UNITED STATES ENVIRONMENTAL PROTECTION AGENCY



REGION 5 77 WEST JACKSON BOULEVARD CHICAGO, IL 60604-3590

U.S. ENVIRONMENTAL PROTECTION AGENCY UNDERGROUND INJECTION CONTROL PERMIT: CLASS I HAZARDOUS

Permit Number: <u>MI-163-1W-C011</u>

Facility Name: Well #2-12

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

Republic Industrial and Energy Solutions, LLC of Phoenix, Arizona

is hereby authorized to continue operation of an existing Class I hazardous waste injection well located in Michigan, Wayne County, T3S, R9E, Section 12, SE Quarter Section, subject to the conditions of this permit. The injection zone, or zone which will contain the hazardous constituents, for this well includes the Mt. Simon, Eau Claire, Franconia-Galesville, Trempealeau, Glenwood, and lower Black River Formations between the depths of 3369 and 4550 feet. Injection is permitted into the interval of the Mt. Simon, Eau Claire, and Franconia-Galesville Formations between the depths of 3937 and 4550 feet upon the express condition that the permittee meets the restrictions set forth in this permit. The designated confining zone for this injection well includes the upper Black River, Trenton, and Utica Formations.

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, and J.

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, 42 U.S.C. § 6924(f), (g) or (m), ban or otherwise condition the authorization in this permit; 2) EPA promulgates rules pursuant to these sections which 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, or 144.41. This permit and the authorization to inject shall expire at midnight, ______ unless terminated prior to the expiration date.

Signed and Dated: DRAFT

Tera L. Fong Division Director, Water Division

PART I GENERAL PERMIT COMPLIANCE

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A. EFFECT OF PERMIT

The permittee is allowed to engage in underground injection in accordance with the conditions of this permit. Notwithstanding any other provisions of this permit, the permittee authorized by this permit shall not construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of injection, annulus or formation fluids into underground sources of drinking water (USDWs). The objective of this permit is to prevent the introduction of contaminants into USDWs if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 C.F.R. Part 141 or may otherwise adversely affect the health of persons. Any underground injection activity not specifically authorized in this permit is prohibited. 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 is not 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 laws or regulations. Nothing in this permit shall 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. <u>Modification, Revocation, Reissuance and Termination</u> The Director of the Water Division of Region 5 of EPA, hereinafter, the Director, may, for cause upon his or her initiative or upon request from any interested person, including the permittee, modify, revoke and reissue, or terminate this permit in accordance with 40 C.F.R. §§124.5, 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. <u>Transfer of Permits</u> 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 40 C.F.R. §144.5, any information submitted to EPA pursuant to this permit may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice. If a claim is asserted, the validity of the claim will be assessed in accordance with the procedures in 40 CFR Part 2 (Public Information). Claims of confidentiality for the following information will be denied:

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

E. DUTIES AND REQUIREMENTS

- 1. <u>Duty to Comply</u> 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. <u>Penalties for Violations of Permit Conditions</u> Any person who violates a permit requirement is subject to civil penalties 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. <u>Continuation of Expiring Permits</u>
 - (a) <u>Duty to Reapply</u> 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) <u>Permit Extensions</u> 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) <u>Effect</u> Permits continued under 5 U.S.C. §558(c) and 40 C.F.R. §144.37 remain fully effective and enforceable.
- (d) <u>Enforcement</u> When the permittee is not in compliance with the conditions of the expiring or expired permit, the Director may choose to do any or all of the following:
 - (1) Initiate enforcement action based upon the permit which has been continued;
 - (2) Issue a notice of intent to deny the new permit. If the permit 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) <u>State Continuation</u> 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. <u>Need to Halt or Reduce Activity Not a Defense</u> 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. <u>Duty to Mitigate</u> 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. <u>Proper Operation and Maintenance</u> 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. <u>Duty to Provide Information</u> The permittee shall furnish to the Director, within a time specified, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request within a time specified, copies of records required to be kept by this permit.
- 8. <u>Inspection and Entry</u> The permittee shall allow the Director or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:
 - (a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this permit;
 - (b) Have access to and copy, at reasonable times, any records that 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. <u>Records</u>
 - (a) The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original chart recordings for continuous monitoring instrumentation and copies of all reports required by this permit for a period of at least five years from the date of the sample, measurement or report.
 - (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 (5) years from the date the permit application was signed.

- (c) The permittee shall retain records concerning the nature and composition of all injected fluids until three (3) years after the completion of plugging and abandonment of this injection well.
- (d) The retention period specified in Part I(E)(9)(a) through (c) of this permit may be extended by request of the Director at any time. The permittee shall continue to retain records after the retention period specified in Part I(E)(9)(a) through (c) of this permit or any requested extension thereof expires unless the permittee delivers the records to the Director or obtains written approval from the Director to discard the records.
- (e) Records of monitoring information shall include:
 - (1) The date, exact place, and time of sampling or measurements;
 - (2) The name(s) of 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. <u>Monitoring</u> 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) and Part III(A) of this permit.
 - Monitoring of the nature of injected fluids shall comply with applicable analytical methods cited and described in Tables IA, IB, and IC of 40 C.F.R. §136.3 or in Appendix III of 40 C.F.R. 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. <u>Signatory Requirements</u> All reports or other information required to be submitted by this permit or requested by the Director shall be signed and certified in accordance with 40 C.F.R. §144.32.
- 12. <u>Reporting Requirements</u>
 - (a) <u>Planned Changes</u> The permittee shall give written notice to the Director, as soon as possible, of any planned physical alterations or additions to the permitted facility.
 - (b) <u>Anticipated Noncompliance</u> The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
 - (c) <u>Compliance Schedules</u> The permittee shall submit reports of compliance or noncompliance with, or any progress reports on, interim and final requirements in any compliance schedule of this permit no later than 30 calendar days following each schedule date.
 - (d) <u>Twenty-four Hour Reporting</u>
 - (1) The permittee shall report to the Director any permit noncompliance which may endanger human health or the environment. See, e.g., Part I(H)(5) of this permit. Any information shall be provided orally within twenty-four (24) hours from the time the permittee becomes aware of the circumstances. Such reports shall include, but not be limited to, the following information:
 - (i) Any monitoring or other information which indicates that any contaminant may cause an endangerment to a USDW; and
 - (ii) Any noncompliance with a permit condition, or malfunction of the injection system, which may cause fluid migration into or between USDWs; and
 - (iii) Any failure to maintain mechanical integrity.
 - (2) The permittee shall report to the Director any event which triggers an alarm or shutdown device required in Part II(B)(4) of this permit. Any information shall be provided orally within twentyfour (24) hours from the time the permittee becomes aware of the circumstances.

- (3) A written report shall also be submitted to EPA within five (5) working days of the time the permittee becomes aware of the circumstances described in either Part I(E)(12)(d)(1) or (2) of this permit. The report shall contain, at minimum, a description of the event that caused the alarm to go off and, to the best of the permittee's current knowledge, the cause(s) and potential environmental impact(s) of the event. If the event caused noncompliance with any of the terms of this permit, it shall also include:
 - (i) A description of the noncompliance and its cause;
 - (ii) The period of noncompliance, including exact dates and times;
 - (iii) If the noncompliance has not been corrected, the anticipated time it is expected to continue; and
 - (iv) Steps taken or planned to reduce, eliminate and prevent recurrence of the noncompliance.
- (e) <u>Other Noncompliance</u> 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) <u>Other Information</u> When the permittee becomes aware of its 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 ten (10) calendar days, unless a longer time period is approved by the Director.
- (g) <u>Report on Permit Review</u> Within thirty (30) calendar days of receipt of this permit, the permittee shall certify to the Director that one of its officers has read and is personally familiar with all terms and conditions of this permit.
- 13. <u>Hazardous Waste Treatment, Storage, and Disposal Facility Requirements</u> The permittee shall comply with the requirements for wells injecting hazardous waste listed at 40 C.F.R. §144.14.

F. CLOSURE

- <u>Closure Plan</u> 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 at 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. <u>Plugging and Abandonment</u> The permittee must receive the approval of the Director before plugging the well and shall plug and abandon the well consistent with 40 C.F.R. §146.71, as provided in the Closure Plan at Part III(B) of this permit. Within 60 calendar days after plugging the well, the permittee shall submit a Closure Report to the Director. The report shall be certified as accurate by the permittee and by the person who performed the plugging operation (if other than the permittee), and shall consist of either:
 - (a) A statement that the well was plugged in accordance with the Closure Plan previously approved by the Director; or
 - (b) If the actual closure differed from the approved plan, a statement defining the actual closure and explaining why the Director should approve such deviation. If the Director determines that a deviation from a previously approved plan may endanger USDWs, the permittee shall replug the well as required by the Director.
- 3. <u>Revision of Closure Plan</u> If the permittee finds it necessary to change the Closure Plan, it shall submit a revised plan to the Director for approval with the next monthly report.
- 4. <u>Notice of Intent to Close</u> 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. The permittee shall submit any proposed significant revision to the method of closure reflected in the Closure Plan for approval by the Director at least 60 calendar days before closure, unless a shorter period of time is approved by the Director.
- 5. <u>Temporary Disuse</u> If the permittee wishes to cease injection for longer than 24 consecutive months, it may keep the well open only if it:
 - (a) Has received authorization from the Director; and

- (b) Has described actions or procedures, satisfactory to the Director, that it 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.
- 6. <u>Standards for Well Closure</u> 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 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 at 40 C.F.R. §§ 146.72 and 146.73.

- 1. <u>Post-Closure Plan</u> The permittee shall comply with the approved plan for postclosure maintenance and monitoring. 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 the permit file for this permit and the permittee shall maintain and comply with this plan as if it were fully set forth in the permit. The obligation to implement the post-closure plan survives the termination of this permit or the cessation of injection activities.
- 2. <u>Duration of Post-Closure Period</u> 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 expiration of the post-closure care period, 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. <u>Post-Closure Corrective Action</u> The permittee shall continue and complete any cleanup action required under 40 C.F.R. §146.64.
- 4. <u>Post-Closure Groundwater Monitoring</u> The permittee shall continue to conduct any groundwater monitoring 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 base of the lowermost USDW as identified in the permit file for this

permit, or as defined by the Director. 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. <u>Survey Plat</u> 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 Director.
- 6. <u>Notification to State and Local Authority</u> The permittee shall provide notification and information to State and local authorities as required by 40 C.F.R. §146.72(b)(4).
- 7. <u>Retention of Records</u> 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. <u>Notice in Deed to Property</u> 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. <u>Financial Responsibility for Post-Closure Care</u> The permittee shall submit an approved demonstration of financial responsibility for post-closure care, as required in 40 C.F.R. §146.73, to the Director prior to the commencement of injection. 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. <u>Standards</u> 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 satisfy the requirements of 40 C.F.R. §146.8, unless EPA informs the permittee that it is not possible to witness the test.
- 2. <u>Periodic Mechanical Integrity Testing [§146.8]</u> The permittee shall conduct the mechanical integrity testing as follows:
 - (a) Long string casing, injection tubing and annular seal shall be tested by means of an approved pressure test in accordance with 40 C.F.R. §146.8(a)(1) at least once every twelfth month beginning with the date of the last approved demonstration and in the following circumstances: 1) whenever there has been a well workover in which tubing is removed from the well; 2) the packer is reset; or 3) when loss of mechanical

integrity becomes suspected during operation. The pressure test shall be performed at 100 psig over the maximum injection pressure set in Part III(A) or 500 psig, whichever is greater;

- (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, oxygen activation, or other approved log shall be run prior to the commencement of injection, and thereafter at least once every 24 months, beginning with the date of the last approved demonstration to determine the absence of upward fluid migration. If after three such demonstrations no upward fluid migration has been detected, the permittee may request that the frequency be reduced to at least once every five years. The Director may require such tests whenever the well is worked over. The permittee must submit logging procedures to the Director for approval before running logs for the purpose of meeting this requirement;
- (d) An approved casing inspection log shall be run before injection commences and whenever the permittee conducts a workover in which the injection tubing is pulled. The permittee may request the Director to waive this requirement if a satisfactory casing inspection log has been run within the previous year; and
- (e) The permittee may use any other test approved by the Director in accordance with the procedures in 40 C.F.R. §146.8(d).
- 3. <u>Prior Notice and Reporting</u> The permittee shall notify the Director in writing 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. Failure to provide this prior notice will invalidate any successful mechanical integrity demonstration unless the shorter notice time was approved by the Director. Reports of mechanical integrity demonstrations which include logs must include an interpretation of the results by a knowledgeable log analyst. The permittee shall report the results of a mechanical integrity demonstration thereof and the results must be retained on site in accordance with Part I(E)(9)(a).
- 4. <u>Gauges</u> The permittee shall calibrate all gauges used in mechanical integrity demonstrations to an accuracy of not less than one-half (0.5) 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 5 psi increments. Failure to calibrate the gauges will invalidate any successful mechanical integrity demonstration.

- 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. (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 written approval to recommence injection.
- 6. <u>Mechanical Integrity Testing on Request From Director</u> The permittee shall demonstrate mechanical integrity at any time upon written notice from the Director.

I. FINANCIAL RESPONSIBILITY

- 1. <u>Financial Responsibility</u> 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. A copy of the approved financial assurance mechanism for closure costs is in Part III(B) of this permit. The permittee shall update this mechanism to include post-closure costs before injection commences.
 - (a) Pursuant to 40 C.F.R. §§ 144.62(a), 146.71, 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, 146.72, and 146.73. 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 permittee shall follow the method described in 40 C.F.R. §144.62(b) or other method approved by the Director.
 - (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, 146.72, and 146.73, during the operating life of the facility.
- 2. <u>Insolvency</u> The permittee must notify the Director within ten 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) Loss by the institution issuing the financial mechanism of its authority to issue such an instrument.
- 3. <u>Notification</u> The permittee must notify the Director by certified mail and by email of the commencement of voluntary or involuntary proceedings under Title 11 (Bankruptcy), U.S. Code naming the permittee as debtor, within ten 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. <u>Establishing Other Coverage</u> The permittee must establish other financial assurance or liability coverage acceptable to the Director, within 60 calendar days of the occurrence of the events identified in Part I(I)(2) or (3) of this permit.

J. CORRECTIVE ACTION

- 1. <u>Compliance</u> The permittee shall comply with 40 C.F.R. §146.64.
- 2. <u>Corrective Action</u> 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 which penetrate the confining zone for this well are known to be present in the Area of Review (AOR). Within 30 days of written notification from the Director that there are wells in the AOR which penetrate the confining zone and either are improperly plugged, completed, or abandoned, or for which adequate plugging or completion information is unavailable, the permittee shall submit a Corrective Action Plan with a schedule for its implementation for approval by the Director. The AOR is specified in the administrative record for this permit.
- 3. <u>Prohibition of Movement of Fluids into USDWs</u> Should upward migration of fluids through the confining zone of this permitted well be discovered within the AOR for this well, the permittee shall immediately cease injection into this well until the situation has been corrected and reauthorization has been given by the Director. The permittee shall immediately notify EPA and the Michigan

Department of Environmental Quality (MDEQ) within 24 hours of the discovery of the problem and submit written confirmation transmitted by letter within five days. This includes but is not limited to fluid migration through any previously unknown, improperly plugged or unplugged well due to the injection of permitted fluids, or due to problems with the casing of this well due to the injection of permitted fluids.

4. <u>Corrective Action under Section 3004(u) of RCRA</u> - The permittee shall comply with corrective action requirements for all solid waste management units at this facility, as required by any RCRA permit issued to this facility.

K. INJECTION OF RESTRICTED HAZARDOUS WASTES

- 1. <u>Further Requirements</u> 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(E) of this permit as long as it meets all other requirements of this permit and applicable regulations and at least one of the following remains in effect:
 - (a) an extension of the effective date of a prohibition has been granted pursuant to 40 C.F.R. §148.4 with respect to such waste;
 - (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;
 - (c) land disposal ban dates have not been promulgated for the hazardous constituents of the wastestream; or
 - (d) the concentration of hazardous constituents in each RCRA hazardous waste are below the treatment standards for each specific RCRA waste code found at 40 C.F.R. §268.40, Table entitled "Treatment Standards for Hazardous Waste."
- 2. <u>Injection Limitations</u> 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. <u>Exemption/Permit Modifications</u> This permit may be modified to permit injection of wastes other than those listed in Part III(D) of this permit or wastes in concentrations in excess of those listed in Part III(D) of this permit provided an exemption to statutory restrictions has been obtained pursuant to the provisions of 40 C.F.R. Part 148.

- 4. <u>False Information</u> The permittee must notify the Director within 48 hours after obtaining knowledge that information submitted in support of a request for exemption under 40 C.F.R. Part 148 is false, inaccurate, or incomplete.
- 5. <u>Petition Termination</u> 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.
- 6. <u>Petition Renewal</u> The Director may require a new or updated 40 C.F.R. Part 148 demonstration prior to renewing this permit if the Director has determined that the basis for granting the exemption to the statutory restriction is affected by new information.

L. COMMENCEMENT OF INJECTION

Injection into the well is prohibited until the permittee obtains written approval from the Director. Approval will not be granted until the following conditions are met:

- 1. <u>Information to be Submitted</u>: The operator has submitted and obtained the Director's written approval of a personnel training and staffing plan demonstrating that all operators who will be on site during the operation of the injection well have adequate training, including training on deep well operations, and providing for continuing education for all operators on at least an annual basis.
- 2. <u>Director Inspection</u> All well monitoring equipment is operational and has been inspected by EPA or its representative in accordance with 40 C.F.R. §144.51(m).
- 3. <u>Mechanical Integrity Demonstration</u> Mechanical integrity of the well has been demonstrated in accordance with 40 C.F.R. §146.8(a)(1) and (2) and with Part I(H)(1) and (2) of this permit.
- 4. <u>Warning and Shut-off Systems</u> The automatic warning and shut-off system required in Part II(B)(4) of this permit must pass a test witnessed by an authorized representative of the Director subjecting it to simulated failure conditions. The permittee must certify that a trained operator will be on site at all times when the well is operating to implement the system.
- 5. <u>Notice to Inject</u> The permittee is prohibited from commencing injection until it receives written notice from the Director that the well has been constructed in compliance with this permit and that Part III(E) has been modified to add any approved sources.

M. PERMIT REOPENER

This permit may be reopened after an exemption to the restricted hazardous waste land disposal prohibition has been issued or modified under 40 C.F.R. Part 148 to incorporate any conditions which may have been attached to such exemption.

PART II WELL SPECIFIC CONDITIONS FOR UIC PERMITS

A. CONSTRUCTION

- 1. <u>Siting</u> The injection well shall inject only into the formation(s) at the depths listed on the cover page of this permit. At no time shall injection occur into a formation which is above the lowermost formation containing, within one quarter mile of the well bore, an underground source of drinking water.
- 2. <u>Casing and Cementing</u> Notwithstanding any other provisions of this permit, the permittee shall case and cement the well 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. <u>Tubing and Packer Specifications</u> The permittee shall inject only through tubing with a packer set within the long string casing within 100 feet above the top of 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. <u>Wellhead Specification</u> The permittee shall maintain a female coupling and valve on the wellhead, to be used for independent injection pressure readings.
- 5. <u>Site Security</u> In order to help prevent any improper use and to help protect the integrity of the injection well, the operator must construct and maintain a fence around the facility and provide 24 hour guard service to preclude access by unauthorized personnel.

B. OPERATIONS

- 1. <u>Injection Pressure Limitation</u> Except during stimulation, the permittee shall not cause or permit the injection pressure at the wellhead to exceed the maximum limitation which is specified in Part III(A) of this permit or initiate fractures or propagate existing fractures in the injection zone. In no case shall injection pressure initiate fractures or propagate existing fractures or propagate existing fractures in the confining zone or cause the movement of injection or formation fluids into a USDW. Prior to performing any stimulation of the well, the permittee is required to submit stimulation procedures as well as a list of all products to be used and their chemical composition for review and approval by EPA.
- 2. <u>Additional Injection Limitation</u> No substances other than those identified in Part III(E) 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. <u>Annulus Fluid and Pressure</u> 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. The permittee shall submit any proposed change in the annulus fluid for the approval of the Director before

implementation. The permittee shall maintain a positive pressure on the annulus over the entire length of the tubing as specified in Part III(A) of this permit, except during workovers or times of annulus maintenance.

- 4. <u>Annulus/Tubing Pressure Differential</u> Except during workovers or times of annulus maintenance, the permittee shall maintain, over the entire length of the tubing, a pressure differential between the tubing and annulus as specified in Part III(A) of this permit.
- 5. <u>Warning and Shut-off System</u> The permittee shall install an automatic warning and automatic shut-off system prior to the commencement of injection. The permittee shall continuously operate and maintain the system after the commencement of injection and immediately stop injection if any of the following situations occur:
 - (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 prior to receiving authorization to inject, and at least once every twelfth month after the last approved demonstration. These tests must involve subjecting the system to simulated failure conditions and must be witnessed by the Director or his or her representative unless the Director waives this requirement.

6. <u>Trained Operator</u> - A trained operator must be on site at all times during operation of the well. Prior to receiving authorization to inject the permittee must submit to EPA a personnel training and staffing plan that shows adequate training for all operators on site during the operation of the injection well. Each operator is required to undergo at least 24 hours of deep well operations refresher training during each calendar year.

7. Precautions to Prevent Well Blowouts

(a) The permittee shall maintain on the well at all times a pressure 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 shall be prevented from entering the casing or tubing. The well bore shall be filled with a high specific gravity fluid during workovers to maintain a positive (downward) gradient and/or a plug shall be installed that can resist the pressure differential. A blowout preventer shall be kept in proper operational status during workovers which involve tubing or packer removal.

- (b) Where the injected wastes have the potential to react with the injection formation to generate gases, the permittee shall follow the procedures below to assure that a backflow or blowout does not occur:
 - (1) Limit the temperature, pH or acidity of the injected waste; and
 - (2) Develop procedures necessary to assure that pressure imbalances do not occur.
- (c) If a blowout occurs, the permittee shall not resume operation until the Director gives written approval to recommence injection.

C. MONITORING

- 1. <u>Sampling Point</u> The injection fluid samples shall be taken at the sampling locations specified in the approved Waste Analysis Plan for this permit.
- 2. <u>Continuous Monitoring Devices</u> The permittee shall install continuous monitoring devices and use them to monitor injection pressure, injection volume, sight glass level, pH, 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) and Part III(A) of this permit and maintained for EPA's inspection at the facility.
- 3. <u>Waste Analysis Plan</u> The permittee shall comply with the approved Waste Analysis Plan which describes the procedures used to monitor the nature of injected fluids and the procedures which will be carried out to comply with Part I(E)(10) of this permit. The Waste Analysis Plan is a part of the permit file and compliance with this plan is a condition of the permit. A copy of the approved Waste Analysis Plan shall be kept at the facility. The permittee shall assure that the Waste Analysis Plan remains accurate and the analyses remain representative and shall so certify at the time of the annual report. As provided in the Waste Analysis Plan, the permittee shall sample and analyze for the appropriate parameters every waste load that comes into the facility for injection to ensure that the injected waste composition corresponds to the previously approved waste type.
- 4. <u>Ambient Monitoring</u> 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. The permittee shall submit plans for this testing at least 30 days before the testing is planned, and is prohibited from performing the testing unless the Director has given written approval.

- 5. <u>Compatibility of Well Material</u> The permittee shall continuously monitor corrosion of the construction material(s) by a method approved by the Director. Authorization to inject shall not be given until the corrosion monitoring plan has been approved by the Director. The approved corrosion monitoring plan is identified in Part III, H of this permit. Continuous corrosion monitoring shall be operational at the time of the commencement of injection. The permittee shall report loss of mass, thickness, cracking, pitting and other signs of corrosion at least monthly.
- 6. <u>Temperature Monitoring</u> The permittee shall monitor injectate temperature at least once daily on each day during which injection occurs. If injection occurs during more than one eight-hour period in a day, temperature must be recorded at least once every six hours. The monitoring results shall be submitted to the Director as specified in Part II(D)(1)(f) of this permit.
- <u>Calibration of Equipment</u> The permitteee shall perform calibration of measuring devices, including but not limited to flow meters, injection and annulus pressure recorders, pH meters, at least annually and during any maintenance performed on these devices.
- 8. <u>Compliance Audit</u> Within twelve months after commencing injection, and at least every twenty four months thereafter, the permittee shall obtain a compliance audit, including an on-site review, from an independent third party. In the twenty-four month period between independent third party audits, the permittee shall also conduct an internal compliance audit. The auditor's reports shall evaluate the permittee's compliance with all provisions of the permit and shall be submitted to the permittee and to the Director within two months of the audit. If the audit report identifies deficiencies, the permittee shall expeditiously address those deficiencies. Obtaining the compliance audit or acting on its recommendations shall not excuse the permittee from liability for any penalties or sanctions for violation of this permit.
- 9. <u>Prior Notice</u> 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(F) 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.

D. REPORTING REQUIREMENTS

The permittee shall submit all required reports to the Director at the following address no later than the end of the month following the reporting period. Monitoring reports under Part II(D)(1), (2), and (3) are not required until the initial authorization to inject has been granted or otherwise required by the Director:

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

Unless business confidentiality is claimed under Part I(D) of this permit, the permittee shall also make copies of all required reports publicly available in a document repository maintained by the permittee and located either in the vicinity of the facility or on a website. The permittee must comply with the approved Document Repository Plan located in Part III, I of this permit.

- 1. <u>Monthly Reports</u>. The permittee shall submit monthly reports of the following information:
 - (a) Results of the injection fluid analyses specified in Part III(A) and (E) of this permit and the approved Waste Analysis Plan located in Part III, G of 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) A tabulation of maximum injection pressure, maximum and minimum sight glass levels, maximum and minimum annulus pressure, injectate pH, flow rate, injectate specific gravity, and minimum differential between simultaneous measurements of injection pressure and annulus pressure for each day of the month;
 - (c) Appropriately scaled graphs representing the continuous monitoring as required in Part II(C)(2) of this permit showing injection pressure, annulus pressure, flow rate, pH, injection volume, and sight glass levels. One graph must include, at a minimum, daily maximum injection pressure and daily average flow rate on a single monthly chart. A second graph must display the daily maximum and minimum sight glass levels;
 - (d) A statement of the total volumes of fluid injected to date, in the current calendar year and in the current calendar month. If non-waste-water (for instance, a continuous flush of water for dilution) is injected, the total, annual, and monthly injected volumes for wastewater only, as well as total injected volume must be reported;

- (e) A tabulation of the dates, amounts and types of liquid added to or removed from the annulus system during the month, and the cumulative additions and the cumulative subtractions for the current month and each of the past 12 months;
- (f) Any noncompliance with conditions of this permit, including but not limited to:
 - (1) Any event that exceeds operating parameters for annulus pressure or injection pressure or annulus/tubing differential as specified in the permit; or
 - (2) Any event which triggers an alarm or shutdown device required in Part II(B)(4) of this permit;
- (g) The results of the continuous corrosion monitoring required in Part II(C)(5) of this permit;
- (h) A description of the repair and maintenance, routine or otherwise, performed on any component of the injection or annulus system during the previous month. The description shall include the reasons for performing the repair or maintenance, and, if a component failed or had the potential to fail, the outcome of the repair or maintenance activity and the life expectancy of the new or repaired components;
- (i) Any other monitoring required on a monthly basis.
- 2. <u>Annual Reports</u> The permittee shall report the following at least every twelfth month from the effective date of this permit:
 - (a) Results of the injection fluid analyses specified in Part III(A) and (E) of this permit, and the approved Waste Analysis Plan as recorded in the permit file 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. This report must include statements showing that the permittee has met the requirements of Part I(E)(10), Part II(B)(2), and Part II(C)(3) of this permit.
 - (b) Results of pressure fall-off testing required by 40 C.F.R. §146.68(e) and results of all approved temperature, noise, oxygen activation, or other logs required by Part I (H)(2)(c) of this permit.
 - (c) Results of any calibration of measuring equipment as required in Part II(C) of this permit.
 - (d) Documentation demonstrating the continuing operator training required in Part II (B)(5) of this permit.
 - (e) Compliance audit report as required in Part II(C)(8) of this permit.

3. <u>Reports on Well Tests and Workovers</u> - Within 30 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 the permittee does not make these reports within the required time, the Director may consider the tests to have been failed.

PART III ATTACHMENTS

These attachments include, but are not limited to, permit conditions and plans concerning operating procedures, monitoring and reporting, as required by 40 C.F.R. Parts 144, 146 and 148. The permittee shall comply with these conditions and adhere to these plans as approved by the Director, as follows:

- A. SUMMARY OF OPERATING, MONITORING AND REPORTING REQUIREMENTS
- B. CLOSURE PLAN
- C. CONSTRUCTION DETAILS
- D. GENERAL WASTE CHARACTERISTICS
- E. LIST OF APPROVED SOURCES
- F. MECHANICAL INTEGRITY TESTING
- G. WASTE ANALYSIS PLAN
- H. CORROSION MONITORING PLAN
- I. DOCUMENT REPOSITORY PLAN
- J. SEISMICITY RESPONSE

ATTACHMENT A SUMMARY OF OPERATING, MONITORING AND REPORTING REQUIREMENTS

CHARACTERISTIC	LIMITATION	MINIMUM MONITORING FREQUENCY	MINIMUM REPORTING FREQUENCY
	0.00 : 1		.1.1
Injection Pressure ¹	968 psig maximum ¹	continuous	monthly
Annulus Pressure	100 psig minimum	continuous	monthly
Annulus/Tubing Differential	100 psig minimum above operating injection pressure	continuous	monthly
Injection Rate ² (Average for both wells #1-12 and #2-12)	166 gpm	continuous	monthly
Injection Rate (Maximum instantaneous)	270 gpm	continuous	monthly
Sight Glass Level		continuous	monthly
Annulus Fluid Loss		monthly	monthly
Cumulative Volume		daily	monthly
Temperature ³		6-hour intervals	monthly
Corrosion Monitoring		monthly	monthly
Repair and Maintenance		NA	monthly
Toxicity Characteristic List		annually	annually
Fingerprint Analysis		per load	monthly
Chemical Composition and Physic Characteristics of Injected	al Oilfield Brine ⁴	annually	annually
pH of Injected Fluids		continuous	monthly
Specific Gravity of Injected Fluids	1.10	per load	monthly

¹ The limitation on the injection pressure will serve to prevent injection-formation fracturing. This limitation was calculated using the following formula: $[\{0.726 - (0.433 \text{ psi/ft})(\text{specific gravity})\} \times \text{depth}] - 14.7 \text{ psi}$. The maximum injection pressure is dependent upon the depth and specific gravity of the injected fluid. The lower Black River formation at 3937 feet was used as the depth and a specific gravity of 1.10 was used for the injected fluid. The fracture gradient of 0.726 was determined by site specific testing of the injection zone.

² Average injection rate shall be reported using the calculation formulas and form on page A-2 of this permit.

³ Frequency of temperature measurements will be in accordance with Section II(C)(6) of this permit. Reporting of injectate temperature will be in accordance with Section II(D)(1)(f) of this permit.

⁴ As specified in Part III(E) of this permit.

Calculation of Average Injection Rate

CURRENT REPORTING YEAR

CURRENT REPORTING MONTH _____

Date (month, year) of the first injection into either well at the Citrin Road Facility

CURRENT MONTH (all volumes in gallons)

	Injected Waste	Injected Non-Waste	Total injected
MI	Well #1-12		
Current Month			
Since facility first injected			
MI	-163-1W-C011, v	Vell #2-12	
Current Month			
Since facility first injected			
		Lifetime Combined	

Conversion factors

365.25 days per year \div 12 months per year = 30.4375 days per month 30.4375 days per month \times 1440 minutes per day = 43,830 minutes per month

Calculations

Whole number of months of injection _____

lifetime number of months of injection × 43,830 minutes/month

= _____ minutes of injection

Lifetime combined injected volume _____ × ____ minutes of injection

= _____ gpm average injection rate

Hazardous Substances Limitations and Reporting

RCRA <u>CODE(S)</u>	<u>NAME</u>	LIMIT <u>(mg/ml)</u>	MINIMUM ⁵ MONITORING <u>FREQUENCY</u>	MINIMUM REPORTING <u>FREQUENCY</u>
F039, P004	Aldrin	200	monthly/per load	monthly
U021	Benzidine	200	monthly/per load	monthly
P016,K017	sym-Dichloromethyl ether	160	monthly/per load	monthly
F020,F021, F022,F026, F027,F028, F032,F039, F032,K043, K099	Hexachlorodibenzo-p-dioxins	6	monthly/per load	monthly
K174,K178	Hexachlorodibenzo-p-dioxins, all	6	monthly/per load	monthly
F039,P082	Nitrosodimethylamine	200	monthly/per load	monthly
F039,K174, K178	1,2,3,4,6,7,8,9- Octachloro- dibenzofuran	6	monthly/per load	monthly
F039,K174, K178	1,2,3,4,6,7,8,9- Octachloro- dibenzo-p-dioxin	6	monthly/per load	monthly
F020,F021, F022,F026, F027,F028, F032,F039, F032,K043	Tetrachlorodibenzo-p-dioxins (TCDD)	30	monthly/per load	monthly
K174,K178	Tetrachlorodibenzo-p-dioxins (TCDD)	30	monthly/per load	monthly
P110	Tetraethyl lead	100	monthly/per load	monthly

⁵The monthly chemical analyses for the specific chemicals and waste codes required by this table apply to posttreatment "source" material for injection. A "per load" fingerprint analysis is required for each incoming waste shipment received and for each batch of post-treatment source material as specified in Part III(E) to confirm the general characteristics of the materials. The fingerprint analysis of the general characteristics of the source is not specific to these individual waste codes.

Attachment B	
Closure Plan	

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							Closur	e Flan			Page	B-1 of 4
							C	MB No. 2040-	0042 Ap	proval Expire	s 12/31/2018	
.0.E	DΛ			United S	States E Wa	Environmer ashington,	ntal Protection DC 20460	n Agency				
YE	FA		PLU	GGING	AN	D ABA	NDONN	IENT PL	AN			
Name an	d Address of Fa	acility				N	lame and Add	ress of Owne	r/Operator			
Republ	ic Industrial and	l Energy Solution	ons, LLC				Republic Ind	ustrial and En	ergy Solution	s, LLC		
Romuli	us MI 48174						284/0 Citrin Romulus MI	48174				
litoinui				Sta	ate			County		Permit	Number	
Loc	ate Well and O	utline Unit on			Л			Wavne		MI-163-	-1W-C011	
300	1011 Flat - 640 F	Acres		Su	rface L	ocation De	escription					
		N		ev	X AIA A		-6 SE 4/4 -4		Continu 12	Taurahin	25 Damas	OF
			31	<u>~</u> 1/4 C	of <u>NW</u> 1/4	of <u>SE</u> 1/4 of	1/4 of	Section 12		Range	<u>9</u> E	
		╾┠╴┽╼┝		Lo	cate w	ell in two d	lirections fro	m nearest line	es of quarter	section and	drilling unit	
	_+ ⊢+ -	₋┠ ╶┽ ┝		Su	rface							
				Lo	cation	1000 ft. frn	n (N/S) <u>N</u> L	ine of quarte	r section			
	-+ <u> -</u> -+ -	╶┠╴┽╼┝		an	d 280	ft. from (E	/W) <u>W</u> Line	of quarter se	ction.			
w				_	_	TYPE OF /	AUTHORIZATI	NC	_	WELL /	ACTIVITY	
	i i i	l i i			X Indi	vidual Peri	mit			SS I		
					Area	a Permit				SS II		
		—┣— ┿ —┝	+		Rule	e			E E	Brine Dispos	al	
	i i i				Number	of Wells	1			Inhanced Re	covery	
										lydrocarbon	Storage	
	<u> i i i i </u>									SS III		
		S		Le	ase Na	me Disposal	(MI, M-452)		Well Num	ber 2-12		
	CA	SING AND TUB		AFTER PLU	JGGING	3		METH	IOD OF EMPL	ACEMENT O	F CEMENT P	LUGS
SIZE	WT (LB/FT)	TO BE PUT IN	WELL (FT)	TO BE LEF	T IN W	ELL (FT)	HOLE SIZE	X Th	e Balance Me	ethod		
16"	60	1	77'		177'		20"] Пты	The Dump Bailer Method			
13 3/8"	48	5	598'		598'		17.5"		e Two-Plua N	lethod		
9 5/8"	36	1	444'		1444'		12 1/4"	Ot	ner			
7"	26	39	983'		3983'		8 3/4"					
	CEMENTING	TO PLUG AND	ABANDON DA	ATA:		PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of H	lole or Pipe in	which Plug Wil	l Be Placed (inche		8 3/4"	6.276"					
Depth to	Bottom of Tub	ing or Drill Pip	e (ft			4550'	3950'					
Sacks of	Cement To Be	Used (each plu	g)			207	719					
Slurry Vo	olume To Be Pu	mped (cu. ft.)				244	848					
Calculate	ed Top of Plug	(ft.)				3950'	3'					
Measure	d Top of Plug (i	f tagged ft.)				TBD	TBD					
Slurry W	t. (Lb./Gal.)					15.6	15.6					
Type Cer	nent or Other M	laterial (Class I	II)			Class A	Class A					
	LIS	T ALL OPEN H	OLE AND/OR	PERFORATE	ED INTE	RVALS AN	ID INTERVAL	S WHERE CAS	ING WILL BE	VARIED (if a	iny)	
	From			То				From			То	
Non	e											
Estimate	d Cost to Plug	Wells										
3	6225,225.00 (Co	ost Estimate bre	akdown Attac	hed)								
					(Certifica	ation					
l c att inf po	ertify under the achments and formation is tru ssibliity of fine	e penalty of law that, based on e, accurate, an and imprison	v that I have p my inquiry o d complete. nent. (Ref. 4	personally ex f those indiv I am aware 0 CFR 144.3	xamine viduals that th 32)	d and am f immediate ere are sig	amiliar with t ely responsib nificant pena	he informatio le for obtaini lties for subn	n submitted ng the inforn nitting false i	in this docur nation, I belio nformation,	nent and all eve that the including the	9
Name ar	d Official Title	(Plassa turna -	r print)		ei~-	aturo				I	Date Signer	4
ivanie an		Thease type 0			sigr	atule	H	110	1			2021
	Stephen L. I	Celly, Senior Pr	oject Manage	r			Myr	K K Fel	5		July 7,	2021
EPA Forr	n 7520-14 (Rev	. 12-11)						/				

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REPUBLIC INDUSTRIAL AND ENERGY SOLUTIONS, LLC WELL NOS. 1-12 (API NO: 21-163-M452) & 2-12 (API NO: 21-163-M453) UIC PERMIT NUMBERS: MI-163-1W-C010 & MI-163-1W-C011 ROMULUS, MICHIGAN

PLUGGING & ABANDONMENT COST ESTIMATE (PER WELL)

Prepared April 20, 2021

	Cost Category	Estimated Cost
1	Pressure Falloff Test with Analysis	\$15,000
2	Static Temperature Survey	10,000
3	Location Preparation	6,000
4	Workover Rig	52,000
5	Well Rentals (BOP, Workstring, etc)	7,500
6	Miscellaneous Rentals (Fork-Lift, etc.)	3,500
7	Packer Removal	6,500
8	Cementing (cement retainer, Pump truck, cement, etc.)	42,000
9	Brine Water & Hauling	4,500
10	Excavating & Welding	3,000
11	Pressure Gauge & Recorder	1,500
12	Disposal Costs (Tubing, Packer, Wellhead)	6,000
13	On-Site Supervision & Expenses	19,250
14	Management Fee, Project Management & Report Preparation	28,000
	Subtotal	204,750
	Contingency @ 10%	20,475
	Total Estimated Well Closure Cost (per Well)	\$225,225

"in accordance under adopted reference 40 CFR 270.11(d), the Principal, desires to purchase the referenced facility. This bond is only valid upon completion of ownership transfer." MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY - OIL, GAS, AND MINERALS DIVISION

POND FOR CONFORMANCE	MINERAL WELL OPERATIONS BOND						
BUND FOR CONFORMANCE	Bond number	Well name and number					
By authority of Part 625, Mineral Wells, Act 451 PA 1994, as amended. Non-submission and/or falsification of this information may result in fines and/or imprisonment.	880306	306 Detroit Industrial Well EGT No. 2-12					
	Part 625 Bond Amounts		and the second sec				
ndividual test well permit	Blanket test well permi	1	Disposal, storage, or brine well				
\$5,500.00 for a depth of 0 to 1000'	S5,500.00 for 1 to 2	24 wells	S33,000.00 for a single well				
\$11,000.00 for a depth greater than 1000' to 2000'	S11,000.00 for 25	o 49 wells	Disposal storage bring and individual				
\$22,000.00 for a depth greater than 2000' to 4000'	\$16,500.00 for 50	o 75 wells	lest well				
333,000.00 for a depth greater than 4000	\$22,000.00 for 76	o 200 wells	\$440,000.00 for blanket coverage				
epublic Industrial and Energy Solutions, LLC, 28470 C	itrin Drive, Romulus, MI	48174					
B	(Name and Address of Princ	cipal)					
the State of Delaware	as Principal and						
vergreen National Indemnity Company, 6140 Parkla	nd Blvd, Ste 321, Mayfiel	d Heights, OH 4	4124				
	(Name and Address of Sur	ety)					
corporation organized and existing under the laws of the Sta	te of Ohio		and duly authorized to transact				
isiness in the State of Michigan, as Surety, are held and firm	ly bound unto the State of I	Aichigan In the pe	nal sum of				
wo Hundred Twenty Five Thousand Two Hundred Tv	venty Five and no/00		Dollars				
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ATTACHMENT D GENERAL WASTE CHARACTERISTICS

<u>Source of Waste</u> – Republic Industrial and Energy Solutions, LLC (Republic) of Romulus, Michigan will operate the existing Class I facility in Romulus, Michigan. Republic plans to use this facility to dispose of hazardous and non-hazardous wastes as defined under RCRA, as specified at the 40 CFR 261.4.

<u>Limitation</u> – Only approved wastes, as specified in Attachment E of this permit, generated by clients of Republic may be injected into the well #1-12. All the other fluids entering this borehole must be approved by the Director for purposes of well testing, stimulation, workovers, or as buffer fluids.

<u>Prohibitions</u> – The permittee is prohibited from injecting wastes with either D001 (ignitable) or D003 (reactive) waste codes. In addition, no injectate containing PCBs at a concentration greater than or equal to 50 ppm shall be injected.

<u>Waste Analysis Plan</u> – This plan will be entered into this record and is an integral part of the permit.

<u>Potential Waste Streams</u> – At this time, no waste streams have been approved for disposal in the #1-12 well. Because this is a commercial well, it is not possible to list all potential waste streams that could be disposed of in the well. The likely hazardous waste streams will include:

- Diluted acid waste waters, such as used in metal cleaning and steel pickling operations, which would have a low pH and possibly an elevated level of heavy metals, such as chromium, cadmium, lead;
- Landfill leachates. Leachate may be from municipal and/or hazardous waste landfills; and
- Solvent-water mixtures containing less than 10% solvents. These solvents would include, but not be limited to: tetrachloroethylene, trichloroethylene, methylene chloride, xylene, acetone, methanol, and carbon tetrachloride.

Non-hazardous waste streams would likely include similar waste streams as above except at nonhazardous levels, as well as various rinsates, waste waters from manufacturing processes, landfill leachates from municipal landfills, and brine from oil and gas operations (Class II wells fluids).

	F									
D C	odes	Codes		KC	odes			P C	odes	
D002	D039	F001	K001	K038	K102	K157	P001	P041	P084	P185
D004	D040	F002	K002	K039	K103	K158	P002	P042	P085	P188
D005	D041	F003	K003	K040	K104	K159	P003	P043	P087	P189
D006	D042	F004	K004	K041	K105	K160	P004	P044	P088	P190
D007	D043	F005	K005	K042	K106	K161	P005	P045	P089	P191
D008		F006	K006	K043	K107	K169	P006	P046	P092	P192
D009		F007	K007	K044	K108	K170	P007	P047	P093	P194
D010		F008	K008	K045	K109	K171	P008	P048	P094	P196
D011		F009	K009	K046	K110	K172	P009	P049	P095	P197
D012		F010	K010	K047	K111	K173	P010	P050	P096	P198
D013		F011	K011	K048	K112	K174	P011	P051	P097	P199
D014		F012	K013	K049	K113	K175	P012	P054	P098	P201
D015		F019	K014	K050	K114	K176	P013	P056	P099	P202
D016		F020	K015	K051	K115	K177	P014	P057	P101	P203
D017		F021	K016	K052	K116	K178	P015	P058	P102	P204
D018		F022	K017	K060	K117		P016	P059	P103	P205
D019		F023	K018	K061	K118		P017	P060	P104	
D020		F024	K019	K062	K123		P018	P062	P105	
D021		F025	K020	K069	K124		P020	P063	P106	
D022		F026	K021	K071	K125		P021	P064	P108	
D023		F027	K022	K073	K126		P022	P065	P109	
D024		F028	K023	K083	K131		P023	P066	P110	
D025		F032	K024	K084	K132		P024	P067	P111	
D026		F034	K025	K085	K136		P026	P068	P112	
D027		F035	K026	K086	K140		P027	P069	P113	
D028		F037	K027	K087	K141		P028	P070	P114	
D029		F038	K028	K088	K142		P029	P071	P115	
D030		F039	K029	K093	K143		P030	P072	P116	
D031			K030	K094	K144		P031	P073	P118	
D032			K031	K095	K145		P033	P074	P119	
D033			K032	K096	K147		P034	P075	P120	
D034			K033	K097	K148		P036	P076	P121	
D035			K034	K098	K149		P037	P077	P122	
D036			K035	K099	K150		P038	P078	P123	
D037			K036	K100	K151		P039	P081	P127	
D038			K037	K101	K156		P040	P082	P128	

List of Allowed RCRA Waste Codes

U Codes											
U001	U039	U079	U118	U155	U193	U240	U393				
U002	U041	U080	U119	U156	U194	U243	U394				
U003	U042	U081	U120	U157	U196	U244	U395				
U004	U043	U082	U121	U158	U197	U246	U396				
U005	U044	U083	U122	U159	U200	U247	U400				
U006	U045	U084	U123	U160	U201	U248	U401				
U007	U046	U085	U124	U161	U202	U249	U402				
U008	U047	U086	U125	U162	U203	U271	U403				
U009	U048	U087	U126	U163	U204	U277	U404				
U010	U049	U088	U127	U164	U205	U278	U407				
U011	U050	U089	U128	U165	U206	U279	U408				
U012	U051	U090	U129	U166	U207	U280	U409				
U014	U052	U091	U130	U167	U208	U328	U410				
U015	U053	U092	U131	U168	U209	U353	U411				
U016	U055	U093	U132	U169	U210	U359					
U017	U056	U094	U133	U170	U211	U364					
U018	U057	U095	U134	U171	U213	U365					
U019	U058	U096	U135	U172	U214	U366					
U020	U059	U097	U136	U173	U215	U367					
U021	U060	U098	U137	U174	U216	U372					
U022	U061	U099	U138	U176	U217	U373					
U023	U062	U101	U139	U177	U218	U375					
U024	U063	U102	U140	U178	U219	U376					
U025	U064	U103	U141	U179	U220	U377					
U026	U066	U105	U142	U180	U221	U378					
U027	U067	U106	U143	U181	U222	U379					
U028	U068	U107	U144	U182	U223	U381					
U029	U069	U108	U145	U183	U225	U382					
U030	U070	U109	U146	U184	U226	U383					
U031	U071	U110	U147	U185	U227	U384					
U032	U072	U111	U148	U186	U228	U385					
U033	U073	U112	U149	U187	U234	U386					
U034	U074	U113	U150	U188	U235	U387					
U035	U075	U114	U151	U189	U236	U389					
U036	U076	U115	U152	U190	U237	U390					
U037	U077	U116	U153	U191	U238	U391					
U038	U078	U117	U154	U192	U239	U392					
ATTACHMENT E LIST OF APPROVED SOURCES

Proposed Waste "Source" Information

The information shown in Subparts A through F of this Attachment must be submitted by the permittee initially for each proposed waste "source", pursuant to Part II(B)(2) of this permit. Initially each "source" is expected to be generated by the facility's on-site treatment process. It is noted that because the nature of the wastes receiving treatment may vary, characteristics of such a "source" may also vary. The permittee may incorporate the information into a form of its own, provided that all information is included, and that the same form is used for all proposed "sources". The permittee, by submitting appropriate knowledge of waste, shall specify that the waste from each "source" is either hazardous or non-hazardous wastes as defined at 40 CFR §§ 261.30-33. Appropriate knowledge of waste may consist of any or all of the following three categories: (1) knowledge of the waste generation process, (2) detailed record-keeping, or (3) waste analysis data.

The permittee must receive written authorization from EPA prior to injecting waste from this "source". Authorization shall consist of a final minor-modified permit, which shall list this "source" as an approved "source" in Part III (E) of this permit. Upon receiving the minor-modified permit, the permittee shall be authorized to inject this waste, subject to the conditions of this permit and the permittee's approved waste analysis plan. EPA will make every reasonable effort to expedite the administrative processing of minor permit modifications.

- A. <u>Permittee Information (required of all requested "sources")</u>
 - 1) Owner/Operator Name
 - 2) Owner/Operator Address (Street, City, State, Zip Code)
 - 3) Facility contact name and telephone number
 - 4) Well Location (Township, Range, Section, Quarter Section, footage NSL, EWL)
 - 5) EPA UIC Permit Number
 - 6) State Permit Number (if applicable)
 - 7) Well Name

B. <u>Proposed Waste Generator ("Source") Information</u>

- 1) Information required of all requested "sources":
 - a) "Source" Identification number (a unique number assigned to the waste generator at the location specified)
 - b) Generator Name
 - c) Generator Address (Street, City, State, Zip Code)
 - d) Generator Contact Name and telephone number
 - e) EPA Identification numbers (if applicable)
- 2) Oilfield waste "sources" must also include:
 - a) MDEQ (or equivalent) Oilfield Name
 - b) Location (Township, Range, and Section)
 - c) Geologic Formation

C. <u>Waste Transporter Information (if applicable)</u>

- 1) Transporter name
- 2) Transporter Address (Street, City, State, Zip Code)
- 3) Transporter Contact Name
- 4) Transporter Contact phone number
- 5) EPA Identification numbers (if applicable)

D. Waste "Source" Characterization of Hazardous and non-Hazardous Industrial Wastes

- 1) Sample analysis results, which include:
 - a) Corrosivity
 - b) Reactivity (as applicable to sample matrix)
 - c) Ignitability
 - d) Toxicity
 - e) Specific Conductance
 - f) Specific Gravity
 - g) Temperature
 - h) All other constituents which are indicated by the generator as likely to constitute a major portion of the waste stream (i.e., greater than 0.01 percent by mass).

The test for toxicity shall follow the Toxicity Characteristic Leaching Procedure and should include all appropriate constituents which are listed at 40 CFR §261.24. The permittee may rely on the generator's knowledge of waste consistent with 40 CFR §262.11 and all appropriate knowledge of waste to reduce the number of constituents tested.

- 2) Sampling and Analysis Description
 - a) The following information must be specified for each sampling event:
 - (i) Sample collector's name, title, and employer
 - (ii) Sample Collection method and preservation technique
 - (iii) Sample Collection point
 - b) The following information must be specified for each parameter:
 - (i) Analytical method for parameter detection/quantification
 - (ii) Analytical method accuracy
 - (iii) Upper and lower analytical method quantification limits

E. <u>Quality Assurance and Quality Control (QA/QC)</u>. A description of the following QA/QC Protocol followed, including, at minimum:

- 1) Equipment cleaning blanks
- 2) Trip blanks
- 3) Sample duplicates
- 4) Chain of custody
- 5) Equipment calibration
- 6) Data reduction and validation

These requirements are specified in the QA/QC portion of the permittee's waste analysis plan.

F. Historical and operational background of facility

- 1) A description of the historical and operational background of the facility, including, at minimum, the following elements:
 - a) a detailed description of the process involved in generating, collecting, and storing the waste; and
 - b) an identification of any changes in facility operations, periodic or otherwise, which may alter the composition of the waste stream.
- 2) The fingerprint monitoring frequency applied to each "source" shall be per load.

G. <u>Periodic Monitoring of Approved "Sources"</u>

- 1) **Periodic Analysis**. All waste sources will be analyzed as specified in Part III(E)(H) of this permit. An analysis of the constituents listed on Page A-3 will be conducted monthly for sources that may contain the identified waste codes.
- 2) **Fingerprint Analysis**. Prior to injection, all waste batches from a completed treatment process require fingerprint analysis as specified in Part III(E)(H) of this permit and shall, at a minimum, be subject to tests for the following:

Specific Gravity, Total Suspended Solids, pH, Temperature, Total Dissolved Solids, Visual Solids Content, Flashpoint, Conductivity, and any other analyses deemed appropriate for characterizing the injected waste.

H. List of Presently Approved Sources

Presently approved "sources" of waste for disposal into the Well #1-12 injection well are identified below by identification number, name, location, and sampling frequency and analytical parameters. Future "sources", as approved by the Director, will be added to these tables.

1) Hazardous Waste Fluids

Source ID Number	Source Name	Location (Address)	Waste Analysis Parameters ⁶	Waste Sampling Frequency ⁷
00211	Republic Industrial and Energy Solutions, LLC	28470 Citrin Drive Romulus, Michigan	Toxicity Characteristic List	Annual
			Fingerprint	Per load

7 All hazardous waste fluids shall be sampled (fingerprinted) on a per-load basis.

⁶ Hazardous waste fluid sampling parameters shall be determined on a case-specific basis. In requesting approval for a new source, the permittee may propose to test for a subset of the Toxicity Characteristic List (40 CFR § 261.24), which will be subject to EPA approval.

2) Non-hazardous Waste Fluids

Source ID Number	Source Name	Location (Address)	Waste Analysis Parameters ⁸	Waste Sampling Frequency ⁹
00212	Republic Industrial and Energy Solutions, LLC	28470 Citrin Drive Romulus, Michigan	Toxicity Characteristic List	Annual
			Fingerprint	Per load

3) Oilfield Brines

Source ID Number	Oilfield Name	Location (T-R-S)	Geologic Formation	Waste Sampling Frequency
00213	brines received from various oilfields and treated by Republic Industrial and Energy Solutions, LLC	T3S – R9E – S12	various formations	Annual

The permittee will update the Waste Source Characterization information, including detailed sample analysis results, annually and shall submit that information to EPA.

If the permittee seeks approval to inject a waste "source" directly into the well without treatment, its submission for approval of that "source" shall also include any appropriate analytical results necessary to identify waste constituents which may indicate a listed hazardous waste as defined at 40 CFR §§ 261.31, 261.32, 261.33, or 261.34 and if appropriate, a letter describing how the waste was determined to be non-hazardous.

⁸ Non-hazardous waste fluid sampling parameters shall be determined on a case-specific basis. In requesting approval for a new source, the permittee may propose to test for a subset of the Toxicity Characteristic List (40 CFR § 261.24), which will be subject to EPA approval.

⁹ All non-hazardous waste fluids shall be sampled (fingerprinted) on a per-load basis.

I. <u>Waste Stream Characterization</u>

The information shown in Subparts A through F of this Attachment must also be submitted by the permittee initially for each proposed waste stream type to be received for treatment, although approval of the waste stream types is not required. The permittee may incorporate the information into a form of its own, provided that all information is included, and that the same form is used for all proposed waste streams. The permittee, by submitting appropriate knowledge of waste, shall specify that the waste in each waste stream is either hazardous or non-hazardous wastes as defined at 40 CFR §§ 261.30-33. Appropriate knowledge of waste may consist of any or all of the following three categories: (1) knowledge of the waste generation process, (2) detailed record-keeping, or (3) waste analysis data.

Each waste shipment must receive a fingerprint analysis for Specific Gravity, Total Suspended Solids, pH, Temperature, Flashpoint, Conductivity, Color, and any other analyses deemed appropriate for characterizing the waste. Shipments of oilfield brine waste must receive a fingerprint analysis for Barium, Calcium, Total Iron, Magnesium, Sodium Chloride, Bicarbonate, Carbonate, Sulfate, Sulfide Specific Gravity, Total Dissolved Solids, pH, and Resistivity (ohmmeters @ 75°F).

ATTACHMENT F MECHANICAL INTEGRITY TESTING

Standard Annulus Pressure Test

- 1. Ensure the packer is set within 100 feet of the top of the injection zone. Packers not set within 100 feet of the top of the injection zone will be evaluated by EPA on a case-by-case basis. Note any approved deviations from previously reported well construction.
- 2. Document the test using a mechanical or digital device or a service company job record which records the value of the parameters of interest as measured during the test.
 - a. Submit along with the test results a gauge calibration certificate for the mechanical or digital device used to record test parameters. All calibration (for new or recalibrated gauges) must have been performed within a year prior to the test.
 - b. Place a gauge on the wellhead to measure pressure. If a recording device is used, the recording device serves to verify the data witnessed on the wellhead gauge.
 - c. Use an appropriately scaled mechanical gauge which has a measurement range that is 1.2 2 times the maximum pressure measured or a 1 psi resolution digital gauge with sufficient full scale.
 - d. Measure and document pressure using a gauge and/or a digital record and/or a chart record that can be read with sufficient accuracy to identify pressure change which would result in a failure of the test and to record accurate values during the test interval. For example, if the test pressure is 300 psig, the gauge and/or chart record should be marked in increments of 5 psi or less.
- 3. Verify that the tubing/casing annulus is full of liquid. No unapproved 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 sealpot or surge tank being sure to prevent any leaking across the shut-off valves.
- 6. Test for at least 60 minutes. Note the time, the annulus pressure, and the injection/tubing pressure at the start of the test and measure and note these same parameters at least every 10 minutes thereafter up to the end of the required test duration.
- 7. Send a report of the testing including any other data or documents available at the conclusion of the test which support the test results, such as gauge calibration certification, third-party service ticket, and/or original chart/digital recordings, to EPA per the reporting requirements of the permit.

- 8. If the tested well was reworked in association with the test, submit a rework record.
- 9. Include the certification statement and signature on the transmittal letter or on the individual MIT results form and, if submitted, the rework record to comply with the requirements of 40 CFR § 144.32(b).

Fall-Off Test

- 1. Injection of normal injectate at the normal rate is preferred.
- 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 longer if temperature stabilization based on previous logs requires more time.

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

ATTACHMENT G WASTE ANALYSIS PLAN

Republic Industrial and Energy Solutions, LLC Site ID No. MIR 000 016 055 Waste Analysis Plan Revision 4.0

FORM EQP 5111 ATTACHMENT A3 WASTE ANALYSIS PLAN

This document is an attachment to the Michigan Department of Natural Resources and Environment's Instructions for Completing Form EQP 5111, Hazardous Waste Treatment, Storage, and Disposal Facilities Construction Permit and Operating License Application Form.

The administrative rules promulgated pursuant to Part 111, Hazardous Waste Management, of Michigan's Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451), being R 299.9504, R 299.9508, and R 299.9605, and Title 40 of the Code of Federal Regulations (CFR) §270.14(b)(3) and 264.13(b) and (c), establish requirements for Waste Analysis Plans (WAPs) for hazardous waste management facilities. All references to 40 CFR citations specified herein are adopted by reference in R 299.11003.

This license application attachment addresses requirements for a Waste Analysis Plan (WAP) for the hazardous waste management units and the hazardous waste management Facility for the Republic Industrial and Energy Solutions, LLC ("Republic" or "Facility") Facility. All activities associated with the WAP are conducted at the Facility located at 28470 Citrin Drive, Romulus, Michigan.

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A3.A COMMERCIAL FACILITY

Republic is a commercial hazardous waste treatment and storage that receives wastes generated from off site locations. Republic has developed this WAP to ensure that its Facility at 28470 Citrin Dr, Romulus, MI will accept only wastes that it is authorized to accept. The hazardous wastes managed at the Facility will be properly characterized prior to waste acceptance. All generators are required to provide a completed waste characterization, including chemical analysis when appropriate. Waste screening ("fingerprinting") is conducted by Republic on every shipment of waste to ensure that the waste conforms to the waste profile for the generator and information on incoming manifests and to ensure that the waste can be properly managed within the Facility.

In addition, Republic will also generate several hazardous wastes, including a solid filter cake waste, wash waters and laboratory samples. Republic has developed this WAP to ensure that these on-site generated wastes are also properly characterized.

All analyses performed pursuant to this application are consistent with the Facility's QA/QC Plan. All samples for the purpose of waste characterization are collected, transported, stored, and disposed of by trained and qualified individuals in accordance with the QA/QC Plan. The forms within this WAP, its attachments and references are typical of the forms used by the Facility. These forms may change to equivalent or alternate forms as regulations, customer needs, operations, or company policy dictate. The Facility will handle form changes in accordance with the requirements of R 299.9519 as appropriate.

In accordance with R 299.9609 and 40 CFR §264.73 and Part 264, Appendix I, the Facility retains all records and results of all waste determinations (whether "inbound" or "outbound") performed as specified in 40 CFR §264.13, 264.17, 264.314, 264.1034,

264.1063, 264.1083, 268.4(a), and 268.7 in the Facility operating record until closure of the Facility.

A3.A.1 INITIAL WASTE CHARACTERIZATION REQUIREMENTS FOR GENERATORS

[R 299.9605(1) and R 299.9504(1) (c) and 40 CFR §264.13(b) (5)]

Prior to accepting a waste stream at the Facility, Republic will characterize the waste stream in accordance with this WAP. The Facility requires the waste profile information for initial waste shipments from all off-site generators prior to shipment as indicated on the Waste Profile Sheet ("WPS"), attached as Appendix A3.A.1. In addition to the WPS information submitted by the generator, the Republic Facility:

Requires submittal of a representative waste sample

Conduct an audit of the generator facility

Review industry literature to identify typical waste streams

Other:

In lieu of a representative sample, Republic can rely on analytical information provided by the generator.

The Facility (or contract) laboratory will analyze the generator-supplied representative waste sample using Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846) or equivalent methods as approved by the DNRE. The analytical results, together with the information contained in the WPS and any additional available analytical data or Material Safety Data Sheets ("MSDS") on the waste stream, will be used to determine whether the waste stream will be accepted by the Facility.

A3.A.1(a) GENERATOR WASTE CHARACTERIZATION DISCREPANCIES

[*R* 299.9605(1) and *R* 299.9504(1) (c) and 40 CFR §264.13(a) (3) and (4), 264.13(b) (c), and 264.72]

Each incoming waste shipment is screened in accordance with this WAP to ensure that the waste shipment is consistent with the waste stream that has been approved for management at the Facility in accordance with Section A3.A.1, above. If any significant discrepancies are identified suggesting that the waste shipment is not the pre-approved waste stream, Republic will assure contact with the generator in order to resolve those discrepancies. Republic may require the generator to provide additional information concerning the waste shipment or the waste stream, including analytical data or additional representative samples. If Republic cannot resolve the discrepancy, Republic will reject the shipment, and may cancel the approval for the waste stream.

SUBSEQUENT WASTE SHIPMENT PROCEDURES A3.A.1(b)

[R 299.9605(1) and R 299.9504(1) (c) and 40 CFR 264.13(a) (3) and 264.13(b) (4)]

The initial analysis of each waste stream described in Section A.3.A1 will be reviewed or repeated annually to ensure that the analysis is accurate and up-to-date. In addition, the analysis will be repeated each time the generating process changes.

ADDITIONAL WASTE ANALYSIS REQUIREMENTS A3.A.1(c)

[R 299.9605(1) and R 299.9504(1)(c) and 40 CFR §264.13(b)(6) and 264.13(c)(3)]

Facility personnel review the WPS information to ensure that the Facility is authorized to receive the waste, and can manage the waste in conformance with the following:

	General requirements for ignitable, reactive, or incompatible wastes (not accepted at the Republic facility)
⊠ R 299.9605 and 40 CFR §264.314	Special requirements for bulk and containerized liquids
R 299.9630 and 40 CFR §264.1034(d)	Test methods and procedures (Subpart AA) [Attachment A3, Section A3.A.2(c)]
R 299.9631 and 40 CFR §264.1063(d)	Test methods and procedures (Subpart BB) [Attachment A3, Section A3.A.2(c)]
⊠ 40 CFR §264.1083	Waste determination procedures (Subpart CC) [Attachment A3, Section A3.A.2(c)]
⊠ R 299.9627 and 40 CFR §268.7	Waste analysis and record keeping LDR requirements See Sections A3.A.3, A3.B.3
R 299.9228	Universal waste requirements

A3.A.2 WASTE ACCEPTANCE PROCEDURES

[R 299.9605(1) and R 299.9504(1)(c), and 40 CFR §264.13(c), 264.72(a) and (b), and 264.73(b)]

Waste shipments arrive at the Facility in the following containers:

Drums

⊠ Totes

Tanker trucks

Carboys

Filter bags

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Wrangler box

Roll-off boxes

Vacuum trucks

Other: Railcars

Upon receipt of wastes from an off-site generator, Republic performs all of the following tasks prior to acceptance:

- Review paperwork (waste profile, manifest, etc)
- Visually inspect the waste
- Perform waste screening/fingerprint analysis of waste

These tasks are discussed below.

A3.A.2(a) REVIEW PAPERWORK

[R 299.9605(1) and R 299.9504(1)(c), and 40 CFR §264.13(c), 264.72(a) and (b), and 264.73(b)]

Facility personnel review all paperwork, including manifests and LDR notifications, before any wastes are accepted by the Facility. All paperwork is reviewed for completeness. In addition, the manifest and any LDR notification are compared for consistency. The manifest is then compared to the WPS and analytical information provided by the generator and to the waste shipment to ensure the accuracy of information provided on shipment paperwork. The manifest is also compared to the number of containers, the volume, and/or the weight of the waste in the shipment. All discrepancies are resolved before processing the waste. The information on the WPS is also reviewed to determine whether the waste is a Subpart CC waste, and if it is, the material is dedicated to RT-10.

A3.A.2(b) VISUAL INSPECTION OF WASTE

[R 299.9605(1) and R 299.9504(1)(c) and 40 CFR §264.13(c)]

Facility personnel visually inspect a minimum of one container and up to a maximum of 100 percent of the containers for each waste stream from each generator. The contents of the container are visually inspected for the following:

\boxtimes	Color	\bowtie	Consistency
\bowtie	Physical state	\square	Other: Oil

🛛 pH

Visual observations are recorded and compared to the WPS information. The pH is also measured. All discrepancies are resolved before processing the waste.

Waste shipments found to have a significant discrepancy (ies) or non-conformance(s) that cannot be corrected, will either be rejected and returned to the generator (or appropriate alternate facility) or re-evaluated for acceptance by the Facility or for transshipment to another licensed hazardous waste management facility.

This evaluation is based on the following criteria, as appropriate:

- Permits conditions, compliance history, and, current regulations;
- Discussions with the generator;
- Need for any additional supplemental analyses;
- Alternate facility's ability to handle the material in a safe and environmentally sound manner; and
- General Manager or Laboratory Manager's judgment.

In addition to the evaluation and pursuant to 40 CFR Part 264.72, Republic discusses and attempts to resolve with the generator, any discrepancies between the actual waste shipment and that shown on the manifest. If the load is found to be acceptable at the Facility, a waste shipment acceptance can be initiated.

A3.A.2(c) WASTE SCREENING/FINGERPRINTING

[R 299.9605(1) and R 299.9504(1)(c) and 40 CFR §264.13(b)(14) and 264.13(c)(2)]

Table A3.A.1, below, lists the waste analysis procedures, including screening parameters for each hazardous waste, the rationale for the selection of these parameters, test methods that are used to test for these parameters, the appropriate reference, whether the waste is specified in R 299.9216, the frequency of waste screening, and the rationale for the frequency. The sampling methods that are used to obtain a representative sample of the waste to be analyzed and the sampling equipment and rationale are summarized in Table A3.A.2 and Table A3.A.3, respectively. The results of the waste screening/fingerprint analysis is compared to the WPS information and analytical results provided by the generator during the initial waste characterization process. All discrepancies are resolved before processing the waste.

An example of the form utilized to document the fingerprint analysis is attached as Appendix A3.A.2.

A3.A.2(c)(i) SHIPMENT ACCEPTANCE EVALUATION LOGIC

The decision whether to accept or reject a particular waste stream shipment is made by evaluating whether the as-shipped waste is in conformance or non-conformance with this WAP and the WPS. The waste shipment is classified as being in "non-conformance" if its composition is significantly different from the information shown on the WPS, the pre-acceptance results, the manifest, or, if it is significantly different in quantity (e.g., weight, volume, container count) from the information shown on the manifest.

Facility personnel use the following three primary criteria to determine the existence of a significant manifest discrepancy or non-conformance of the waste shipment:

- For bulk wastes, variations greater than 10% in weight;
- For batch wastes, (e.g., drums or any other DOT-approved container, etc.) any variation in piece count (such as discrepancy of one drum in a waste load); or,
- Obvious differences such as waste acid or toxic constituents not reported on the manifest or shipping document, determined by inspection or analysis of any waste shipment

Discrepancies or non-conformances that do not fall within these criteria are considered to be "minor." If Facility personnel have reason to believe that a minor discrepancy is not a one-time variation and that a particular waste shipment indeed is different from the pre-approved waste stream, the generator is required to repeat the pre-acceptance procedures prior to the waste stream being accepted. The detection of a waste constituent that was not recorded on the WPS or manifest would not necessarily trigger a repeat of pre-acceptance procedures for the waste stream (unless it met the preceding criteria) if the discrepancy can be justified by the generator.

A3.A.2(c)(ii) EVALUATION OF POTENTIAL ACCEPTANCE OF NON-CONFORMANCE

Waste shipments found to have a significant discrepancy (ies) or non-conformance(s) that cannot be corrected will either be rejected and returned to the generator (or appropriate alternate facility) or re-evaluated for acceptance by the Facility for transshipment to another licensed hazardous waste management facility.

This evaluation is based on the following criteria:

- Republic's license conditions, generator compliance history and current regulations;
- Discussions with the generator;
- Need for any additional supplemental analyses;
- Facility ability to handle the material in a safe and environmentally sound manner, and
- General Manager or Laboratory Manager Judgment.

In addition to the Republic Facility evaluation and pursuant to 40 CFR Part 264.72, Republic personnel will discuss and attempt to resolve with the generator, any discrepancies between the actual waste shipment and that shown on the manifest. If the load is found to be acceptable at the Facility, a waste shipment acceptance can be initiated.

A3.A.2(c)(iii) PCB ANALYSIS

Republic does not accept waste containing Toxic Substances Control Act (TSCA)regulated PCBs. No waste streams will be accepted or off-loaded for treatment, storage or management at the Facility unless the pre-acceptance procedures in Section A3.A.1, above, are met and the generator submits to the Facility either the concentration or the absence of detection of PCBs in the waste stream. If the generator does not provide any PCB information for a waste stream, Republic will analyze a pre-acceptance sample for PCBs.

A3.A.2(c)(iv) SUPPLEMENTAL ANALYSES

Republic may perform supplemental analyses at the discretion of the Laboratory Manager or his/her designee during pre-acceptance testing or fingerprint testing of incoming shipments to further characterize the waste streams, or to ensure that the proper waste management techniques are utilized. The decision to use one or more of

these supplemental analyses will be based on knowledge of the waste and the technical expertise of the Laboratory Manager or his/her designee. The results of these discretionary analyses provide another level of confidence concerning the proper means of disposal. Some of these additional supplemental analyses utilize procedures and protocol developed by Facility personnel, in the absence of other standard procedures. Other analyses utilize standard analytical techniques recognized by the EPA, the American Society for Testing & Materials ("ASTM"), or similar techniques.

The applicability of these analyses, as described below, are based on procedures and protocol formulated for hazardous waste management with Underground Injection Control ("UIC") disposal.

- Timed Filtration Tests allow the Facility laboratory to quickly ascertain the filter loadings caused by suspended solids in the wastes and gain a rough approximation of potential filtering in the underground injection formation.
- Calcium Hydroxide Ca (OH)₂. Testing is performed as a screen for potential formation compatibility problems because a minor reactive component of the injection formation at the Republic Facility consists of dolomite materials.
- Process Blend Testing is performed to identify other wastes with which the waste stream can be mixed to yield a UIC mixture. The testing is also performed to identify potential problems that could result in adding a waste stream or blend to existing tank contents. The testing can also be used to determine proper spacer fluids to be used during injection of otherwise incompatible wastes.
- pH Spectrum is used to determine the phase behavior of a waste stream over a wide pH change, and is uniquely applicable to UIC disposal wells.
- Heat Phase Separation is to determine phase behavior with respect to temperature fluctuation.
- Sulfate Screen is to determine presence of sulfates which can cause filter plugging and formation plugging.
- Radiation Screen is used to ensure that no radioactive materials above background are present in the waste stream.

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Republic Industrial and Energy Solutions, LLC Site ID No. MIR 000 016 055 Waste Analysis Plan

Table A3.A.1 Waste Analysis Procedures						
Screening Parameter (Check as appropriate)	Rationale for Parameter	Test Method	Reference	Specified in R 299.9216 (Y/N)	Frequency	Rationale for Frequency
⊠ Waste Code(s)	Compare with Facility accepted waste codes	NA	40 CFR 261 R 299.217, 219, 220, 222, 224, 225		All shipments and containers	Compliance with permits
Free Liquids						
Ignitability/ Flashpoint	No D001 Accepted	1010A	SW-846	\boxtimes	All shipments and containers	Compliance with permits
Reactivity						NA – See below
Compatibility	Check for compatibility	50/50 blend			All shipments and containers	Compliance with permits, maintain operations
Land Disposal Restrictions	Compliance with permits	NA	NA			Note: Facility UIC wells are exempted from LDRs pursuant to No Migration Petition
Volatile Organic Compound Content						
Radioactivity						
Other: PCB	Compliance with permits	8082A	SW-846		Oily waste only	Generator certification required, PCB not typical in acid and caustic waste streams. Regulated PCB was not accepted at Facility.

Republic Industrial and Energy Solutions, LLC Site ID No. MIR 000 016 055 Waste Analysis Plan

Table A3.A.1 Waste Analysis Procedures						
Screening Parameter (Check as appropriate)	Rationale for Parameter	Test Method	Reference	Specified in R 299.9216 (Y/N)	Frequency	Rationale for Frequency
Other: pH	Compliance with permits & maintain operations	9041A and/or 9040C and/or 9045D	SW-846		All shipments and containers	Compliance with permits
Other: Physical Description	Maintain operations	Visual inspection	Republic		All shipments and containers	Compliance with permits
Other: Cyanide Screen	Compliance with permits & maintain operations	ITS484001*	Republic		All shipments and containers	Compliance with permits
Other: Sulfide Screen	Compliance with permits & maintain operations	ITS481197-1*	Republic		All shipments and containers	Compliance with permits
Other: Total Settable Solids	Maintain operations	EPA 160.2, 160.4	EPA		All shipments and containers	Maintain operations
Other: Oil	Maintain operations	Republic PLA29*	Republic		All shipments and containers	Maintain operations
Other: Solvent Screen						
Other: Specific Gravity	Compliance with UIC permits & maintain operations	2710 &/or D70/D891/D1217 /D1429	SW-846 &/or SMEWWW &/or ASTM		All shipments and containers	Compliance with UIC permits

Republic Industrial and Energy Solutions, LLC Site ID No. MIR 000 016 055 Waste Analysis Plan

Table A3.A.1 Waste Analysis Procedures						
Screening Parameter (Check as appropriate)	Rationale for Parameter	Test Method	Reference	Specified in R 299.9216 (Y/N)	Frequency	Rationale for Frequency
Other: Total suspended solids	Compliance with UIC permits & maintain operations	2540	SMEWWW & ASTM		All shipments and containers	Compliance with UIC permits
Other: Temperature	Compliance with UIC permits & maintain operations	2550	SMEWWW		All shipments and containers	Compliance with UIC permits
Other: Conductivity(aka Specific Conductivity)	Compliance with UIC permits & maintain operations	9050A/9100 &/or 2710 &/or D1125	SW-846 &/or SMEWWW &/or ASTM		All shipments and containers	Compliance with UIC permits
Other: Color	Compliance with UIC permits & maintain operations	Visual Observation &/or 202 &/or 2120	N/A &/or ASTM &/or SMEWWW		All shipments and containers	Compliance with UIC permits
Other: Barium	Compliance with UIC permits & maintain operations	6010B &/or 3500- Ba	SW-846 &/or SMEWWW		All shipments and containers of <u>Oil Field</u> <u>Brine Only</u>	Compliance with UIC permits

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Table A3.A.1 Waste Analysis Procedures						
Screening Parameter (Check as appropriate)	Rationale for Parameter	Test Method	Reference	Specified in R 299.9216 (Y/N)	Frequency	Rationale for Frequency
Other: Calcium	Compliance with UIC permits & maintain operations	6010B &/or 3500- Ca	SW-846 &/or SMEWWW		All shipments and containers of <u>Oil Field</u> <u>Brine Only</u>	Compliance with UIC permits
Other: Total Iron	Compliance with UIC permits & maintain operations	3500-Fe &/or 6010B	SMEWWW &/or SW-846		All shipments and containers of <u>Oil Field</u> <u>Brine Only</u>	Compliance with UIC permits
☑ Other: Magnesium	Compliance with UIC permits & maintain operations	6010B &/lor 3500-Mg	SW-846 &/or SMEWWW		All shipments and containers of <u>Oil Field</u> <u>Brine Only</u>	Compliance with UIC permits
Other: Sodium Chloride	Compliance with UIC permits & maintain operations	9212/9250/9251/ 9253 &/or 4500- Cl	SW-846 &/or SMEWWW		All shipments and containers of <u>Oil Field</u> <u>Brine Only</u>	Compliance with UIC permits
Other: Bicarbonate	Compliance with UIC permits & maintain operations	2330	SMEWWW		All shipments and containers of <u>Oil Field</u> <u>Brine Only</u>	Compliance with UIC permits

Table A3.A.1 Waste Analysis Procedures							
Screening Parameter (Check as appropriate)	Rationale for Parameter	Test Method	Reference	Specified in R 299.9216 (Y/N)	Frequency	Rationale for Frequency	
Other: Carbonate	Compliance with UIC permits & maintain operations	2330	SMEWWW		All shipments and containers of <u>Oil Field</u> <u>Brine Only</u>	Compliance with UIC permits	
Other: Sulfate	Compliance with UIC permits & maintain operations	9035/9036/9038 &/or 4500-SO4	SW-846 &/or SMEWWW		All shipments and containers of <u>Oil Field</u> <u>Brine Only</u>	Compliance with UIC permits	
Other: Sulfide	Compliance with UIC permits & maintain operations	9215/9030A &/or 4500-S	SW-846 &/or SMEWWW		All shipments and containers of <u>Oil Field</u> <u>Brine Only</u>	Compliance with UIC permits	
Other: Total Dissolved Solids	Compliance with UIC permits & maintain operations	2540	SMEWWW		All shipments and containers of <u>Oil Field</u> <u>Brine Only</u>	Compliance with UIC permits	
Other: Resistivity	Compliance with UIC permits & maintain operations	9050A/9100 &/or 2510	SW-846 &/or SMEWWW		All shipments and containers of <u>Oil Field</u> <u>Brine Only</u>	Compliance with UIC permits	
* Republic internal test meth	od maintained at	the Facility.					

Table A3.A.2 Sampling Procedures					
Container Type Or Material	Sampling Method	Sampling Equipment	Rationale		
Tanker Truck, Vacuum Trucks, Rail Tankers	COLIWASA (ASTM D5495-03 or equivalent)	COLIWASA	Test Method for the evaluation of solid waste, Physical/chemical methods - US EPA		
Totes, Drums or Containers	COLIWASA (ASTM D5495-03 or equivalent)	COLIWASA	Test Method for the evaluation of solid waste, Physical/chemical methods - US EPA		
Tank Sampling	Sample Port	Sample Port	Fingerprint, compatibility, treatment verification		

As used in Tables A3.A.1 and A3.A.2, above:

ASTM = American Society for Testing and Materials

SMEWWW = "Standard Methods for the Examinatiion of Water and Wastewater", APHA (Greenberg, M.A.H.), AWWA (Eaton, A.D.), and WEF (Closceri, L.S.), 19th Edition, 1995

SW-846 = "Test Methods for Evaluating Solid Waste, Physical Chemical Methods", (aka SW-846), through Update IV, www.epa.gov

A3.A.2(d) WASTE RECEIPT SAMPLING PROCEDURES

Each incoming shipment of waste is sampled and analyzed in accordance with Tables A3.A.1 and A3.A.2, above, to ensure that it matches the overall description of the waste designated on the accompanying manifest and the WPS. Facility personnel document the inspection of and analysis of each hazardous waste shipment received at the Facility to determine whether it conforms to the information on the WPS and matches the description of the waste specified on the accompanying manifest, as required by 40 CFR 264.13.

A3.A.2(d)(i) CONTAINERIZED WASTES

Vehicles carrying containerized waste stream(s) are directed to the container handling area. Container loads are checked visually to confirm that labeling and packaging of the containers are consistent with data listed on the manifest. The integrity of each container is also inspected to insure that all openings are closed, and that there is no damage to the container that could compromise its integrity. Once Facility personnel have determined that the paperwork is representative of the as-received load, the load is dispatched for off-loading, segregation, and sampling.

At least 10 percent of the containers from each manifest line item (i.e., each separate waste stream) associated with a containerized waste shipment (e.g., drums, or other DOT-approved containers of waste) are selected for sampling. Containerized shipments are sampled according to the frequency established in the table below.

Table A3.A.3 Container Sampling					
Number Of Containers In Shipment	Minimum Number of Separate Samples To				
	Be Taken				
1-5 Containers	1				
6-10 Containers	2				
11-25 Containers	4				
26-30 Containers	6				
31-80 Containers	8				

The individual containers within a specific shipment (for each individual waste stream identified by line number on a manifest) are numbered. The specific individual containers to be sampled are then chosen by using a random number table. The samples are composited to provide a representative sample of each individual waste stream.

If the analysis of the representative sample of the waste stream matches the generator's waste profile description and the waste shipment is otherwise acceptable (i.e., no significant discrepancies), the shipment will be accepted and processed. If the analysis does not match the generator's waste profile description, Republic will either reconcile the discrepancy or reject the shipment.

A3.A.2(d)(ii) BULK SHIPMENTS

Each bulk (tanker or railcar) waste delivery is sampled in accordance with Table A3.A.2 and analyzed in accordance with Table A3.A.1. If the analysis of the representative sample of the waste stream matches the generator's waste profile description and the waste shipment is otherwise acceptable (i.e., no significant discrepancies), the shipment will be accepted and processed. If the analysis does not match the generator's waste profile description, Republic will either reconcile the discrepancy or reject the shipment.

A3.A.3 Procedures to Ensure Compliance with Land Disposal Restrictions ("LDR") Requirements

[R 299.9627 and 40 CFR, Part 268]

Although the Facility's UIC wells are exempt from the LDR requirements pursuant to the approved No Migration Petition (subject to the conditions contained in that exemption set forth at 69 Fed. Reg. 15341-42 (Mar. 25. 2004), including compliance with the maximum wellhead concentrations established in Republic's UIC permits for the constituents listed in Section A.3.D.2, below), shipments of wastes subject to LDR received at the Facility are accompanied by appropriate generator notification and LDR notification in accordance with R 299.9627 and 40 CFR §268.7. Any LDR notification accompanying generator wastes is reviewed, and any discrepancies in the LDR notification and the associated manifest, analytical records, or WPS requires shipment rejection unless additional, satisfactory, clarifying information is provided by the generator. All information obtained to document LDR compliance is maintained in the Facility operating record until closure of the Facility.

If the Facility receives a shipment of waste without LDR notification, or a notification with incorrect or incomplete information, Republic will assure contact with the generator in order to obtain the missing notification, or to correct or complete the notification. If the problem cannot be resolved, Republic will reject that waste.

In accordance with the LDR regulations, all wastes shipped off site are analyzed, or generator knowledge is used when appropriate, to determine whether the waste meets the applicable LDR treatment standards specified in R 299.9627 and 40 CFR §268.41-43. All analytical results are maintained in the Facility operating record until closure of the Facility. Wastes that are determined through analysis to meet treatment standards as specified in R 299.9627 and 40 CFR §268.41-43 can be disposed of in a hazardous waste management landfill.

Republic supplies LDR notifications and certifications, including appropriate analytical records to support the certification, to the receiving facility with each shipment of waste. The notifications and certifications contain the information required under R 299.9627 and 40 CFR §268.7. Any additional data obtained from the generators (e.g., WPSs, original LDR notifications, analysis provided by generators) is provided to any licensed TSDF where the waste (solids) have been sent.

A3.A.3(a) SPENT SOLVENT AND DIOXIN WASTES

[R 299.9627 and 40 CFR §264.13(a)(1), 268.7, 268.30, 268.31, 268.40, 268.41, 268.42, and 268.43]

Spent solvent wastes (F001-F005) are accepted at the Facility. Typically generator process knowledge is used to determine the presence of spent solvent wastes (F001-F005). Generator process knowledge is documented on the WPS and LDR notification. The LDR notification provides additional information regarding the appropriate treatment standards for the waste and whether it has already been treated to the appropriate standards.

A3.A.3(b) LISTED WASTES

[*R* 299.9627, *R* 299.9213, and *R* 299.9214 and 40 CFR §264.13(a)(1), 268.7, 268.33, 268.34, 268.35, 268.36, 268.39, 268.40, 268.41, 268.42, and 268.43]

Generator process knowledge is typically used to determine whether listed waste meets the applicable treatment standards or to demonstrate that the waste has been treated by the appropriate specified treatment technology. In accordance with R 299.9627 and 40 CFR §268.41, where treatment standards are based on concentrations in the waste extract, the Facility uses the Toxicity Characteristic Leaching Procedure (TCLP) to determine if wastes meet treatment standards as appropriate. Generator process knowledge is documented on the WPS and LDR notification.

A3.A.3(c) CHARACTERISTIC WASTES

[R 299.9627, R 299.9208, and R 299.9212 and 40 CFR §261.3(d)(1), 264.13(a)(1), 268.7, 268.9, 268.37, 268.40, 268.41, 268.42, 268.43 and Part 268, Appendix I and Appendix IX]

Generator process knowledge is typically used to determine whether characteristic waste meets the applicable treatment standards or to demonstrate that the waste has been treated by the appropriate specified treatment technology. In accordance with R 299.9627 and 40 CFR §268.41, where treatment standards are based on concentrations in the waste extract, generators shipping waste to the Facility determine if their waste meets treatment standards.

Typically, generator process knowledge is used to identify the underlying hazardous constituents that are expected to be present in the waste. Generator process knowledge is documented on the material Waste Profile Sheet and LDR notification.

A3.A.3(d) RADIOACTIVE MIXED WASTE

[R 299.9627 and 40 CFR §268.7, 268.35(c), 268.35(d), 268.36, and 268.42(d)]

The Facility does not accept radioactive mixed waste.

A3.A.3(e) LEACHATES

[R 299.9627 and 40 CFR §260.10, 268.35(a), and, 268.40]

N/A

A3.A.3(f) LABORATORY PACKS

[R 299.9627 and 40 CFR §268.7and 268.42(c) and Part 268, Appendix IV and Appendix V]

The Facility does not accept laboratory packs.

A3.A.3(g) CONTAMINATED DEBRIS

[R 299.9627 and 40 CFR §268.2(g), 268.7, 268.9, 268.36, 268.45, and 270.13(n)]:

Contaminated debris is not accepted at the Facility.

A3.A.3(h) WASTE MIXTURES AND WASTES WITH OVERLAPPING REQUIREMENTS

[R 299.9627 and 40 CFR §264.13(a), 268.7, 268.41(b), 268.43(b), and 268.45(a)]

Generator process information and analytical data are used to demonstrate that those waste mixtures and wastes with multiple waste codes are properly characterized. Each waste that has more than one characteristic will be identified with a number for each characteristic. Waste identified as meeting a listing and exhibiting a characteristic will be primarily identified with at least one of the listed waste codes for the purpose of manifesting, etc. consistent with listing up to six (6) waste codes per waste stream on a manifest.

A3.A.3(i) DILUTION AND AGGREGATION OF WASTES

[R 299.9627 and 40 CFR §268.3]

The Facility will not dilute or partially treat a listed waste to change its treatability category (i.e., from non-wastewater to wastewater), in order to comply with different treatment standards. If the wastes are all legitimately amenable to the same type of treatment to be performed, the Facility may aggregate wastes for treatment.

A3.B CAPTIVE FACILITY

The Facility is not a captive Facility.

A3.C NOTIFICATION, CERTIFICATION, AND RECORDKEEPING REQUIREMENTS

[R 299.9627 and R 299.9609 and 40 CFR §264.73, 268.7, and 268.9(d)]

The Facility performs the following procedures for preparing and/or maintaining applicable notifications and certifications to comply with LDRs.

A3.C.1 RETENTION OF GENERATOR NOTICES AND CERTIFICATIONS

[R 299.9627 and 40 CFR §268.7(a)(7)]

The Facility retains a copy of all notices, certifications, demonstrations, data, and other documentation associated with compliance to LDRs.

The following notices and certifications submitted by the initial generator of the waste are reviewed and maintained:

- Notices of restricted wastes not meeting treatment standards or exceeding levels specified in RCRA §3004(d), including the information listed in R 299.9627 and 40 CFR §268.7(a)(1).
- Notices of restricted wastes meeting applicable treatment standards and prohibition levels, including the information in R 299.9627 and 40 CFR §268.7(a)(2).

A3.C.2 NOTIFICATION AND CERTIFICATION REQUIREMENTS FOR TREATMENT FACILITIES

[R 299.9627 and 40 CFR §268.7(b)]

The Facility submits a notice and certification to any land disposal facility it uses with each shipment of restricted waste or treatment residue of a restricted waste. The notice includes the information specified in R 299.9627 and 40 CFR §268.7(b)(4) and 268.7(b)(5).

If the waste or treatment residue will be further managed at a different treatment or storage facility, the Facility will comply with the notice and certification requirements applicable to generators as specified in R 299.9627 and 40 CFR §268.7(b)(6).

A3.C.3 WASTE SHIPPED TO SUBTITLE C FACILITIES

[R 299.9627 and 40 CFR §268.7(a) and 268.7(b)(6)]

For restricted waste or waste treatment residues that are further managed at a Subtitle C (hazardous waste management) facility, the Facility submits notifications and certifications in compliance with the notice and certification requirements applicable to generators under R 299.9627 and 40 CFR §§ 268.7(a) and (b)(6).

A3.C.4 WASTE SHIPPED TO SUBTITLE D FACILITIES

[R 299.9627 and 40 CFR §268.7(d) and 268.9(d)]

The Facility does not ship waste to Subtitle D facilities.

A3.C.5 RECYCLABLE MATERIALS

[R 299.9627 and 40 CFR §268.7(b)(7)]

The Facility does not accept recyclable materials used in a manner constituting disposal.

A3.C.6 RECORD KEEPING

[*R* 299.9608(4), *R* 299.9609, *R* 299.9610(3), and *R* 299.9627 and 40 CFR §264.72, 264.73, 268.7(a)(5), 268.7(a)(6), 268(a)(7), and 268.7(d)]

Republic maintains a Facility operating log in accordance with R 299.9609 and 40 CFR §264.73. The operating log consists of at least waste characterizations, profiles, analytical results, fingerprint forms, LDR's, approvals and manifests.

Copies of all necessary notifications and certifications, as well as relevant inspection forms and monitoring data, are also maintained on file at the Facility. Files are maintained for a minimum of three years (for inspection records and LDR notifications), or until Facility closure (for inventory records).

If a significant manifest discrepancy is discovered (such as variation in one-piece count or misrepresentation of the type of waste) that cannot be resolved with the generator or transporter within 15 days of receipt, Facility personnel submit to the MDNRE Director and EPA Regional Administrator a letter describing the discrepancy and all attempts to reconcile the discrepancy. The letter will include a copy of the discrepant manifest or shipping document.

A3.C.7 REQUIRED NOTICES

[R 299.9605(1) and 40 CFR §264.12(a) and (b))]

The Facility notifies the MDNRE Environmental Resource Management Division Chief and EPA Region 5 in writing at least four weeks before the date the Facility expects to receive hazardous waste from a foreign source. Notice of subsequent shipments of the same waste from the same foreign source is not currently required. When receiving such hazardous waste, the Facility complies with applicable treaties or other agreements entered into between the country in which the foreign source is located and the United States. Republic will also comply with the recently promulgated manifest document attachment requirements.

When the Republic Facility receives hazardous waste from an off-site source, the Republic Facility informs the generator in writing that the Republic Facility has the appropriate license for, capacity, and, will accept the waste the generator is shipping. The Republic Facility keeps a copy of this written notice in the operating record.

A3.C.8 QUALITY ASSURANCE/QUALITY CONTROL PLAN

Republic maintains a quality assurance/quality control plan at the Facility.

A3.D POST-TREATMENT SAMPLING (UIC PERMIT REQUIREMENTS)

A3.D.1 PRE-INJECTION FINGERPRINT

Republic shall conduct a "fingerprint" test of the injectate in conformance with Attachment E of Republic's two EPA-issued UIC permits (MI-163-1W-C010 & MI-163-1W-C011, the "UIC Permits"). Prior to injection, each waste batch from a completed treatment process is tested for Specific Gravity, Total Suspended Solids, pH, Temperature, Total Dissolved Solids, Visual Solids Content, Flashpoint, Conductivity, and any other analyses deemed appropriate for characterizing the injected waste.

A3.D.2 MONTHLY INJECTATE SAMPLING

Republic shall conduct a monthly composite test of injectate in conformance with Attachment A (Hazardous Substances Limitations and Reporting Table on page A-3 of 3) of the UIC Permits whenever any of the identified "RCRA Code(s)" in that Table are received in the prior month. Such test shall be conducted on sample(s) obtained from a treated batch containing such received waste. Depending on the waste codes received, the analyses may include one or more of the following nine chemical constituents: Aldrin; Benzidine; sym-Dichloromethyl ether; Hexachlorodibenzo-p-dioxins; Nitrosodimethylamine; 1,2,3,4,6,7,8,9-Octachlorodibenzofuran; 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin; Tetrachlorodibenzo-p-dioxins (TCDD); and Tetraethyl lead.

A3.D.3 SAMPLING AND ANALYTICAL PROCEDURES

Sampling and analytical procedures for the tests described in Sections A3.D.1 and A3.D.2 above shall conform as follows: Sampling with Appendix I of 40 CFR Part 261 (or an equivalent method approved by the Director), and, analysis with Tables IA, IB, and IC of 40 CFR Section 136.3 or in Appendix III of 40 CFR Part 261 (or an equivalent method approved by the Director).

Republic Industrial and Energy Solutions, LLC Site ID No. MIR 000 016 055 Waste Analysis Plan

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APPENDIX A3.A.1 WASTE PROFILE SHEET

ENVIRONMENTAL GEO-TECHNOLOGIES, LLC 28470 Citrin Dr, Romulus, MI 48174. Telephone 734 946 1000. Fax 734 946 1002

. ,				E	Profile	#	
GENERATOR INFORMATION							
Name:			USEPA II	D#			
Facility Address:			SIC/NAIC	S Code:	_ State Co	de:	
City:			State:	Zip	Code:		
Contact:	Title:	Phone: ()	Fa	x: ()		
BILLING INFORMATION		SAME AS A	BOVE		, ,		
Company Name:							
Address:							
City:			_State:	Zip	Code:		
Attention:		Phone: ()	Fa	x: ()		
WASTE INFORMATION							
Name of Waste/Common	Chemical Name:						
	<u></u>						
Process Generating Waste (Ple	ase be specific, incomplete	information may	√ delay the a	pproval process):			
2							
1 This waste is considered to k		s Liquid Industria	l Waste	🗖 Hazardous	Waste		
2. Regulated by TSCA? □Ye	es 🔲 No (PCBs, etc.)		i vvuoto		, i doto		
3. List ALL Applicable Waste C	odes:						
PHYSICAL CHARACTERISTIC	SOFWASTE						
Color: Su:	spended Solids	Layers:		Specific Grav	vity:		
White/Clear	0-1 % □ 3-5 %	☐ Multi la □ Bi-Lav	ayered		1.0 - 1.2		
Other		☐ Single	Phase	Exact / Other			
pH: □ NA □ ≤ 2 □	2 - 4 4 - 6	6 - 8	8 – 10	☐ 10 - 12.5	_ <u>></u> 12.5		
Liquid Flash Point: 🔲 <73°F	□ 73 – 100°F □ 101 – 1	40°F 🔲 141 –	200°F 🔲 >:	200°F 🔲 None	e 🗌 Clos	ed Cup 🔲 Ope	n Cup
VOC CONCENTRATION -		PPM (MUST BE C	OMPLETED)				
TOTAL COMPOSITION OF WA	STE - MUST BE EQUAL TO O	R GREATER THAN 1	00% (LIST EA	ch CONSTITUEN	IT <>/= 0.1	%)	
CONSTITUENT		MAX MIN	CONSTIT	UENT		MA	<u>X MI</u> N
		%					
		% _			1 5 6		-:

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<u>EGT - 28470 Citrin Drive – Romulus</u>	- MI – 48174			Waste Profile	– Page 2
Metals: Indicate if this waste contains	any of the following metals,. If C tor Knowledge	Generator knowledge-provide	e backup DTAL		
Not Concentration Present ppm PCB ppm Dioxins ppm Cyanides Reactive ppm Sulfides Reactive ppm Sulfides Reactive ppm Sulfides Total ppm Sulfides Total ppm TCLP Organics D012 – D043 above regular	Not <u>Concentration</u> <u>Present</u> atic Amineppm cidesppm icidesppm licidesppm licidesppm	Arsenic (As) Barium (Ba) Cadmium (Cd) Chromium (Cr) Lead (Pb) Mercury (Hg) Selenium (Se) Silver (Ag)	D004 D005 D006 D007 D008 D009 D010 D011	5 ppm <100	ррт ррт ррт ррт ррт ррт ррт
IS WASTE ANY OF THE FOLLOWING Radioactive Water Reactive NIOSH Human-Positive Carcinoge	At Least One Box N Oxidizer Sins NESHAP Wastes (Benze	l <i>ust Be Checked.</i> Shock Sensitive	tive (other gical	r) 🔲 DOT Ex 🗌 None A	plosives pply
SHIPPING INFORMATION Is this a DOT Hazardous Material (Reportable Quantity (RQ) in pound 	49CFR 172.101 & 173 Subpart s	D)? TYes No			
3. DOT Shipping Name			_ Hazard (Class	UN/NA
PG ERG Hazardo	us Constituents for "n.o.s."				-1°:
 Method of Shipment: Number of Units to Ship Now: Special Handling Requirements inc 	Bulk Tanker Vac truck 6. Anticipate	_Rail Car Drums □ ed Volume / Units per Year:	Totes		_or 🗌 One Time
CERTIFICATION STATEME I hereby represent and warrant that I h attached documents. Based on my im information, the information contained material fact has been omitted as to n in the handling and processing of the Technologies not to correct any incons of the sample characterization and/or n	NT ave personally examined and a quiry and personal knowledge o herein is true, accurate, and co nake this information misleading waste material described herein istencies. Any corrections Env egulatory requirements.	m familiar with the informat f those individuals respons mplete to the best of my kr . I understand that others i . If this box is checked ironmental Geo-Technologi	tion contai ible for su iowledge a may rely o I request ies makes Title:	ned and submit pplying or obtai and belief. Furt on this represen Environmental will be consiste	ted in this and all ning the hermore, no ration and warranty Geo- nt with the results
Printed Name:			l itle: _		
Generator's Signature:			Date:		
GENERATOR'S CHAIN OF the waste described in the above refer one obtained using any of the applicat provided below. If you have problems representative.	CUSTODY RECORD IN enced GENERATORS WASTE_PRo ble sampling methods cited in 40 obtaining a representative sam	ISTRUCTIONS: PLE DFILE REPORT using an appr D CFR 261-Appendix 1. Fill ple of your waste, please c	ASE COllec opriate co l in the sai ontact you	t a representati ntainer. A repre mpling informat ir Environmenta	ve 1-quart_sample o esentative sample is on in the spaces I Geo-Technologies
12					
3					
SAMPLE COLLECTOR'S NAME,					
5 CHAIN OF CUSTODY Fach part		ust sign below when the sa	mnle nasi	ses from one to	another
Relinquished by: (Signature)	Date Time	Received by: (Signature)	inipie past	Date	Time

APPENDIX A3.A.2 FINGERPRINT FORM

Republic Industrial and Energy Solutions, LLC.

RECEIVING & APPROV	AL FOR	M		
RECEIVING INFORMATION				
Date				
Receiving ID#				
Manifest# Line:				
Land Ban Cert included	Yes	No		
Republic Approval #				
Generator				
Client				
Transporter				
Time in				
Time out				
Received by				
Sampled by				
All Waste Shinments			Oilfield Brines Only:	
Compatible? (RT#)	Yes	No	Barium	
PCBs (ppm)(Oily Waste	103	110	Danam	
Only)?			Calcium	
TOC (ppm)(CC Waste Only)?			Total Iron	
Flash Point (°F)			Magnesium	
pH (S.U.)			Sodium Chloride	
Cyanides? (mg/L)			Bicarbonate	
Sulfides? (ppm)			Carbonate	
Specific Gravity			TDS	
Physical Description			Resistivity	
Stream Consistency	Yes	No	Sulfate	
Oil in Sample	Yes	No		
Temperature				
Conductivity				
% Solids				
Turbidity	Yes	No		
Color (visual)				
TSS (%)				
Radiation Screen (as needed)				
Lab Signature				

Receiving & Departure Approval Form

ATTACHMENT H CORROSION MONITORING PLAN

Republic Industrial and Energy Solutions, LLC ("Republic") Corrosion Monitoring Plan

The material used for construction of each well component has been tested by manufacturers for compatibility with a variety of hazardous chemicals and conditions. Similar (although less resistive) well components are currently used at many other currently operating commercial deepwell ("UIC") facilities.

The Republic Corrosion Monitoring Plan ("CMP") is designed to ensure that all well components (fiberglass, 316L stainless steel, and Hastelloy) are suitable for use in contact with the waste sources proposed for injection. The materials used in construction of the wells are intended to meet or exceed the standards set by the American Petroleum Institute ("API") and the American Society for Testing Materials ("ASTM").

The injection tubing, wellhead, interior surfaces of the packer, and casing shoe will be the well components in constant dynamic contact with the waste sources during periods of injection. The stainless steel packer, sealing elements, and Hastelloy casing shoe are all highly corrosion resistant. Another protective feature is that an inert liquid is emplaced beneath the packer in each well. Yet another protective feature is that the fiberglass injection tubing has an epoxy resin coating on its internal surface intended to maximize tubing service life. The interior surfaces of the wellhead assemblies are also coated to reduce the potential for impacts from corrosion. Specifications and additional details on individual well components are found in the completion reports included as attachments to the original permit application document.

The principal well material of construction is red box fiberglass which again, has an epoxy resin coating on the interior surfaces of that injection tubing. A test coupon is assembled from excess fiberglass tubing and that fiberglass coupon is installed in the surface effluent line between the final storage tank ("SST") and the wellheads. Similarly, the other two test coupons (316L stainless steel and Hastelloy) are installed at the same location and will be subjected to the identical same testing. In this manner, these test coupons will be subjected to virtually identical conditions (injection temperature, flow rate, velocity, etc.) as the injection tubing. The test coupons will be removed on a regular monthly basis, and visually examined for signs of deterioration such as mass, thickness, pitting or cracking. Data will be reported to the U.S. EPA as required in Republic's two EPA UIC permits. The procedure describing the testing of the coupons follows below. Should significant corrosion be detected in any observation or maintenance activities, additional non-invasive ultrasonic thickness testing may be conducted on selected wellhead and/or pipeline locations to monitor future conditions.

Barco/ Hardness

This is a qualitative test principally used to investigate the deterioration of the fiberglass laminates. Barcol hardness will be measured every quarter for the first year and then annually in the years following. Fiberglass manufacturers have determined a Barcol hardness range for each fiberglass resin product. To determine damage, hardness must be measured before and after exposure. If hardness measurements fall outside the full cure range, then ii is probable that the sample has been subjected to chemical attack from the waste sources injection. A significant increase in hardness value outside the manufacturer's specified range indicates a brittle condition of the resin due to waste sources exposure. A

hardness reading decrease to a value outside the specification range would be indicative of fiber blooming (an attack on the resin) followed by a "wicking" or chemical attack permeating the fiberglass laminate. Barco! hardness will be measured initially for the fiberglass to establish a baseline prior to immersion in the waste sources pipeline. These test results will be qualitative in nature with hardness differences of 5.0 or less considered to be insignificant.

Mass and Thickness Determination

This test is a quantitative test that can be used to indicate chemical attack on the fiberglass (injection tubing), 316L stainless steel or Hastelloy. All three coupon materials will be initially weighed on a digital scale for baseline information. The coupons will be weighed monthly and compared to the initial baseline measurement. Weight loss will be converted to an average penetration (corrosion) rate such as mils penetration or microns of penetration per year. These values will be compared to industry standards (such as ASTM and NACE) and to prior measurements to determine the expected remaining component life. Significant changes in mass will result in additional testing to determine the nature of the material degradation, if any. Should significant loss of mass be observed, calipers, and/or ultrasonic thickness measurements may also be used to assess changes in coupon thickness (prior to engaging in any other testing).

Visual Inspection and Microscope Determinations

Annual visual observations and photographs will also be used to determine and track pitting and or cracking of the fiberglass, 316L stainless steel and Hastelloy coupons.

The intent of monitoring as described in this document is to continuously estimate expected service life reduction due to corrosion of the principal well material, i.e., the fiberglass injection tubing, and the other well materials (316L stainless steel and Hastelloy). Loss of mass, loss of thickness, cracking, pitting and/or other signs of corrosion will be reported to the EPA on a monthly basis.

Note: ASTM Standards D-2583 and C-581 will serve as the procedures for the Barco! hardness determinations. If serious degradation of a fiberglass coupon is observed, further testing and analysis may be conducted (such as flexural properties determinations, ASTM D-790-5). The procedures referenced herein are subject to change as such ASTM procedures change.
ATTACHMENT I DOCUMENT REPOSITORY PLAN

Republic Industrial and Energy Solutions, LLC

MIR 000 016 005

Document Repository Plan

In accordance with Part II, Condition D of Republic Industrial and Energy Solutions, LLC's ("Republic") Underground Injection Control Permits (the "UIC Permits"), Republic shall make copies of all Required Reports under the UIC Permits publicly available in a Document Repository maintained by Republic in accordance with this Plan.

A. <u>Required Reports and Documents</u>

Unless Republic claims business confidentiality under Part I, Condition D of the UIC Permits, Republic will maintain the following Required Reports and documentation in the Document Repository:

- 1. Monthly Reports, as required under Part II, Condition D.1.
- 2. Annual Reports, as required under Part II, Condition D.2.
- 3. Reports regarding demonstrations of mechanical integrity, well workovers, and other tests required by the permit, as required under Part II, Condition D.3. This includes reports required under Parts I.E.12, II.B.3, II.B.4, II.C.6, and Attachments A and E.
- 4. Proposed changes to plans required under the UIC Permits and correspondence with EPA regarding those changes.
- 5. EPA inspection reports received by Republic and correspondence with EPA regarding those inspection reports.

B. Confidential Business Information

If a Required Report contains confidential business information, Republic may use reasonable efforts to redact that information from the Required Report before placing it in the Document Repository. If the confidential business information cannot be redacted using reasonable efforts, Republic may exclude that Required Report from the Document Repository.

C. Document Repository Locations

Copies of the Required Reports will be maintained at the following locations:

1. Print hard-copies and/or electronic copies will be maintained at Republic's main offices at 28470 Citrin Drive, Romulus, MI 48174. Required Reports will be available to the public for review at this location by appointment

during normal business hours. Persons visiting Republic's facility will be subject to Republic's security and safety procedures.

- 2. Electronic copies will be posted in PDF or other commonly-used formats to Republic's website (currently at <u>www.detroitindustrialwell.com</u>).
- 3. Print hard-copies will be delivered to the Romulus Public Library located at 11121 Wayne Rd., Romulus, MI 48174. Prior to the initial delivery, Republic will contact Library staff to inform them of this Plan. In the event that the Library is, for any reason, unable or unwilling to maintain the Document Repository, or to make the Required Reports available to the public, Republic may cease delivering the Required Reports to the Library and maintain those reports only at the locations identified in Paragraphs 1 and 2, above.

D. Frequency of Updating Document Repository

Republic shall update the Document Repository at each location identified in Section C of this Plan at least once each calendar quarter. Each Required Report shall be maintained in the Document Repository for at least five (5) years after its initial placement into the Document Repository.

ATTACHMENT J SEISMICITY RESPONSE

Prior to commencing injection, the permittee shall subscribe to the U.S. Geological Survey Earthquake Notification Service to receive notification of seismic events within 100 kilometers (62 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: <u>Seismic events not recorded or $M_w < 3.5$ </u>: Continue normal well injection operations.

YELLOW: Seismic events with Moment Magnitude $3.5 \le M_w \le 5.0$ are 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 shall 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: <u>Moment Magnitude 5.0 or greater seismic events are observed within a 100 km (62.14 Miles)</u> 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 shall 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.