9066
Sulfate	NA	9038
Total Iron	NA	SW6010B
Sodium	NA	SW6010B
Calcium	NA	SW6010B
Naphthalene	SW8270C	NA
Sulfide	SM 4500-S2D-2000	NA

Notes:
Current methods listed in table. Analytical methods used will be the most recent version of EPA approved methods from SW-846, Methods for Chemical Analysis of Water and Wastes, Standard Methods for the Examination of Water and Wastewater and ASTM standards.
SW = Analytical Method specified in SW-846
E = Analytical Method specified in Methods for Chemical Analysis of Water and Wastes.
M = Analytical Method specified in Standard Methods for the Examination of Water and Wastewater.
D = Analytical Method specified by the American Society for Testing and Materials (ASTM)

Table 3- Estimated Quantitation Limits (EQL's) for Targeted Parameters in Milligrams per Liter (mg/l) or as noted

Constituent	Waste Ammonia Liquor EQL (mg/l)	Galesville Sandstone Groundwater EQL (mg/l)
Total Selenium	0.030	NA
Total Benzene	0.005	NA
Total Pyridine	0.010	NA
Toluene	0.005	NA
Specific Gravity	0.01 T/4C	NA
pH	2 pH units	NA
Temperature	2 ^{0}F	NA
Total Chromium	NA	NA
Acidity	NA	5
Ammonia as N	0.1	0.1
Chloride	NA	1.0
Cyanide	0.005	0.005
Phenol (4AAP)	0.01	0.010
Sulfate	NA	500
Total Iron	NA	1
Sodium	NA	10
Calcium	NA	10
Naphthalene	0.01	NA
Sulfide	1	NA

Note: Data in this table assumes no sample dilutions have been performed. EQLs are subject to change as they are evaluated on a quarterly basis

PART III(E)
GROUNDWATER MONITORING REQUIREMENT

On March 15, 2015, the United States Environmental Protection Agency granted the permittee a reissuance of an Exemption for Continued Injection of Hazardous Waste Subject to the Land Disposal Restrictions of the Hazardous and Solid Waste Amendments of 1984. This exemption requires the permittee to continue groundwater monitoring in the Galesville Sandstone Formation, which is the lower-most formation located immediately above the confinement formation for deep- well injection activities. As long as the exemption condition remains in force, the requirement for the permittee to operate and monitor the Galesville well continues.

The Galesville Sandstone Groundwater Monitoring Well (Galesville well) is located approximately 100 feet west of the Waste Ammonia Liquor Injection Well #2 (U.S. EPA Permit #IN-127-lW-0004). The Galesville well monitors the Galesville Sandstone formation, the first aquifer overlying the injection zone, between the depths of approximately 1881 and 1927 feet below ground level.

The purpose of the Galesville well is to provide assurance that no upward migration of injected hazardous waste occurs. Monitoring includes recording pressure measurements of the Galesville Sandstone formation and collection of connate water samples from the Galesville Sandstone formation for chemical analysis. The specific monitoring and reporting requirements for the Galesville well are described below.

The operational plan for this well requires continuous pressure monitoring to confirm that the pressurization of the subsurface formations is consistent with the no-migration model simulation submitted in support of the exemption as well as to provide early detection of anomalous activity within the injection zone. In addition, the well is to be periodically sampled and the groundwater is analyzed in order to confirm that waste is not migrating out of the injection zone.

GROUNDWATER CHARACTERIZATION

The following lists the constituents that will be sampled under the Waste Analysis Plan. A brief rationale why the constituent will be sampled is also provided.

Parameter	Frequency of Analysis	Rationale
Acidity	Quarterly	Historical*, Waste Character**
Ammonia as N	Quarterly	Historical, Waste Character
Chloride	Quarterly	Historical, Waste Character, Guidance***
Cyanide	Quarterly	Historical, Waste Character
Phenols (4AAP)	Quarterly	Historical, Waste Character
Sulfate	Quarterly	Historical, Guidance
Iron, Total	Quarterly	Historical, Guidance
Sodium	Quarterly	Historical, Guidance
Calcium	Quarterly	Historical, Guidance

* Historical constituents are those constituents that have been analyzed for during each of the previous sample events.
**Waste Character constituents are those constituents in the waste streams that are either known to be present or routinely analyzed under the Waste Analysis Plan.
***Guidance constituents are those constituents in groundwater that EPA's regional guidance specifies be analyzed.

SAMPLING METHODS FOR GALESVILLE SANDSTONE GROUNDWATER

Samples of the groundwater in the Galesville Sandstone Formation will be obtained at the frequency listed above. Samples will be obtained and analyzed using the procedures and parameters described in detail in the Waste Analysis Plan. During any sample collection event, the EPA or its representatives will have an opportunity to obtain split samples. Results of analyses performed in accordance with this plan will be kept on file onsite by Cleveland-Cliffs, LLC for a minimum of five years.

Establishment of Baseline

All of the analytical data gathered since the well was first sampled in 1995 plus the first eight, independent, and statistically valid analytical results for each parameter obtained after the effective date of this permit shall be used to establish the chemical baseline of the Galesville Formation water for that parameter. The baseline shall be determined as the average of these analytical results, while at the same time calculating both Upper and Lower Tolerance Limits as available from Shewhart and CUSUM charts. The permittee shall use the boundaries of the Upper and Lower Tolerance Limits to establish the permissible amount of variance that subsequent results may exhibit without falling outside the baseline.

On-going monitoring

After establishment of a baseline value for each parameter shown in the Waste Analysis Plan (Part III(D)), the permittee may either (1) elect to discontinue sampling for a parameter (if all eight baseline values show non-detections at the specified sample minimum detection threshold), or (2) continue to sample for each parameter. The continued sampling for each parameter detected during establishment of the baseline shall take place at least quarterly. The minimum detection threshold values in the Waste Analysis Plan will continue to apply.

If a sample result falls outside the baseline Upper and Lower Tolerance Limits, then the permittee may elect to either (1) engage in trend analysis to determine if the out-of-range value represents real change, or (2) re-sample the Galesville well to determine if the out-of-range result is reliable. For either method elected by the permittee to investigate an out-of-range value, the third consecutive value of any single parameter that is outside the limits established under either the Shewhart Chart or the Cumulative Sum Chart (CUSUM) tables shall be considered a possible breach of the confining zone defined by this permit, initiating the need for dialogue between the Director and the permittee, calling into question the reasonable degree of certainty that all hazardous wastes injected by the permittee shall remain confined in the injection zone for a period of at least 10,000 years.

Reporting Water Analysis Results

The permittee shall report the results of water samples analyzed quarterly as specified in Part II(D)(2) of this permit. Each report shall include graphical illustration of the parameter values as a function of sample date, showing all samples taken during the life of the Galesville well. Upon written request from the Director, the permittee shall provide laboratory records of analyses which may include

electronic tapes with spectral files to independently verify the analytical results of samples taken for organic chemistry, or other standard laboratory records.

Pressure Sampling

The Galesville well shall maintain a capability to measure pressure in the Galesville Sandstone Formation. Formation pressure shall be continuously monitored and shall be recorded at least once every four hours. Formation pressure shall be measured by dedicated equipment capable of a precision of at least 0.1 psi. The permittee shall correct each recorded formation pressure value for changes in simultaneous barometric pressure values. To make this correction, the permittee may either directly measure the barometric pressure at the Galesville well, or obtain a barometric pressure value from a nearby source at the time of the Galesville Sandstone Formation pressure recording. The permittee shall calibrate all gauges in use for pressure measurements at the Galesville well at least annually. The calibration shall ensure that the precision value of 0.1 psi is maintained.

Reporting Pressure Data

The permittee shall report values of Galesville Formation pressure data each month as specified in Part II(D)(1). Each report shall include a tabulation and graphical representation of the daily maximum values for the Galesville Formation pressure, the barometric pressure, and the maximum injection pressure recorded from any well injecting waste ammonia liquor on that day. Each report shall also include a graph showing the daily Galesville Formation pressures recorded at six-hour intervals (i.e., four data points per day) and the maximum injection pressures (recorded at the same intervals) from any well injecting waste ammonia liquor on that day. The six-hour graph axes must be scaled in increments small enough to indicate fluctuations in the Galesville Formation pressure and the injection pressure(s) clearly.

Mechanical Integrity

The Galesville well shall maintain mechanical integrity to ensure that chemical and pressure samples taken from the well are representative of the Galesville Sandstone Formation. To determine that the well maintains mechanical integrity, the permittee shall conduct a standard annulus pressure test at least once every twelve months. The standard annulus pressure test must be witnessed by an authorized representative of the Director unless it proves impossible to resolve scheduling conflicts between the operator and the agency. In order to conduct testing without an EPA representative, the procedures discussed in Part I(H)(1) and Part III(H) must be followed. The minimum annulus test pressure shall be 300 psi and the duration shall be at least one hour. No more than 3% change in the test pressure is permissible during the standard annulus pressure test. If the Galesville well fails a standard annulus pressure test, then an oral report of such failure shall be made to the Director within 24 hours of the failure and a written report of the failure shall be submitted to the Director within 30 days of the failure. The permittee shall make attempts to restore the well's mechanical integrity as soon after a failure as practical. During a time when the well lacks mechanical integrity, the well's condition shall be noted on any written monitoring reports submitted to the Director.

Galesville Well Workovers

The permittee shall submit any plan to workover the Galesville well to the Director for approval at least 30 days in advance of the scheduled date to commence the well workover. Each workover shall conclude with a demonstration of mechanical integrity as specified in this permit. Reports of the workover shall be submitted to the Director within the time frame specified in Part II(D)(3).

Plugging and Abandonment

The Galesville well shall remain active until the highest pressure in the injection zone declines to a value insufficient to cause fluid to move to the base of the lowermost underground source of drinking water (USDW), as identified in the administrative record for this permit, unless the Director determines that additional ground water monitoring is required to protect USDWs. The current Closure Plan to plug and abandon the Galesville well is part of this attachment.

The permittee shall submit any proposed significant revision to the method of closure reflected in the Closure Plan for approval by the Director no later than sixty calendar days before closure, unless a shorter time period is approved by the Director. Final plugging of the well shall include installation of a permanent marker to identify the well. The permittee shall maintain an adequate financial mechanism to properly plug and abandon the Galesville well, until the well has been completely plugged and abandoned. The estimate of the cost to properly plug and abandon the Galesville well shall be updated at least once every twelve months, and the financial mechanism to meet or exceed the estimated cost shall be adjusted as needed each year. The permittee shall, within 45 days of its completion, submit a report of the plugging and abandonment of the Galesville well.

PART III(F)
CORRECTIVE ACTION AT THE FACILITY
UNDER SECTION 3004(U) OF THE RESOURCE CONSERVATION AND RECOVERY ACT

I. CORRECTIVE ACTION AT THE FACILITY

In accordance with Section 3004(u) of Resource Conservation and Recovery Act (RCRA) and the regulations promulgated pursuant to that Section, the Permittee must institute Corrective Action as necessary to protect human health and the environment for all releases of hazardous waste(s) or hazardous constituent(s) from any solid waste management units (SWMUs) at the facility, regardless of the time at which waste was placed in such units.

II. CORRECTIVE ACTION BEYOND THE FACILITY BOUNDARY

In accordance with Section 3004(v) of RCRA and the regulations promulgated pursuant to that Section, the Permittee must implement Corrective Action(s) beyond the facility property boundary, where necessary to protect human health and the environment, unless the Permittee demonstrates to the satisfaction of the Director that, despite the Permittee's best efforts, the Permittee was unable to obtain the necessary permission to undertake such actions. The Permittee is not relieved of any responsibility to clean up a release that has migrated beyond the facility boundary where offsite access is denied.

III. FINAL CORRECTIVE MEASURES IMPLEMENTATION

In 2006, a prior owner/operator of the Facility (International Steel Group (ISG), Burns Harbor, LLC which was a wholly owned subsidiary of Mittal Steel, LLC) implemented RCRA Corrective Action remedial measures at certain Investigation Areas (IAs) through a modification of the Facility's Underground Injection Control (UIC) permit. The remedial measures included:

- the imposition of institutional controls filed with the Porter County Recorder for selected areas of the Facility to restrict land and groundwater use for industrial purposes or for use as an environmental learning/restoration area;
- the performance of groundwater monitoring;
- the inspection and maintenance of engineered barriers;
- a requirement to maintain financial assurance necessary for corrective measures activities.

IV. NEWLY IDENTIFIED SOLID WASTE MANAGEMENT UNITs (SWMUs) OR RELEASES AND NOTIFICATION REQUIREMENTS

In December 2007, the Permittee discovered a subsurface release of diesel fuel north of the Locomotive and Mobile Equipment Shop during a routine construction project. Immediate responses included the use of a vacuum truck to recover liquid diesel fuel and water found perched in shallow subsurface fill soil. Follow up responses included the excavation and off-site disposal of approximately 3,100 cubic yards of diesel fuel-impacted soil and recovery of liquid diesel fuel using a vacuum truck. A free product recovery system utilizing vacuum enhanced in- well skimming technology was placed into

operation in 2009. Active system operations were suspended on June 10, 2016, after which passive operations were initiated using absorbent socks in each of the recovery wells.

On November 9, 2018, the Permittee notified the Director of the discovery of a new SWMU adjacent to an area previously designated as RCRA Facility Investigation (RFI) Area (IA) 3 (Tar Impoundment). The SWMU was discovered during the construction of a mixing pad when a buried drum was discovered and struck below grade releasing tar to the soil. The new SMWU was considered part of IA 3 due to the similar nature of contaminants. The contaminated debris was excavated, additional delineation of contamination performed, and a new Corrective Measures Implementation Work Plan submitted to U.S. EPA on April 15, 2022.

A. The Permittee and EPA shall each designate a Corrective Action Project Manager and notify each other in writing of the Project Manager selected within 14 days of the effective date of this Permit. The Permittee and EPA shall provide prompt written notice whenever they change Project Managers and whenever contact information for Project Managers changes.

B. The Permittee shall notify the Director of any new SWMU identified at the facility within 30 days of discovery in accordance with 40 C.F.R. §270.14(d). The Permittee shall also submit all available information pertaining to any release of hazardous waste(s) or hazardous constituent(s) from any new or existing SWMU to the Director within 30 days of discovery including the information required under 40 C.F.R. §270.14(d)(1):

1. the location of the unit on the site topographic map;
2. designation of the type of unit;
3. general dimensions and structural description (supply any available drawings);
4. when the unit was operated; and
5. specifications of all waste(s) that have been managed at the unit.

C. If the Permittee identifies an immediate threat to human health or the environment from the releases of hazardous waste(s) or hazardous constituent(s) from any SWMUs, the Permittee must immediately notify the Director orally and in writing within 7 days. The notification must summarize the immediacy and magnitude of the potential threat to human health or the environment and provide a plan for corrective measures.

D. Nothing herein shall be construed as restricting the Permittee from performing an immediate or emergency response to a newly discovered release or threat of a release of a hazardous waste or hazardous constituent to the environment at or from the Facility.

E. Notifications shall be made to the EPA Corrective Action Project Manager designed under Section IV.A using the contact information below:

Land, Chemicals, and Redevelopment Division Remediation Branch
U.S. EPA Region 5 (LU-16J)
Chicago, IL 60604
312-353-2000
r5hotline@epa.gov

V. CORRECTIVE ACTION FOR NEWLY IDENTIFIED SWMUs OR RELEASES

The Director will review the information related to new releases identified in Sections IV.B and IV.B above and may, as necessary, require Interim Measures, further investigations, or corrective measures under RCRA §§3004(u) or 3004(v), 40 C.F.R. §270.14(d)(3), and Section VII.A. The Permittee shall submit a written Interim Measures Work Plan within 21 days or RCRA Facility Investigation Work Plan in accordance with Section VII.A. after written notification by the Director that further action or investigation is necessary.

VI. LONG TERM STEWARDSHIP AND FIVE-YEAR REMEDY REVIEW

A. Within 90 days after the effective date of this Permit, the Permittee shall provide a work plan to assess current groundwater conditions at the Facility and Facility boundary. The work plan shall include: figures identifying the location of all existing groundwater monitoring wells at the Facility including the IA and SWMU boundaries, information on well condition including completion depths and screened intervals, copies of well boring logs, a list of proposed analytes, and a schedule for sampling.

B. Annual Certification of Long-Term Controls

The Permittee shall provide an annual Certification of Long-Term Controls by March 31 of each year to ensure that all required controls are inspected, in place, and operating effectively. The Certification shall include the information required in Appendix I of this Part.

C. Long-Term Stewardship Plan

The Permittee shall establish a long-term stewardship (LTS) plan for the duration of time contamination remains on-site or off-site above unrestricted use levels. As part of this plan, every five years after the effective date of this permit, the Permittee will review the efficacy of the remedies. The LTS plan shall include, but not be limited to, the following information:

1. Description of the 2006 remedial measures, how implemented remedies are continuing to operate and function as designed, and progress in meeting remedial measure objectives established in 2006 for the IAs, the releases and new SWMUs described in Section IV.

2. Identification of opportunities to improve the performance and efficiencies of the remedial measures.

3. Identification of Institutional Controls in place, their effectiveness in preventing exposures, and whether revisions or updates are required.

4. Identification of engineering or access controls required by the 2006 UIC permit modification, required at the releases and new SWMUs identified under Section IV, and confirmation that they are in place and proving to be effective in preventing exposure to receptors.

5. Identification of any actions (e.g., removals) necessary to ensure that immediate threats at IAs and at the releases and new SWMUs identified under Section IV are addressed.

6. Identification of any changes to human health or ecological routes of exposure or receptors that could affect the protectiveness of the implemented remedies and lead to a potential or actual exposure pathways not previously addressed by the remedies at the IAs and at the releases and new SWMUs identified under Section IV.

7. Identification of changes to current or reasonably anticipated future land uses on or near the site (including redevelopment or changed resource use).

8. Identification of changes to physical site conditions or the understanding of these conditions changed in a way that could affect the protectiveness of the remedies at the IAs and at the releases and new SWMUs identified under Section IV.

9. Identification of any other available information that could call into question the protectiveness of the remedies at the IAs, releases, and new SWMUs identified under Section IV such as site changes or vulnerabilities that may be related to climate change impacts.

D. The Director will review the information provided in Sections VI.B. and VI.C above and may, as necessary, provide written notification to the Permittee that identifies Long-Term Stewardship deficiencies and corrective actions required.

VII. CORRECTIVE ACTION ACTIVITIES

A. RCRA Facility Investigation (RFI)

A prior Facility owner completed a RFI prior to EPA's 2006 Final Decision. Based on information provided under Sections IV or VI or reevaluation of existing information, the Permittee shall conduct an RFI to thoroughly evaluate the nature and extent of the release of hazardous waste(s) and hazardous constituent(s) from all SWMUs identified by the Director as requiring further or additional investigation under Sections V and VI.D.

1. RFI Work Plan

The Permittee shall submit a written RFI Work Plan to the Director within 90 days after written notification by the Director that further investigation is necessary.

The Director will approve, modify and approve, or disapprove and provide comments on the

RFI Work Plan in writing to the Permittee. Within 60 days of receipt of such comments, the Permittee must provide a response to the Director's comments.

2. RFI Implementation

Within 30 days of the Director's written approval of the RFI Work Plan, the Permittee must implement the plan according to the terms and schedule contained therein.

3. RFI Report

Within 90 days after the completion of the RFI, the Permittee must submit an RFI Report to the Director. The RFI Report must describe the procedures, methods, and results of the RFI. The report must contain adequate information to support further corrective action decisions at the facility. After the Permittee submits the RFI Report, Director will either approve or disapprove the report in writing. If EPA disapproves the report, the Director will notify the Permittee in writing of the deficiencies. The Permittee has 60 days after receipt of Director's comments to submit a revised RFI Report to the Director.

B. Determination of No Further Action

1. Permit Modification

After completion of the RFI, and based on its results and other relevant information, the Permittee may submit an application to the Director for a permit modification under 40 C.F.R. §270.42 to terminate the corrective action tasks at the SWMU. This permit modification must demonstrate that there are no releases of hazardous waste(s), including hazardous constituents, that are the subject of the modification at the facility that pose a threat to human health or the environment.

If, based upon review of the Permittee's request for a permit modification, the results of the completed RFI, and other information, Director determines that releases or suspected releases that were investigated either are nonexistent or do not pose a threat to human health or the environment, Director will grant the requested modification.

2. Further Investigations

A determination of no further action will not preclude Director from requiring further investigations, studies, or remediation at a later date, if new information (including different risk assumptions) or subsequent analysis indicates that a release or likelihood of a release from a SWMU at the facility is likely to pose a threat to human health or the environment. In such a case, Director will rescind the determination made in accordance with the above permit condition. Additionally, Director may determine that there is insufficient information on which to base a determination and may require the Permittee to perform additional investigations as needed to generate the needed information.

C. Corrective Measures Study (CMS) and Remedy Selection

If Director determines, based on the results of the RFI and other relevant information, that corrective measures are necessary, the Director will notify the Permittee in writing that the Permittee must conduct a CMS. The purpose of the CMS is to develop and evaluate the corrective action alternative(s) that will satisfy the performance objectives specified by Director. The CMS must be conducted within 60 days of notification by the Director that the CMS is required. This period of time may be extended by the Director if necessary to adequately complete the CMS. Note that this process can be significantly shortened by the selection of presumptive remedies (i.e., remedies that are known to be effective).

1. CMS Report

Within 60 days after the completion of the CMS, the Permittee must submit a CMS Report to the Director. The CMS Report must summarize the results of the investigations for each remedy studied and must include an evaluation of each remedial alternative. After the Permittee submits the CMS Report, Director will either approve, modify and approve, or disapprove the Report. If Director disapproves the report, the Director will notify the Permittee in writing of the deficiencies. The Permittee has 60 days after receipt of Director's comments to submit a revised CMS Report to the Director. The CMS Report, as approved, becomes an enforceable condition of this permit.

2. CMS Remedy Selection

Director will approve a corrective measure for implementation based on the following factors. The corrective measure selected for implementation must: (1) be protective of human health and the environment; (2) attain media cleanup standards; (3) control the source(s) of releases so as to reduce or eliminate further releases of hazardous waste(s) (including hazardous constituent(s)); (4) minimize the transfer of contamination from one environmental medium to another; and (5) comply with all applicable standards for management of wastes.

If two or more of the corrective measures studied meet the threshold criteria set out above, Director will choose among alternatives for implementation by considering remedy selection factors including: (1) long-term reliability and effectiveness; (2) the degree to which the corrective measure will reduce the toxicity, mobility or volume; (3) the corrective measure's short-term effectiveness; (4) the corrective measure's implementability; and (5) the relative cost associated with the alternative. In selecting the corrective measure(s), Director may also consider such other factors as may be presented by site-specific conditions.

3. Permit Modification

Within 30 days of Director's approval of a corrective measure, the Permittee will initiate a permit modification, pursuant to 40 C.F.R. §270.41 or 40 C.F.R. §270.42, respectively, for the implementation of the corrective measure(s) selected.

4. Corrective Measures Implementation (CMI)

If the corrective measure(s) recommended in the Corrective Measures Study Report is (are) not the corrective measure(s) approved by Director after consideration of public comments, the Director will inform the Permittee in writing of the reasons for such decision. Within 30 days after the effective date of the permit modification, the Permittee must implement the corrective measure(s).

5. Incorporation of Plans and Reports

All approved plans and reports prepared for this permit will be incorporated into this permit on the date the Director or his/her designee approves such plan or report.

The Director may, at the facility's request, grant extensions to the time frames listed in this section. Director-approved time extensions will not require a permit modification.

VIII. FINANCIAL ASSURANCE

A. The Permittee shall provide financial assurance in the amount specified by the Director for necessary corrective measures activities required by the 2006 UIC permit modification or required at the releases and new SWMUs identified under Sections IV or V, based on the cost of hiring a third party to perform necessary corrective measures (Cost Estimate) and other relevant information, and as required by 40 C.F.R. §§264.101(b) and (c). A third party is a party who (i) is neither a parent nor a subsidiary of the Permittee and (ii) does not share a common parent or subsidiary with the Permittee.

B. The Permittee shall annually adjust the Cost Estimate for inflation within 30 days after the close of Permittee's fiscal year. If at any time EPA determines that a Cost Estimate provided is inadequate, EPA shall notify the Permittee in writing, stating the basis for its determination. If at any time the Permittee becomes aware of information indicating that any Cost Estimate is inadequate, the Permittee must notify EPA in writing of such information within ten (10) days. Within 30 days of EPA's notification, the Permittee must submit a revised Cost Estimate to EPA for review.

C. To fulfill financial assurance obligations, the Permittee shall select and implement one or more of the mechanisms that are substantially equivalent to those specified in 40 C.F.R. Part 264, Subpart H.

D. The Permittee must submit all original executed and/or otherwise finalized financial assurance instruments to EPA's Regional Comptroller (MF-l0J), 77 W. Jackson Blvd., Chicago, IL 60604-3590, within 30 days after date of execution or finalization. A transmittal letter stating the name and RCRA ID number of the Facility, the Permittee's name and address must accompany the instruments. The Permittee must also provide copies to the EPA Project Manager.

IX. DISPUTE RESOLUTION

A. If the Director disapproves or modifies and approves any submission required by Section VII of the permit, Director will provide the Permittee with a written notice setting forth the reasons for the disapproval or modification and approval.

B. If the Permittee disagrees, in whole or in part, with any written decision concerning Director's disapproval or modification and approval of any submission required by Section VII of the permit, the Permittee must notify Director of the dispute. The Permittee and Director must informally, and in good faith, endeavor to resolve the dispute.

C. If the Permittee and Director cannot resolve the dispute informally, the Permittee may pursue the matter formally by submitting a written statement of position to the Director or his/her designee, within 28 days of receipt of Director's written disapproval or modification and approval. The Permittee's statement of position must set forth the specific matters in dispute, the position that the Permittee asserts should be adopted as consistent with the requirements of the permit, the basis for the Permittee's position, and must include any supporting documentation. If the Permittee fails to follow any of the requirements contained in this paragraph, then it will have waived its right to further consideration of the disputed issue. Director’s decision to discontinue further consideration under this condition will constitute a final agency action.

D. Director and the Permittee will have an additional 14 days from the date of the Director’s receipt of the Permittee's statement of position to meet or confer to attempt to resolve the dispute. This time period may be extended by mutual agreement of the Permittee and Director. If agreement is reached, the Permittee must submit a revised submission, if necessary, and must implement the submission in accordance with such agreement.

E. If Director and the Permittee are not able to reach agreement within the 14-day period, or such longer period corresponding to Director’s extension for good cause, the Permittee may submit any additional written arguments and evidence not previously submitted, or further explain any arguments or evidence previously submitted, to the Director. Based on the record, the Director, or delegate, will thereafter issue a written decision that will include a response to the Permittee’s arguments and evidence. This written decision will constitute a final agency action.

F. Notwithstanding the invocation of this dispute resolution procedure, the Permittee must proceed to take any action required by those portions of the submission and of the permit that Director determines are not substantially affected by the dispute. The activity schedule for those portions of the submission and of the permit which are substantially affected by the dispute will be suspended during the period of dispute resolution.

X. FORCE MAJEURE

“Force Majeure,” for purposes of this Permit, is defined as any event arising from causes beyond the control of the Permittee that delays or prevents the performance of any obligation under this Permit despite Permittee's best efforts to fulfill the obligation. The requirement that the Permittee exercise "best efforts to fulfill the obligation" includes using best efforts to anticipate any potential force majeure event as it is occurring and best efforts to address the effects of any potential force majeure event as it is occurring and following the potential force majeure event, such that the delay is

minimized to the greatest extent possible. "Force Majeure" does not include financial inability to complete the work required by this Permit nor any increases of costs to perform the work.

The Permittee must notify Director by calling within 3 calendar days and by writing no later than 7 calendar days after any event which the Permittee contends is a force majeure. Such notification must describe the anticipated length of the delay, the cause or causes of the delay, the measures taken or to be taken by the Permittee to minimize the delay, and the timetable by which these measures will be implemented. The Permittee must include with any notice all available documentation supporting its claim that the delay was attributable to a force majeure. Failure to comply with the above requirements will preclude the Permittee from asserting any claim of force majeure for that event. The Permittee will have the burden of demonstrating that the event is a force majeure. The decision of whether an event is a force majeure will be made by Director. Said decision will be communicated to the Permittee.

If a delay is attributable to a force majeure, Director will extend, orally or in writing, the time period for performance under this Permit by the amount of time that is attributable to the event constituting the force majeure.

PART III(F)

See following form.

Long Term Stewardship – Annual Certification Assessment Checklist

This should be completed for each annual certification.

I. Facility Identification
II. Verification of Remedy / Engineering Controls
III. Verification of Institutional Controls
IV. Deficiencies and Follow Up Actions Needed
V. Assessment Certification

I. Facility Identification	
Facility Name	
Facility EPA ID	
Facility Address	
Facility Contact	
Current Review Period	*(e.g., October 2016 – October 2017)*

II. Verification of Remedy / Engineering Controls (EC)

Note: Complete this checklist to verify the status of the remedy and required engineering controls. Include a description of the basis for the 'yes' or 'no' determination and provide supporting documentation as appropriate.

		Yes/No	*Describe any variations and attach or reference supporting reports, documents and photos.*
1	Are all ECs required by the Final Remedy in place?		
2	Are all fencing, markers, and security systems still in place and effective?		
3	Are all barriers (e.g., pavement, caps, subsurface barrier walls) still in place and effective?		
4	Are all ECs and remediation systems in place and operated / maintained as required?		
5	Is there a management plan for each EC (e.g., Cap Management Plan, Soil Management Plan)?		
6	Are all monitoring programs still in place, well maintained, and effective?		
7	Are there procedures in place to track on-site activities as well as notify the appropriate personnel prior to being conducted on-site (e.g., GW well installation, soil sample collection, building and construction permits, utility work)?		
8	Who is responsible for O&M of the ECs?		
9	Have all deficiencies identified & recommendations for required actions from the last annual review been completed?		
10	Were there any new releases during the past year/reporting period?		
11	What are the O&M inspections, assessment, and reporting frequencies?		
12	Who receives the O&M reports?		

III. Verification of Institutional Controls (IC)

Note: Complete this checklist to verify the status of the required institutional controls. Include a description of the basis for the 'yes' or 'no' determination and provide supporting documentation as appropriate.

		Yes/No	*Supporting documentation attached?*
1	Are all ICs required by the Final Remedy in place?		
2	What is the current site land use?		
3	Has the site use changed since the final decision was issued?		
4	Are all deed restrictions still in place and effective?		
5	Are all ordinances still in place and effective?		
6	Are there any changes in zoning or land use?		
7	Has the local government(s) been contacted & verified controls are still in place and effective? *(Provide current contact information for local government official)*		
8	Is financial assurance still adequate and in place?		
9	Has the property transferred ownership since the controls / remedy were established? *(If so, provide name/contact information for new owner and any new activities performed by the new owner/operator.)*		
10	Is any redevelopment planned for any part of the site? *(Including leasing space to outside parties)*		
11	Have potential or new owners of the property been notified by the seller of environmental conditions and liabilities at the site?		

IV. Deficiencies and Follow up Actions Needed *Explain any deficiencies identified above and recommendations for any required actions to address*	
IC or Remedy/EC	Explanation of deficiency and required action to correct
e.g., Remedy/EC #2	*Fence broken in November 2018 ice storm - to be repaired January 2019*

V. LTS Assessment Certification
Summary of Findings
☐ No deficiencies identified ☐Deficiency identified / corrective action(s) required. If so, date corrective action(s) will be completed: Click or tap to enter a date. Comments:

Report Prepared by: Click or tap here to enter text.

Signature: _____ Date: Click or tap to enter a date.

Report Reviewed by: Click or tap here to enter text.

Signature: _____ Date: Click or tap to enter a date.

Report Approved by: Click or tap here to enter text.

Signature: _____ Date: Click or tap to enter a date.

PART III(G)
WASTE MINIMIZATION CERTIFICATION

Waste Ammonia Liquor (WAL) is generated as a by-product of the coking operation. Coal is the input to the coke operation and coke, coke oven gas and coal tar are the principal outputs. The WAL is recirculated in a closed-loop recycle system and is used to cool and cleanse the coke oven gas produced. The clean coke oven gas is used as a fuel throughout the plant.

Excess water is introduced into the closed-loop WAL system primarily as a result of the liberation of moisture, which is contained within the coal, during the coking process. The excess WAL is removed from the closed-loop system and disposed via the deep wells. The waste ammonia liquor is treated through a clarifier and multiple layers of filters to clean the material before injection. A principal contaminant in coke oven gas, ammonia, is largely removed from the process stream by scrubbing with sulfuric acid to for ammonia sulfate, which is crystallized, recovered, and then sold as a by-product. Gases from the coke ovens that contain light hydrocarbon fractions are primarily recycled and burned as fuel within the plant.

PART III(H)
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 that 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 fluids 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 seal pot 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 C.F.R. § 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 shut-in 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 shut-in (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.

Radioactive Tracer Survey

1. The tool shall be calibrated by recording the tool response to rock formations of lithology known to produce a low reading, and to lithology known to produce a high reading.

2. Set the scaling at the same level for all phases. 40 counts per second per inch is usually effective.

3. Record a base log before any radioactive material is released in the well.

4. Use slugs large enough to ensure the maximum height of deflection caused by the slug is 50-times higher than the background.

5. Inject at the highest practicable rate during the slug tracking test, but at low enough velocity to allow the slug to be followed effectively.

6. If the slug moves upward outside of the tubing or splits during the tracking test, follow the slug upward to determine the limit of its upward movement.

7. Inject at the highest practicable rate during the stationary test.

8. Set the tool with the bottom detector within five feet above the end of the tail pipe, the casing shoe or the top perforation (whichever is deeper) during the stationary test; or if the slug moved upward during the tracking test, place the top detector above and the bottom detector below the highest level of upward movement detected during the tracking test. If the slug passes both detectors during the stationary test, move the tool up in steps to find the shallowest extent of movement.

9. The stationary test must be run for a minimum of 30 minutes and must be run long enough to be able to detect upward flow of 2 feet per minute.

10. Run a final base log after testing.

11. The test shall include a written report by a knowledgeable analyst. Such report must explain any anomalies shown in the results.

12. The test report shall include an up-to-date well schematic; digital logging data on CD/flash-

drive/email in a spreadsheet format; description or illustration of the logging tool with measurements of detector and ejector placement relative to the tool bottom; and plots of the logging activity including merged and unmerged slug tracking records, stationary test plot, Initial base log, final base log, and superimposed initial and final base logs.

13. The test report shall include a tabulation of values for the following background parameters EPA permit number, long string casing inner diameter (in), long string casing length (ft),tubing inner diameter (in), tubing length (ft), depth to top of packer (ft), depth to bottom of packer (ft), tail pipe inner diameter (in), tail pipe length (ft), tail pipe lowermost depth (ft),top of open hole or uppermost perforation (ft), open hole diameter (in), well total depth (ft),plugged back total depth or top of fill depth (ft), Kelly bushing elevation (ft), and as applicable depth to top of confining zone (ft), depth to top of permitted injection zone (ft),and depth to top of injection interval (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), and injection rate for each test (gpm).

14. 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

2. longer if temperature stabilization based on previous logs requires more time.

3. 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.

4. Calibrate the temperature tool in a bucket of ambient temperature water and a bucket of ice water immediately prior to conducting the test.

5. Log from the top of the well to the bottom, recording both temperature and natural gamma ray activity.

6. Record log data at least once per foot.

7. Logging speed shall not exceed 30 feet per minute. Reduce speed to 20 feet per minute in air-filled well bores.

8. The test shall include a written report by a knowledgeable log analyst. Such report must explain any anomalies shown in the results.

9. 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.

10. 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 liquid level in the tubing (ft), depth to top of receptive strata (ft), and depth to bottom of receptive strata (ft).

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

PART III(I)
SEISMICITY RESPONSE

The permittee will subscribe to the U.S. Geological Survey Earthquake Notification Service to receive notification of seismic events within 100 kilometers (62.14 miles) of the well. If the well is not purely vertical, the midpoint between the surface-hole and bottom-hole locations shall be used as the center of the circle. The appropriate response to seismic events depends on the Moment Magnitude (M_W) of the seismic event according to the following protocol.

As described below, after a seismic event has been identified, the permittee must make a decision regarding the level of impact a given event could have on injection site operations, whether a response is required, and what the appropriate response will be. This decision and response framework will rely on existing seismic monitoring networks coordinated by the U.S. Geological Survey, followed by a technical evaluation of the injection well by the permittee in order to reduce the likelihood of injectate leaving the injection zone. Identification of events with sufficient Moment Magnitude (M_W) that are located within 100 km (62.14 miles) of the injection site can be accomplished through the U.S. Geological Survey's web site. [In the case of a well with a deviated or horizontal component, the midpoint between the surface-hole location and the bottom-hole location should be used as the center of the circle.] The operational protocol for responding to events will follow a "traffic light" approach (modified after Zoback 2012; National Research Council 2013) that uses three operational states:

GREEN: Seismic events not recorded or M_W <3.0: Continue normal well injection operations.

YELLOW: Seismic event with Moment Magnitude $3.0 \leq M_W < 5.0$ is observed within a 100 km (62.14 Miles) radius of the site: Injection operations must cease. The permittee will notify the EPA UIC Program Director of any such event within 24 hours, providing information on the status of the injection site. Within 45 days the permittee will evaluate the mechanical integrity of the internal well systems (Part 1) via a well test approved by the Director. If the well fails the mechanical integrity test or the permittee identifies any problems with the system that might impact underground sources of drinking water (USDW), the injection well must remain shut-in and the permittee must submit a written report as soon as possible but no later than five days from the time the permittee becomes aware of the circumstances. The written submittal will contain a description of the noncompliance 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. Upon completion of the steps to ensure mechanical integrity and the subsequent mechanical integrity demonstration, the permittee must submit the results and any other required documentation to EPA's office for final written approval. If the well has mechanical integrity and no problems that might impact USDWs are detected, the permittee must provide proof of those findings to the Director. Injection operations shall not be resumed until the Director gives written approval to recommence injection.

RED: Moment Magnitude 5.0 or greater seismic event is observed within a 100 km (62.14 Miles) radius of the site. Injection operations must cease. The permittee will notify the EPA UIC Program Director of any such event within 24 hours, providing information on the status of the injection site. Within 45

days the permittee will evaluate the integrity of the internal well systems by performing a Part 1 well test approved by the Director, as well as perform an evaluation of the external mechanical integrity of the well pursuant (Part 2) to 40 C.F.R. Part 146.8. If the well fails either mechanical integrity test or the permittee identifies any problems with the system that might impact a USDW, the injection well must remain shut-in and the permittee must submit a written report as soon as possible but no later than five days from the time the permittee becomes aware of the circumstances. The written submittal will contain a description of the noncompliance 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. Upon completion of the steps to ensure mechanical integrity and the subsequent mechanical integrity demonstration, the permittee must submit the results and any other required documentation to our office for final approval. Injection operations shall not be resumed until the Director gives written approval to recommence injection.

PART III(J)
FINANCIAL ASSURANCE MECHANISM

Cleveland-Cliffs, LLC has demonstrated adequate financial responsibility to properly plug and abandon the Class I hazardous well with surety bond #US00134830SU24A in the amount of $303,820.44. If Financial Statement Coverage is used as financial mechanism to cover the cost of plugging the injection well, this coverage must be updated on an annual basis.

PART III(K)
POST-CLOSURE PLAN

POST CLOSURE CARE, MONITORING, AND MAINTENANCE PLAN FOR INJECRTION WELLS AT BURNS HARBOR FACILITY

Upon closure of any injection wells at the Cleveland-Cliffs Burns Harbor facility, Burns Harbor shall:

1. Continue and complete any cleanup action required under 40 CFR 146.64, if applicable

2. Continue post-closure maintenance and monitoring of any ground water monitoring wells required under the applicable permits until pressure in the injection zone decays to the point that the injection well's cone of influence no longer intersects the base of the lowermost underground source of drinking water (defined as the Maquoketa Shale for the site).
   Note: Projected to be a period of 3 years after closure of all wells.

3. Submit a survey plat map to the local zoning authority designated by the Director, and to the Regional Administrator of the Region 5 EPA office. The survey plat shall indicate the location of the closed well relative to permanently surveyed benchmarks.

4. Provide appropriate notification and information to state and local authorities that have cognizance over drilling activities to enable them to impose such appropriate conditions on subsequent drilling activities that may penetrate the well's confining or injection zone.

5. Retain, for a period of three years following well closure, records reflecting the nature, composition, and volume of all injected fluids. The Director shall require Cleveland-Cliffs Burns Harbor, LLC to deliver the records to the Director at the conclusion of the retention period, and the records thereafter, be retained at a location designated by the Director for that purpose.

6. Upon closure of the well, in accordance with the approved closure plan, Cleveland-Cliffs Burns Harbor, LLC shall record a notification on the deed of the facility, or on some other instrument that is normally examined during title search, that will in perpetuity provide any potential purchaser of the property with the following information:

a. The fact that the land has been used to manage and dispose of hazardous waste(s) in deep wells.

b. The name(s) of the state agencies and/or local authorities with which the survey plat map was filed, and the address of the regional EPA office to which it was submitted.

c. The type and volume of waste injected, the injection interval or intervals into which it was injected, the name(s) of the generator(s) of the waste and the time period over which the injection occurred.

Cleveland-Cliffs Burns Harbor, LLC shall comply with the post-closure financial assurance requirements of 40 CFR 146.73, and acknowledges that the obligation to maintain financial responsibility for post-closure care survives the termination of the UIC Permit(s) or the cessation of injection. Cleveland-Cliffs Burns Harbor, LLC maintains a water monitoring well on premises that will continually sample and monitor the aquifer during and after the closure of the well.

WASTE AMMONIA LIQUOR WELL NO. 3 (WAL3)

Waste Ammonia Liquor Well No. 3 (WAL3) was drilled in August 2012 and has been injecting since March 2015. This well has been active for 4 years.

Post-Closure Plans

Cleveland-Cliffs Burns Harbor Facility injects waste ammonia liquor derived from the coke manufacturing process. This waste stream has been classified as hazardous. As such, the post-closure plan has been developed to meet the requirements of 40 CFR 146.72 for hazardous waste injection wells. Post-closure plans are to be initiated upon the permanent cessation of injection and closure of the WAL3 injection well at the Burns Harbor Facility. Any changes to the plan will be submitted prior to the closure report for approval per the 40 CFR 146.71 (a)(7)(c) requirement.

The following information is a required part of the post-closure plan:

1. **Original Pressure in the Injection Zone Prior to Injection Operations Commencing (Table L-1)**

   The pressure was measured during the construction of well WAL3, however, it is impacted from the 3 other wells currently operating at the facility by injecting into the same interval. Therefore, the original measurement is not considered a representation of true original bottomhole pressure. Using the established 0.41 psi/ft gradient and reference depth of 2,751 feet, results in a calculated initial pressure of 1,127.9 psi for the lower Mt. Simon Interval are applicable for WAL3. For this 2020 Permit Renewal, this gradient and reference depth is used also used and remains consistent with the Petition document.

2. **Anticipated Pressure in the Injection Zone at the Time of Closure (Table L-2)**

   Modeling contained in Section 3.0 of this 2020 Permit Renewal application is based upon projected maximum injection rates for year 2018 through year-end 2030 at 300 gpm for all WAL wells (combined). Incremental model pressure build-up for WAL3 is 733.2 psi. Final pressure at well closure anticipated to be 1,861.1 psi at 2,751 feet.

1. **The Predicted Time Until Pressure in the Injection Zone Decays to the Point of Well's Cone of Influence No Longer Intersects the Base of the Lowermost USDW**

The calculations in this permit renewal consider the worst-case scenario with the maximum rate of 300 gpm being injected into WAL3 well for the modeled period of 2018 to 2030.

Pressure recovery is the ability of a formation to return to near-original formation pressure once injection has ceased. The DuPont Multi-layer Pressure Model prediction of the post-injection pressure decay for Injection Well WAL3 are shown in Figure L-4. The graph shows the modeled pressure increase over the historical injection period (through year-end 2018) and modeled maximum injection period (2018 through 2030), and the pressure recovery over a modeled 30-year period, assuming that the injection ceases at year end 2030.

Pressure recovery begins immediately after injection ceases and continues to recover over the modeled 30-year period. The pressure in the lower Mt. Simon Injection Interval will equilibrate rapidly, and the driving force needed for vertical permeation of formation brines and waste from the lower Mt. Simon Sandstone into the overlying "B" Cap Shale layer at all locations will dissipate. **There will be NO cone of influence within 3 years of closure.** Asymptotic pressure recovery to the initial formation pressure will continue over the 10,000-year time frame. Since pressure recovery in the injection intervals in rapid, the injection-induced driving force for waste movement also diminishes rapidly. The results are consistent with the approved *2007 Petition for Renewal of Exemption from the Land Restrictions*).

2. **Predicted Position of the Waste Front at Closure (Table L-3)**

The predicted position of the waste front is 4,430 feet from WAL3 at year-end 2030.

3. **Status of Any Clean-ups Required Under 40 CFR 146.64**

This cited regulation concerns corrective action for wells in the Area of Review. No

corrective actions are currently underway or planned within the Cleveland-Cliffs Burns Harbor Area of Review.

1. Estimated Costs of Post-Closure Care (Table L-4)

The estimated costs of post-closure care for WAL3 are $5,000. Post-closure care, monitoring, and maintenance and is applicable for all wells at the Cleveland-Cliffs Burns Harbor Facility.

PART III(L)
POST-CLOSURE PLAN TABLES AND FIGURES

TABLE L-1
ORIGINAL PRESSURES IN INJECTION ZONE

Injection Well	Gradient* (psi/ft)	Depth (feet)	Pressure (psi)
SPL1	0.41	2,751	1,127.9
WAL1	0.41	2,751	1,127.9
WAL2	0.41	2,751	1,127.9
WAL3	0.41	2,751	1,127.9

**gradient established in the approved 2007 Petition for Renewal of Exemption from the Land Restrictions*

TABLE L-2
INCREMENTAL PRESSURE BUILD UP AND
ANTICIPATED PRESSURE AT TIME OF CLOSURE

Injection Well	Depth (feet)	Original Pressure (psi)	Incremental Pressure* (psi)	Pressure in Well at Closure (psi)
SPL1	2,751	1,127.9	499.5	1627.4
WAL1	2,751	1,127.9	731.4	1,859.3
WAL2	2,751	1,127.9	734.4	1,862.3
WAL3	2,751	1,127.9	733.2	1,861.1

**Modeled time period 2019 to 2030 in Section 3 of the 2020 Permit Renewal Application*

TABLE L-3
PREDICTED POSTION OF WASTE FRONT AT TIME OF CLOSURE

Injection Well	Distance from Well (feet)
SPL1	2,296
WAL1, WAL2, WAL3	4,430

**year-end 2030 in modeling results in Section 3 of the 2020 Permit Renewal Application*

TABLE L-4
ESTIMATED COSTS OF POST-CLOSURE CARE

Injection Well	Cost Estimate
SPL1	$5,000
WAL1	$5,000
WAL2	$5,000
WAL3	$5,000

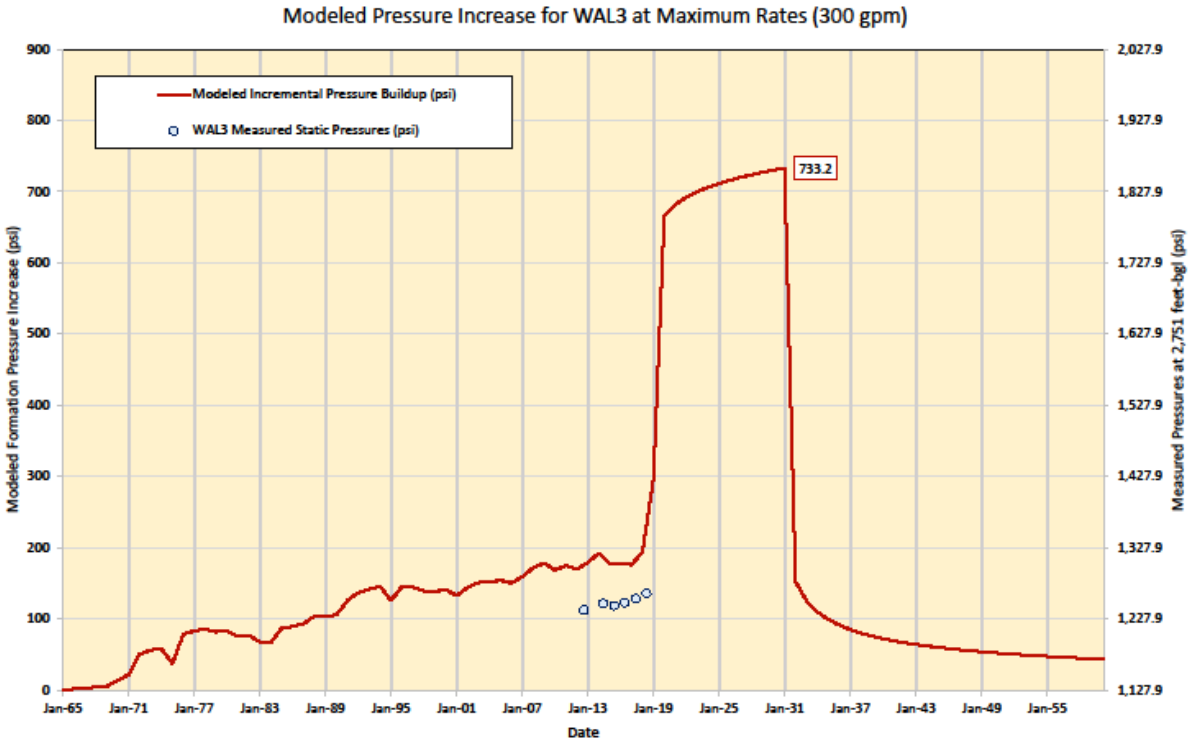


Figure L-4 Prediction of Post Closure Decay in Waste Ammonia Liquor Well No. 3 (WAL3)