REGION 5
CHICAGO, IL 60604

January 8, 2025

PROPOSED DECISION TO REISSUE AN EXEMPTION FROM THE LAND DISPOSAL RESTRICTIONS OF THE HAZARDOUS AND SOLID WASTE AMENDMENTS OF 1984 ISSUED TO VICKERY ENVIRONMENTAL, INC. FOR THE INJECTION OF HAZARDOUS WASTE

Action: Notice of intent to reissue an exemption from the land disposal restrictions of the Hazardous and Solid Waste Amendments of 1984.

Summary: The U.S. Environmental Protection Agency (EPA) is proposing to reissue the exemption for Vickery Environmental, Inc. (VEI) from the land disposal restrictions under the Hazardous and Solid Waste Amendments of 1984 (HSWA) to the Resource Conservation and Recovery Act (RCRA). EPA issued that exemption in 2015. If the exemption is reissued, VEI may inject only hazardous wastes designated by the codes in Table 1 through five Class I hazardous waste injection wells #2, #4, #5, #6, and #8. The reissuance would not change the exemption's existing requirements aside from imposing them on injection well #8.

On June 30, 2022, VEI submitted a petition to EPA seeking reissuance of its exemption from the prohibition on injection of restricted hazardous waste (petition) under Title 40 of the Code of Federal Regulations (40 C.F.R.) part 148, subpart B. VEI's 2015 exemption applied to four disposal injection wells that existed at that time, wells # 2, 4, 5 and 6. VEI petitioned EPA to reissue the exemption to include injection into an additional injection disposal well, Well # 8, at its existing facilities. If this reissuance is granted, VEI may inject hazardous wastes at the five wells. The reissuance would impose the same conditions and requirements on VEI's operations, including for wells # 2, 4, 5 and 6, but also impose them on VEI's operation of well # 8. As discussed in the 2015 Exemption, the reissued exemption is approved for the 20-year modeled injection period, which ends on June 30, 2027.

As part of its petition, VEI was required to demonstrate that, to a reasonable degree of certainty, there will be no migration of hazardous constituents from the injection zone for as long as the waste remains hazardous. This demonstration requires a showing that meets the criteria at 40 C.F.R. § 148.20(a) and (b) which includes, among other things, a showing under 148.20(a)(i) that the hydrogeological and geochemical conditions at the site and the physiochemical nature of the wastestream(s) are such that reliable predictions can be made that any injected fluids will not migrate within 10,000 years: (1) vertically upward out of the injection zone or (2) laterally within the injection zone to a point of discharge or interface with an underground source of drinking water (USDW).

Pursuant to 40 C.F.R. § 148.20(e), any person who has been granted an exemption under that 40 C.F.R. § 148.20 may submit a petition for reissuance of the exemption to include an additional restricted waste or wastes or to modify any conditions placed on the exemption by the Director. The Director shall reissue the petition if the petitioner complies with the requirements of paragraphs (a), (b) and (c) of section 148.20. VEI has submitted a petition to modify the conditions to allow injection of the same wastes through a new well, well # 8, in addition to well #s 2, 4, 5 and 6.

EPA conducted a comprehensive review of VEI's March 27, 2015, exemption, revisions to the petition dated June 30, 2022, and other materials VEI submitted to EPA. Based on its review, EPA determined that VEI has met the requirements of 40 C.F.R. § 148.20(a), (b), (c), and (e). Accordingly, EPA is proposing to reissue VEI's exemption to allow the injection of certain restricted hazardous waste through the following five Class I hazardous waste injection wells at its facility: wells # 2, 4, 5, 6 and 8.

I. Background

A. Authority

HSWA expanded the scope and requirements of RCRA. As amended by HSWA, RCRA at Sections 3004 (d), (e), (f), and (g), 42 U.S.C. § 6924(d), (e), (f), and (g), prohibits the land disposal of untreated hazardous waste beyond specified dates, unless EPA determines that the prohibition is not required in order to protect human health and the environment. Under RCRA Section 3004(k), 42 U.S.C. § 6924(k), land disposal includes any placement of hazardous waste into an injection well. A method of land disposal may not be determined to be protective of human health and the environment (except with respect to a hazardous waste which has complied with the pretreatment regulations promulgated under subsection 3004(m)) unless, upon application by an interested person, it has been demonstrated to a reasonable degree of certainty, that there will be no migration of hazardous constituents from the disposal unit or injection zone for as long as the wastes remain hazardous. See 42 U.S.C. § 6924(g)(5). EPA promulgated regulations at 40 C.F.R. Part 148 that govern such applications to dispose of hazardous wastes in Class I hazardous waste injection wells. See 53 Fed. Reg. 28118 (Jul. 26,1988). EPA proposes to exempt VEI from the prohibition on land disposal because it has demonstrated pursuant to 40 C.F.R. Part 148, that, to a reasonable degree of certainty, there will be no migration of hazardous constituents out of the injection zone or into an underground source of drinking water (USDW) for at least 10,000 years.

Applicants seeking an exemption from the land disposal restrictions under 40 C.F.R. § 148.20(a)(1) must show that the hydrogeological and geochemical conditions at the site and the physiochemical nature of the waste stream(s) are such that reliable predictions can be made that: (i) fluid movement conditions are such that the injected fluids will not migrate within 10,000 years: (A) vertically upward out of the injection zone; or (B) laterally within the injection zone to a point of discharge or interface with an Underground Source of Drinking Water (USDW) (the no-migration standard); or (ii) before the injected fluids migrate out of the injection zone or to a point of discharge or interface with USDW, the fluid will no longer be hazardous because of attenuation, transformation, or immobilization of hazardous constituents within the injection zone by hydrolysis, chemical interactions, or other means. VEI submitted a petition under 40 C.F.R. § 148.20(a)(1)(i).

For each well, 40 C.F.R. § 148.20(a)(2) requires a petition to have: (i) demonstrated that the injection well's area of review complies with the substantive requirements of § 146.63; (ii) located, identified, and ascertained the condition of all wells within the injection well's area of review (as specified in § 146.63) that penetrate the injection zone or the confining zone by use of a protocol acceptable to the Director that meets the substantive requirements of § 146.64; (iii) submitted a corrective action plan that meets the substantive requirements of § 146.64, the implementation of which shall become a condition of petition approval; and (iv) submitted the results of pressure and radioactive tracer tests performed within one year prior to submission of the petition demonstrating the mechanical integrity of the well's long string casing, injection tube, annular seal, and bottom hole cement. (In cases where the petition has not been approved or denied within one year after the initial demonstration of mechanical integrity, the Director may require the owner or operator to perform the tests again and submit the results of the new tests.) Under 40 C.F.R. § 148.20(b), a demonstration under § 148.20(a)(1)(i) shall identify the strata within the injection zone which will confine fluid movement above the injection interval and include a showing that the strata is free of known transmissive faults of fractures and that there is a confining zone above the injection zone. (Subsection (c) looks at the strata within the injection zone for a § 148.20(a)(1)(ii) demonstration.)

B. Facility Information and Operation

VEI operates a commercial waste disposal facility in northeastern Sandusky County, Ohio. The facility disposes of liquid hazardous waste from multiple sources through four existing Class I hazardous waste injection wells. These wells are currently permitted and operated according to Underground Injection Control (UIC) regulations administered by the Ohio Environmental Protection Agency (Ohio EPA). In 2022, Ohio EPA reissued permits to VEI to dispose of hazardous waste commercially by deep well injection through the four existing injection wells. In 2023, Ohio EPA issued a permit to VEI to dispose of hazardous waste commercially by deep well injection through the newly constructed well #8.

The operator’s existing exemption petition included four wells: #2, #4, #5, and #6. The exemption is based on a long term combined maximum injection rate of 240 gallons per minute (gpm), for a total of 10,368,000 gallons per month of hazardous waste identified in Table 1 for the four wells. The rate that VEI injects into each well is also limited by the maximum allowable surface injection pressure at each well.

C. Submission

On October 3, 2007, VEI submitted a petition for exemption from the land disposal restrictions of HSWA. EPA published the exemption in the Federal Register on March 27, 2015. On June 30, 2022, VEI submitted a petition requesting the reissuance of the existing exemption to include well #8. EPA reviewed this submission for completeness and conformance with 40 C.F.R. part 148.

VEI has demonstrated that the addition of one injection disposal well, well #8, to the existing petition does not affect the demonstration of no-migration, because the injection rate and volume which VEI was granted in its original exemption will not change. VEI has provided documentation related to the movement of wastes accounting for this additional well in the injection interval in support of its request.

II. Basis for Determination

A. Waste Identification, Analysis, and Estimation Techniques (40 C.F.R. § 148.22(a)), 40 C.F.R. § 148.21(a)(1) and (2)) – Under 40 C.F.R. § 148.22(a)(1) and (2), any petition must include an identification of the specific waste or wastes and the specific injection well or wells for which the demonstration will be made and a waste analysis to describe fully the chemical and physical characteristics of the subject wastes. In its petition, VEI identified all hazardous waste codes and wells #2, #4, #5, #6, and #8 for which its demonstration was made. VEI included a waste analysis that describes the chemical and physical characteristics of all current hazardous waste codes. EPA proposes to limit VEI's exemption to the waste codes identified in Table 1.

Under 40 C.F.R. § 148.21(a)(1), all waste analysis and any new testing performed by the petitioner must be accurate and reproducible and performed in accordance with quality assurance standards. EPA evaluated VEI's Quality Assurance Plan and determined it to be adequate. Under 40 C.F.R. § 148.21(a)(2), estimation techniques must be appropriate, and EPA-certified test protocols must be used where available and appropriate. When precise values necessary for the demonstration were not available, VEI used appropriate estimates to generate conservative results and performed a sensitivity analysis to evaluate their importance.

B. Wells in Area of Review (40 C.F.R. §§ 146.63, 146.64 and 148.20(a)(2)(i), (ii), and (iii)) – Under § 148.20(a)(2)(i), the petitioner must show that the injection well's AOR complies with the substantive requirements of 40 C.F.R. § 146.63. 40 C.F.R. § 146.63 requires that the AOR for Class I hazardous waste injection wells shall be a minimum 2-mile radius around the well bore. VEI has demonstrated that the injection wells' AOR complies with 40 C.F.R. § 146.63 by selecting a 5-mile radius as the AOR. VEI's decision to consider a 5-mile radius rather than a 2-mile radius as the AOR is more protective of the environment because VEI is looking at a larger area for penetrations into the confining zone.

Under 40 C.F.R. § 148.20(a)(2)(ii), the petitioner must locate, identify, and ascertain the condition of all wells within the injection well's AOR that penetrate the injection zone or the confining zone and meet the substantive requirements of 40 C.F.R. § 146.64. Substantive requirements of 40 C.F.R. § 146.64 include corrective action if wells are improperly plugged, completed, or abandoned. Under 40 C.F.R. § 148.20(a)(2)(iii), the petitioner must submit a corrective action plan. VEI conducted a well search over the AOR and found that there are eight wells penetrating the top of the confining zone within this area. VEI provided completion and plugging reports showing that these eight wells are properly constructed or plugged. Accordingly, under 40 C.F.R. § 148.20(a)(2)(iii) and 40 C.F.R. § 146.64, VEI does not need to submit a corrective action plan.

C. **Mechanical Integrity Test Information (40 C.F.R. § 148.20(a)(2)(iv))** – Under 40 C.F.R. § 148.20(a)(2)(iv), the petitioner must submit the results of pressure and radioactive tracer tests performed within one year prior to submission of the petition demonstrating the mechanical integrity of the wells' long string casing, injection tubing, annular seal, and bottom hole cement[1]. In cases where the petition has not been approved or denied within one year after the initial demonstration of mechanical integrity, EPA may require the owner or operator to perform the tests again and submit the results of the new tests. VEI conducted mechanical integrity tests on wells #2, #4, and #5 in May 2022 and on well #6 in October 2021 and October 2022. The mechanical integrity tests for well #8 were conducted in December 2021. These tests were performed within one year prior to VEI's petition submission in June 2022. Since submitting the petition, VEI has conducted approved mechanical integrity tests on wells #2, #4, and #5 in May 2022, May 2023, and May 2024; on wells #6 and #8 in October 2023 and October 2024. The results from these tests confirmed that all injected fluids were entering the approved injection interval and not channeling up the well bore out of the injection zone. Each year, VEI also submits mechanical integrity test results to Ohio EPA.

D. **Site-Specific Information (40 C.F.R. §§ 148.20(b) and 148.21(b))** – Under 40 C.F.R. § 148.20(b), the petitioner must identify the strata within the injection zone which will confine fluid movement above the injection interval and include a showing that this strata is free of known transmissive faults or fractures. The petitioner must also show that there is a confining zone above the injection zone. Under 40 C.F.R. § 148.21(b), the petitioner must provide sufficient site-specific information to support the demonstration that there will be no migration of hazardous constituents from the injection zone for as long as the waste remains hazardous. VEI identified the Rome, Conasauga, Kerbel, and Knox Formations as the strata overlying the injection interval which will arrest fluid movement and, as discussed below, showed that the strata is free of transmissive faults of fractures. In support of its demonstration, VEI provided site-specific geologic, hydrologic, and geochemical information, including descriptions of the depositional environments of the formations, well logs, cross-sections, well and formation tests, and geologic maps. A summary of the site-specific information is provided below. All depths are from well #8; depths in the other wells are similar.

1. **Identification of Underground Sources of Drinking Water (USDW)** – The lowermost USDW at the site is the Lockport Formation, the base of which is at approximately 602 feet below ground level (bgl) (see Figure 1). There is approximately 2,200 feet of rock between the lowermost USDW and the Injection Interval, where the waste is emplaced. This separation is composed of dolomites, shales, sandstones, and siltstones which are predominantly characterized by low permeability at this location.

2. **Injection Zone** – The injection zone is defined as "a geological 'formation', group of formations, or part of a formation receiving fluids through a well." The injection zone must have sufficient permeability, porosity, thickness, and extent to contain the injected fluids. The injection zone for the VEI facility is composed of the injection interval and the overlying arrestment interval (Figure 1); this includes the Rome, Conasauga, Kerbel, and Knox

[1] "Bottom hole cement" refers to the cement at the bottom of the casing which seals the space between the base of the casing and the rock which surrounds it.

Formations and the Mt. Simon Sandstone, between 2,360 and 2,896 feet below ground level. The injection interval is located at depths between 2,802 and 2,896 feet bgl and is where the waste is directly emplaced. The injection interval can accept the waste because of its high permeability and porosity and its extent and thickness.

The arrestment interval ranges from 2,360 and 2,802 feet bgl and is composed of the Rome, Conasauga, Kerbel, and Knox Formations. These formations are continuous rock formations of low vertical permeability and are free of known transmissive faults or fractures over an area sufficient to prevent the upward movement of waste.

3. **Confining Zone** – The regulations which specify the minimum criteria for siting Class I hazardous waste injection wells require that the injection zone must be overlain by at least one additional formation which can confine the injected fluids. This formation is known as the confining zone, and it must be (1) laterally continuous, (2) free of transecting, transmissive faults or fractures over an area sufficient to prevent fluid movement, and (3) of sufficient thickness and lithologic and stress characteristics to prevent vertical propagation of fractures. The confining zone at the VEI facility is composed of the Black River and Wells Creek Formations found between 1,819 and 2,360 feet bgl (Figure 1). It is 541 feet thick, has no known transmissive faults or fractures within the AOR, and will resist vertical migration because of its low natural permeability.

   The confining zone must be separated from the lowermost USDW by at least one sequence of permeable and less permeable strata that will provide added layers of protection by either allowing pressure bleed-off (high permeability units), or by providing additional confinement (low permeability units). The primary "bleed-off" unit is the Trenton Limestone found between 1,662 and 1,819 feet bgl. The Trenton Limestone consists of limestone that has moderate porosity and permeability. It is capable of accepting significant amounts of fluid without developing excessive hydrostatic pressure. Overlying the Trenton Limestone is the Cincinnatian Series which is found between 870 and 1,662 feet below ground level. The Cincinnatian Series provides additional confinement because it has a much lower porosity and permeability than the Trenton Limestone. These rock formations are laterally continuous for hundreds of square miles and provide the required additional layers of protection.

4. **Absence of Known Transmissive Faults** – There are no known transmissive faults in the Rome, Conasauga, Kerbel, and Knox Formations, the strata within the injection zone that will arrest fluid movement, or in the overlying Black River and Wells Creek Formations that comprise the confining zone. In addition, a seismic reflection survey was conducted from September to December of 1989. The evaluation of the seismic reflections indicated that there is no vertical faulting within this area.

E. Predictive Model

1. **Model Development** – VEI used the Sandia Waste-Isolation Flow and Transport (SWIFT) Model for Fractured Media for Windows, Version 2.6, a subsurface flow and pressure

computer modeling program, to simulate migration of injected fluid from wells #2, #4, #5, and #6. VEI used site specific data from logs, core, and other testing carried out during drilling and operation of wells #2, #4, #5, and #6 and site-specific information (i.e. hydrogeologic properties of the various rock layers and formation brines and characteristics of the injected fluid) in its model. In its 2022 petition for reissuance, VEI updated this model and site-specific data to include well #8; the subsequent modeling discussion will focus on the updated model unless otherwise specified. When site-specific information was not available, VEI used data from peer-reviewed literature or data from facilities injecting hazardous waste into wells with similar site conditions.

2. **Time Period** – In the updated model with well #8, VEI used two simulated time periods for its demonstration: a 51-year operational period and a 10,000-year post-operational period. The operational period included actual historical injection rates through December 2020 and a combined maximum injection rate of 240 gpm through June 2027. This rate history determined the plume size and maximum pressure build up in the injection zone. The post-operational period predicts the maximum vertical molecular diffusion and the horizontal drift of the waste plumes.

3. **Vertical Migration** – VEI made conservative assumptions based on the maximum pressure increase of 39 pounds per square inch (psi) at the end of the facility's operational life as calculated by the SWIFT model. VEI assumed that this pressure existed during the entire 45-year historical operational period and an additional 6-year predicted operational period, instead of only the end of injection. VEI also assumed that vertical movement begins at the base of the arrestment interval (which is the top of the injection interval) which is located at 2,802 feet bgl. The vertical permeability of the rocks in the arrestment interval was measured and was found to be low. Low vertical permeability is crucial in order to prevent fluid from moving upward. Based on measured values and the assumptions used in the model, VEI predicted the vertical movement to be less than the 2007 model. The 2007 model predicted that vertical fluid movement would be 84 feet above the base of the injection interval at the end of the future operational period. Therefore, the modeling conducted in 2007 remains the most conservative estimate and the petition does not need to be altered to account for the inclusion of well #8.

   VEI used conservative assumptions to maximize the distance of the plume for the 10,000-year post-operational period. VEI used the health-based standard to determine the distance at which the constituent would no longer be hazardous (Table 2). Based on the values present in the updated 2021 model and the previous model for the 2007 petition, VEI predicted the maximum extent of movement to be 195 feet above the injection interval. This amount is much less than the 442-foot thickness of the arrestment interval (Figure 1).

4. **Lateral Migration** – The simulation of plume-flow distance and direction during the 10,000-year post-operational period included buoyancy and the natural flow within the Mt. Simon Sandstone as well as dispersion and diffusion. Predictions based on literature values indicated that the rate of regional flow is less than 0.5 ft/year. To maximize plume movement, the model incorporated regional flow in the same direction as the dip of the

rock strata, which is to the southeast. To obtain conservative model outputs, the model does not incorporate the possibility of chemical and physical processes which are likely to impede movement of hazardous constituents. The final plume boundary is shown in Figure 2. The boundary represents the likely maximum distance of waste migration within 10,000 years. By simulating the migration of the injected fluid, VEI was able to predict the pressure in the injection interval and the vertical and lateral movement of waste constituents.

5. **Model Verification, Validation, Calibration, and Appropriateness (40 C.F.R. § 148.21(a)(3))** – Under 40 C.F.R. § 148.21(a)(3), predictive models must be: (1) verified and validated; (2) appropriate for the specific site, waste streams, and injection conditions of the operation; and (3) calibrated for existing sites. The SWIFT computer codes have been used in previous no-migration demonstrations and have been verified extensively by prior testing which showed that the codes accurately represent the mathematical model.

   Based on EPA's review of the information provided by VEI, review of the geology by Ohio EPA, and review of the model by Cadmus, EPA concluded that VEI's simulation model provided for the 2007 petition is a valid representation of the geology, physical processes, and boundary conditions at the site.

   For the 2007 petition, VEI calibrated the SWIFT model for its site by adjusting certain parameters such as the permeabilities of various layers to reflect the observed data from pressure transient tests conducted between 1990 and 2006. The model is appropriate for this site because VEI used conservative values for the properties of the individual rock layers (e.g., permeability and porosity), the injection pressure, injection rate, and waste stream characteristics (e.g., specific gravity and viscosity).

   For the 2022 petition's request to reissue the exemption, VEI repeated their previous 2007 SWIFT model with updated input parameters to incorporate historical injection since 2007 and the addition of well #8. Based on EPA's review of the information provided by VEI, review of the geology by Ohio EPA, and review of the model by Cadmus, EPA concluded that VEI's simulation model does not change the site characterization presented in the 2007 Petition nor in the initial 1990 Petition.

F. Quality Assurance and Quality Control (40 C.F.R. § 148.21(a)(4)) – Under 40 C.F.R. § 148.21(a)(4), a quality assurance and quality control plan must address all aspects of the demonstration, which VEI did in its petition. For example, it addressed investigating artificial penetrations, integrity of geological data and core analysis, and reservoir modeling. The quality of the data is indicated by the consistency of the values. VEI followed an appropriate protocol for locating records of penetrations in the AOR, for collection and analyses of geologic and hydrogeologic data, for waste characterization, and for all tasks associated with the modeling demonstration.

G. Conservative values (40 C.F.R. § 148.21(a)(5)) – Under 40 C.F.R. § 148.21(a)(5), the petitioner must use reasonably conservative values whenever values taken from the literature or estimated on the basis of known information are used instead of site-specific measurements. As described above, when parameters were uncertain, VEI chose conservative values.

H. **Sensitivity Analysis (40 C.F.R. § 148.21(a)(6))** – Under 40 C.F.R. § 148.21(a)(6), the petitioner must conduct a sensitivity analysis to determine the effect that significant uncertainty may contribute to the demonstration. The demonstration must be based on conservative assumptions identified in the analysis. VEI conducted a sensitivity analysis to determine the effect that uncertain parameters may have on its predictive model. VEI used a range of conservative input values for specific gravity, permeability, dispersivity, porosity, and effective dispersion coefficient. In its sensitivity analysis, VEI demonstrated that the uncertainty in these parameters does not significantly change the predictions for pressure build-up in the injection interval or significantly affect waste migration or waste confinement predictions. Though the uncertainty of the parameters does not have significant effect on the migration of injected fluids, VEI used the conservative assumptions identified in its sensitivity analysis to simulate migration of injected fluid in Wells #2, #4, #5, #6, and #8.

I. **Other information in support of petition (40 C.F.R. § 148.22(a)(3))** – Under 40 C.F.R. § 148.22(a)(3), EPA may require additional information to support the petition. Ohio EPA provided documentation related to the mechanical integrity of the VEI wells after receipt of the petition. VEI provided reports on the pressure fall-off tests performed in the VEI wells. This information showed that the wells are operating as intended. EPA also received monitoring well data from both Ohio EPA and from VEI to verify that there has been no contaminant migration after receipt of the petition.

III. Conclusion

After a detailed and thorough review of the submitted petition and supporting documents, VEI's predictive model, and other information contained in the administrative record, EPA has determined that VEI has demonstrated that, to a reasonable degree of certainty, there will be no migration of hazardous constituents vertically out of the injection zone or laterally to a point of discharge in a 10,000-year period. Therefore, EPA proposes to reissue VEI's land ban exemption.

IV. Conditions of Petition Approval

This proposed reissuance of the land ban exemption for the continued injection of restricted hazardous waste is subject to the following conditions, which are necessary to assure compliance with the standard in 40 C.F.R. § 148.20(a). EPA may terminate this exemption under 40 C.F.R. § 148.24(a) for noncompliance by VEI with any condition of this exemption. EPA may also terminate this exemption for any causes identified under 40 C.F.R. § 148.24(a) and (b). If VEI wants to modify any of the conditions placed on the exemption, it must submit a petition for reissuance to EPA as required by 40 C.F.R. § 148.20(e) and (f).

1. The exemption applies to the five existing hazardous waste injection wells, #2, #4, #5, #6, and #8 located at the VEI facility at 3956 State Route 412, Vickery, Ohio;

2. Injection of restricted hazardous waste is limited to the part of the Mt. Simon Sandstone at depths between 2791 and 2950 feet below the surface level;

3. Only restricted wastes designated by the RCRA waste codes found in Table 1 may be injected;

4. Maximum concentrations of chemicals that are allowed to be injected are listed in Table 2;

5. The average specific gravity of the injected waste stream must be no less than 1.08 over a one-year period;

6. VEI may inject up to a combined total of 240 gallons per minute into Well #2, #4, #5, #6, and #8, based on a monthly average;

7. This exemption is approved for the 20-year modeled injection period, which ends on June 30, 2027. VEI may petition EPA for a reissuance of the exemption beyond that date, provided that a new and complete petition and no-migration demonstration is received at EPA, Region 5, by January 31, 2027;

8. VEI must submit, within 90 days after the exemption is granted, an approvable plan to demonstrate that chemicals listed in Table 2 are not or cannot be injected above the listed limits. Upon U.S. EPA's approval of this plan, VEI shall implement the plan per the schedule in the approved plan;

9. VEI must submit copies of the reports on the annual bottom-hole pressure surveys conducted in well #2, #4, #5, #6, and #8 to U.S. EPA when these reports are submitted to the Ohio Environmental Protection Agency (Ohio EPA). The reports must include a comparison of reservoir parameters determined from the fall-off test, such as permeability and long-term shut-in pressure, with parameters used in the approved no-migration petition;

10. VEI must submit copies of the reports on the annual radioactive tracer surveys and annulus pressure tests for wells #2, #4, #5, #6, and #8 to U.S. EPA when these reports are submitted to Ohio EPA;

11. VEI shall notify U.S. EPA in writing if any injection well loses mechanical integrity, prior to any workover or plugging, when these notifications are submitted to Ohio EPA; and,

12. The petitioner must fully comply with all requirements set forth in Underground Injection Control Permits 03-72-009-PTO-I, 03-72-011-PTO-I, 03-72-012-PTO-I, 03-72-013-PTO-I, and 03-72-014-PTO-I issued by Ohio EPA.

13. Upon the expiration, cancellation, reissuance, or modification of the permits referenced above, this exemption is subject to review.

14. Whenever EPA determines that the basis for approval of a petition under 40 C.F.R. §§ 148.23 and 148.24 may no longer be valid, EPA may terminate this exemption and will require a new demonstration in accordance with 40 C.F.R. § 148.20.

The aspects of the no-migration demonstration were described in the **Federal Register** granting the exemption published March 27, 2015. VEI's request documents that the behavior of Well #8 is within the range that was used in the original demonstration. Moreover, VEI's request to reissue the petition does not change the site characterization or the operational parameters presented in the petition issued on March 27, 2015. Therefore, no change other than the addition of well #8 to the exemption is necessary.

Date: The EPA invites public comments on this proposed decision. Comments will be accepted until the deadline given in the fact sheet for this action. Late comments do not have standing and will not be considered in the decision process.

Submit written comments to:

Underground Injection Control (WP-16J)
Docket ID No. EPA-R05-OW-2024-0495 at
https://www.regulations.gov/docket/EPA-R05-OW-2024-0495

For Further Information: Contact Kaelyn Quinlan, Lead Petition Reviewer at (312) 886-7188 or quinlan.kaelyn@epa.gov.

DRAFT

Tera L. Fong
Director, Water Division

Table 1. List of RCRA waste codes approved for injection.

D001	D002	D003	D004	D005	D006	D007	D008	D009	D010	D011	D012
D013	D014	D015	D016	D017	D018	D019	D020	D021	D022	D023	D024
D025	D026	D027	D028	D029	D030	D031	D032	D033	D034	D035	D036
D037	D038	D039	D040	D041	D042	D043	F001	F002	F003	F004	F005
F006	F007	F008	F009	F010	F011	F012	F019	F020	F021	F022	F023
F024	F025	F026	F027	F028	F032	F034	F035	F037	F038	F039	K001
K002	K003	K004	K005	K006	K007	K008	K009	K010	K011	K013	K014
K015	K016	K017	K018	K019	K020	K021	K022	K023	K024	K025	K026
K027	K028	K029	K030	K031	K032	K033	K034	K035	K036	K037	K038
K039	K040	K041	K042	K043	K044	K045	K046	K047	K048	K049	K050
K051	K052	K060	K061	K062	K069	K071	K073	K083	K084	K085	K086
K087	K088	K093	K094	K095	K096	K097	K098	K099	K100	K101	K102
K103	K104	K105	K106	K107	K108	K109	K110	K111	K112	K113	K114
K115	K116	K117	K118	K123	K124	K125	K126	K131	K132	K136	K140
K141	K142	K143	K144	K145	K147	K148	K149	K150	K151	K156	K157
K158	K159	K161	K169	K170	K171	K172	K174	K175	K176	K177	K178
K181	P001	P002	P003	P004	P005	P006	P007	P008	P009	P010	P011
P012	P013	P014	P015	P016	P017	P018	P020	P021	P022	P023	P024
P026	P027	P028	P029	P030	P031	P033	P034	P036	P037	P038	P039
P040	P041	P042	P043	P044	P045	P046	P047	P048	P049	P050	P051
P054	P056	P057	P058	P059	P060	P062	P063	P064	P065	P066	P067
P068	P069	P070	P071	P072	P073	P074	P075	P076	P077	P078	P081
P082	P084	P085	P087	P088	P089	P092	P093	P094	P095	P096	P097
P098	P099	P101	P102	P103	P104	P105	P106	P108	P109	P110	P111
P112	P113	P114	P115	P116	P118	P119	P120	P121	P122	P123	P127
P128	P185	P188	P189	P190	P191	P192	P194	P196	P197	P198	P199
P201	P202	P203	P204	P205	U001	U002	U003	U004	U005	U006	U007
U008	U009	U010	U011	U012	U014	U015	U016	U017	U018	U019	U020
U021	U022	U023	U024	U025	U026	U027	U028	U029	U030	U031	U032
U033	U034	U035	U036	U037	U038	U039	U041	U042	U043	U044	U045
U046	U047	U048	U049	U050	U051	U052	U053	U055	U056	U057	U058
U059	U060	U061	U062	U063	U064	U066	U067	U068	U069	U070	U071
U072	U073	U074	U075	U076	U077	U078	U079	U080	U081	U082	U083
U084	U085	U086	U087	U088	U089	U090	U091	U092	U093	U094	U095
U096	U097	U098	U099	U101	U102	U103	U105	U106	U107	U108	U109
U110	U111	U112	U113	U114	U115	U116	U117	U118	U119	U120	U121
U122	U123	U124	U125	U126	U127	U128	U129	U130	U131	U132	U133
U134	U135	U136	U137	U138	U139	U140	U141	U142	U143	U144	U145
U146	U147	U148	U149	U150	U151	U152	U153	U154	U155	U156	U157
U158	U159	U160	U161	U162	U163	U164	U165	U166	U167	U168	U169
U170	U171	U172	U173	U174	U176	U177	U178	U179	U180	U181	U182

U183	U184	U185	U186	U187	U188	U189	U190	U191	U192	U193	U194
U196	U197	U200	U201	U202	U203	U204	U205	U206	U207	U208	U209
U210	U211	U213	U214	U215	U216	U217	U218	U219	U220	U221	U222
U223	U225	U226	U227	U228	U234	U235	U236	U237	U238	U239	U240
U243	U244	U246	U247	U248	U249	U271	U278	U279	U280	U328	U353
U359	U364	U367	U372	U373	U387	U389	U394	U395	U404	U409	U410
U411											

Table 2. Maximum concentrations of chemical contaminants that are hazardous at less than one part per billion.

Chemical Constituent	Health Based Limit (mg/L)	Maximum Allowable Initial Concentration (mg/L)	Vickery Limit (%)
Acetyl chloride	2.00E-04	2.00E+05	20
Acrylamide (2-Propenamide)	8.00E-06	8.00E+03	0.80
Acrylonitrile (2-Propenenitrile or Vinyl Cyanide)	6.00E-05	6.00E+04	6.00
Aldrin	2.00E-07	2.00E+02	0.02
Allyl Chloride (3-chloroprop(yl)ene)	3.00E-05	3.00E+04	3.00
Bendiocarb (2,2-Dimethyl-1,3-benzodioxol methylcarbamate)	3.00E-04	3.00E+05	30
Benzal chloride	2.00E-05	2.00E+04	2.0
Benz[a]anthracene (1,2-Benzanthracene)	1.30E-04	1.30E+05	13
Benzidine	2.00E-07	2.00E+02	0.02
Benzo[b]fluoranthene	1.80E-04	1.80E+05	18
Benzo[k]fluoranthene	1.70E-04	1.70E+05	17
Benzo[g,h,I]-perylene	7.60E-04	7.60E+05	76
Benzo[a]pyrene	2.00E-04	2.00E+05	20
Benzotrichloride	3.00E-06	3.00E+03	0.30
Benzyl chloride ((Chloromethyl)benzene)	2.00E-04	2.00E+05	20
alpha BHC (see Lindane) alpha-hexachlorocyclohexane	6.00E-06	6.00E+03	0.60
beta BHC (see Lindane) beta-hexachlorocyclohexane	2.00E-05	2.00E+04	2
delta BHC (see Lindane) delta-hexachlorocyclohexane	2.00E-04	2.00E+05	20
Bromoacetone (1-Bromo-2-propanone)	3.00E-05	3.00E+04	3
Bromodichloromethane (Trihalomethane)	6.00E-04	6.00E+05	60
Brucine (2,3-Dimethoxystrychnidin-10-one)	3.00E-04	3.00E+05	30
Carbendazim (1H-benzimidazol-2-yl carbamic acid methyl ester)	4.00E-04	4.00E+05	40
Carbon oxyfluoride	5.00E-04	5.00E+05	50
Chlorinated fluorocarbons, not otherwise specified	5.00E-04	5.00E+05	50
Chloroacetaldehyde	5.90E-04	5.90E+05	59

Chlorodibromomethane	4.00E-04	4.00E+05	40
Chloroethers	3.00E-05	3.00E+04	3
2-Chloroethyl vinyl ether	3.00E-05	3.00E+04	3
Chloromethyl methyl ether	3.00E-05	3.00E+04	3
Chloroprene	3.00E-05	3.00E+04	3
m-Cumenyl methylcarbamate	3.00E-04	3.00E+05	30
Cyclohexane	9.00E-05	9.00E+04	9
2,4-Dichlorophenoxyacetic acid (2,4–D), salts, esters	2.00E-04	2.00E+05	20
p,p′-Dichlorodipheyldichloroethane (p,p′-DDD)	1.00E-04	1.00E+05	10
p,p′-Dichlorodipheyldichloroethylene (p,p′-DDE)	1.00E-04	1.00E+05	10
p,p′-Dichlorodiphehylotrichloroethane (p,p′-DDT)	1.00E-04	1.00E+05	10
Dibenz[a,h]anthracene	3.00E-04	3.00E+05	30
Dibromochloropropane	2.00E-04	2.00E+05	20
2,3-Dibromo-1-propanol phosphate(3:1)	3.00E-04	3.00E+05	30
Dichlorobenzene	2.00E-04	2.00E+05	20
3,3'-Dichlorobenzidine	8.00E-05	8.00E+04	8
sym-Dichloroethyl ether	3.00E-05	3.00E+04	3
sym-Dichloromethyl ether	1.60E-07	1.60E+02	0.016
Dichloropropane	6.00E-05	6.00E+04	6
Dichloropropanol	6.00E-05	6.00E+04	6
Dichloropropene	3.00E-05	3.00E+04	3
cis-1,3-Dichloropropene	3.00E-05	3.00E+04	3
trans-1,3-Dichloropropene	3.00E-05	3.00E+04	3
Dieldrin	2.00E-06	2.00E+03	0.2
Diethylene glycol, dicarbamate	3.00E-04	3.00E+05	30
O,O-Diethyl O-pyrazinyl phosphorothioate	4.00E-04	4.00E+05	40
Dimetilan	3.00E-04	3.00E+05	30
2,6-Dinitrotoluene	3.10E-04	3.10E+05	31
Di-n-octyl phthalate	4.90E-04	4.90E+05	49
Di-n-propylnitrosamine	5.00E-06	5.00E+03	0.5
1,2-Diphenylhydrazine	5.00E-05	5.00E+04	5
Dithiocarbamates (total)	9.00E-04	9.00E+05	90
Ethylene dibromide	5.00E-05	5.00E+04	5
Ethylidene chloride	7.00E-04	7.00E+05	70
Famphur	3.00E-04	3.00E+05	30
Fluoroacetic acid, sodium salt	7.00E-04	7.00E+05	70
Formetanate hydrochloride	3.00E-04	3.00E+05	30
Formparanate	3.00E-04	3.00E+05	30
Heptachlor (and its epoxide)	2.00E-04	2.00E+05	20
1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.50E-05	2.50E+04	2.5
1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.50E-05	2.50E+04	2.5
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	2.50E-05	2.50E+04	2.5

Hexachlorobutadiene	5.00E-04	5.00E+05	50
Hexachlorodibenzo-p-dioxins	2.50E-05	2.50E+04	2.5
Hexaethyl tetraphosphate	4.00E-04	4.00E+05	40
Hydrazine	1.00E-05	1.00E+04	1
Indeno[1,2,3-cd] pyrene	4.30E-04	4.30E+05	43
Isolan	3.00E-04	3.00E+05	30
Lindane (1,2,3,4,5,6-hexa-chlorocyclohexane, gamma isomer)	2.00E-04	2.00E+05	20
Manganese dimethyldithiocarbamate	9.00E-04	9.00E+05	90
Mercury fulminate	1.00E-04	1.00E+05	10
Methiocarb	5.00E-04	5.00E+05	50
Methyl chlorocarbonate	5.90E-04	5.90E+05	59
Metolcarb	3.00E-04	3.00E+05	30
N-methyl-N'-nitro-N-nitroso-guanidine (MNNG)	1.50E-04	1.50E+05	15
Naphthalene	6.00E-04	6.00E+05	60
p-Nitrophenol	1.30E-04	1.30E+05	13
N-Nitrosodiethanolamine	1.00E-05	1.00E+04	1
N-Nitrosodiethylamine	2.00E-07	2.00E+02	0.02
N-Nitrosodimethylamine	7.00E-07	7.00E+02	0.07
N-Nitrosodi-n-butylamine	6.00E-06	6.00E+03	0.6
N-Nitrosomethylethylamine	2.00E-06	2.00E+03	0.2
N-Nitrosomethylvinylamine	1.50E-04	1.50E+05	15
N-Nitroso-N-methylurea	1.50E-04	1.50E+05	15
N-Nitroso-N-methlurethane	1.50E-04	1.50E+05	15
N-Nitrosopyrrolidine	2.00E-05	2.00E+04	2
1,2,3,4,6,7,8,9-Octachlorodibenzofuran	5.00E-05	5.00E+04	5
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	5.00E-05	5.00E+04	5
Parathion	6.00E-04	6.00E+05	60
Pebulate	8.00E-04	8.00E+05	80
Pentachlorodibenzofurans, total	2.50E-05	2.50E+04	2.5
Pentachlorodibenzo-p-dioxin, total	2.50E-05	2.50E+04	2.5
Pentachlorophenols and their chlorophenoxy derivitive acids, esters amines and salts	7.60E-05	7.60E+04	7.6
1,3-Pentadiene	3.00E-05	3.00E+04	3
Phorate	3.00E-04	3.00E+05	30
Phosgene	2.00E-04	2.00E+05	20
Phosphorithioic and phosphordithioic acid esters	3.00E-04	3.00E+05	30
Physostigmine	3.00E-04	3.00E+05	30
Physostigmine salicylate	3.00E-04	3.00E+05	30
Polychlorinated Biphenyls	5.00E-04	5.00E+05	50
Prosulfocarb	6.00E-04	6.00E+05	60
Reserpine	3.00E-04	3.00E+05	30
Streptozotocin	1.50E-04	1.50E+05	15

Sulfur phosphide	3.00E-04	3.00E+05	30
Tars	3.00E-04	3.00E+05	30
Tetrachlorodibenzofurans	1.00E-05	1.00E+04	1
Tetrachlorodibenzo-p-dioxins	3.00E-08	3.00E+01	0.003
1,1,2,2-Tetrachloroethane	2.00E-04	2.00E+05	20
Tetraethyl lead	3.50E-06	3.50E+03	0.35
Thiodicarb	3.00E-04	3.00E+05	30
Thiofanox	3.00E-04	3.00E+05	30
Tirpate	3.00E-04	3.00E+05	30
Trichlorobenzene	1.20E-04	1.20E+05	12
Trichloromethanethiol	2.00E-04	2.00E+05	20
Triethylamine	5.00E-04	5.00E+05	50

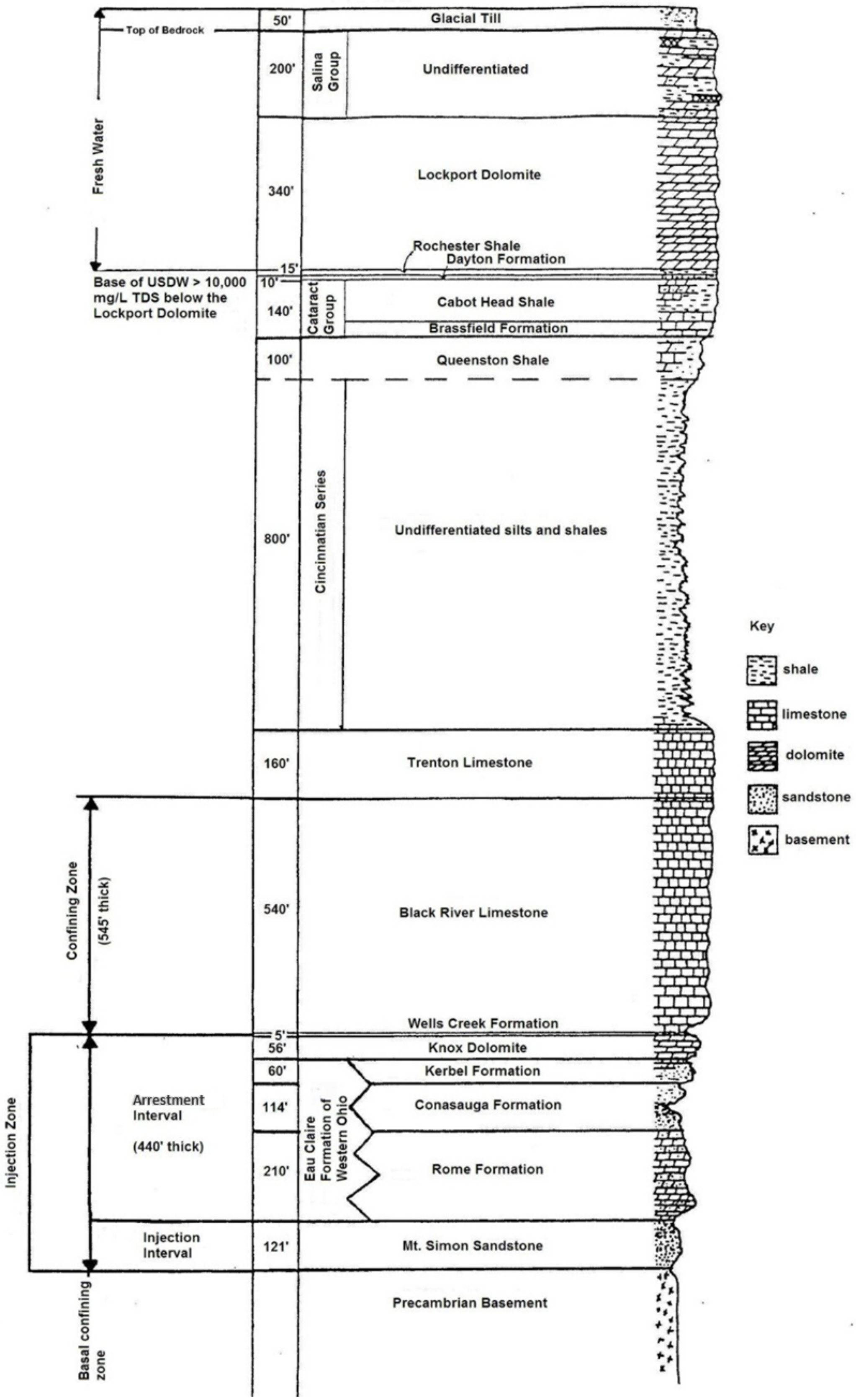

Figure 1. Stratigraphic column of the VEI site. All depths in this figure are relative to the Kelly bushing which was eight feet above ground level when the well was drilled.

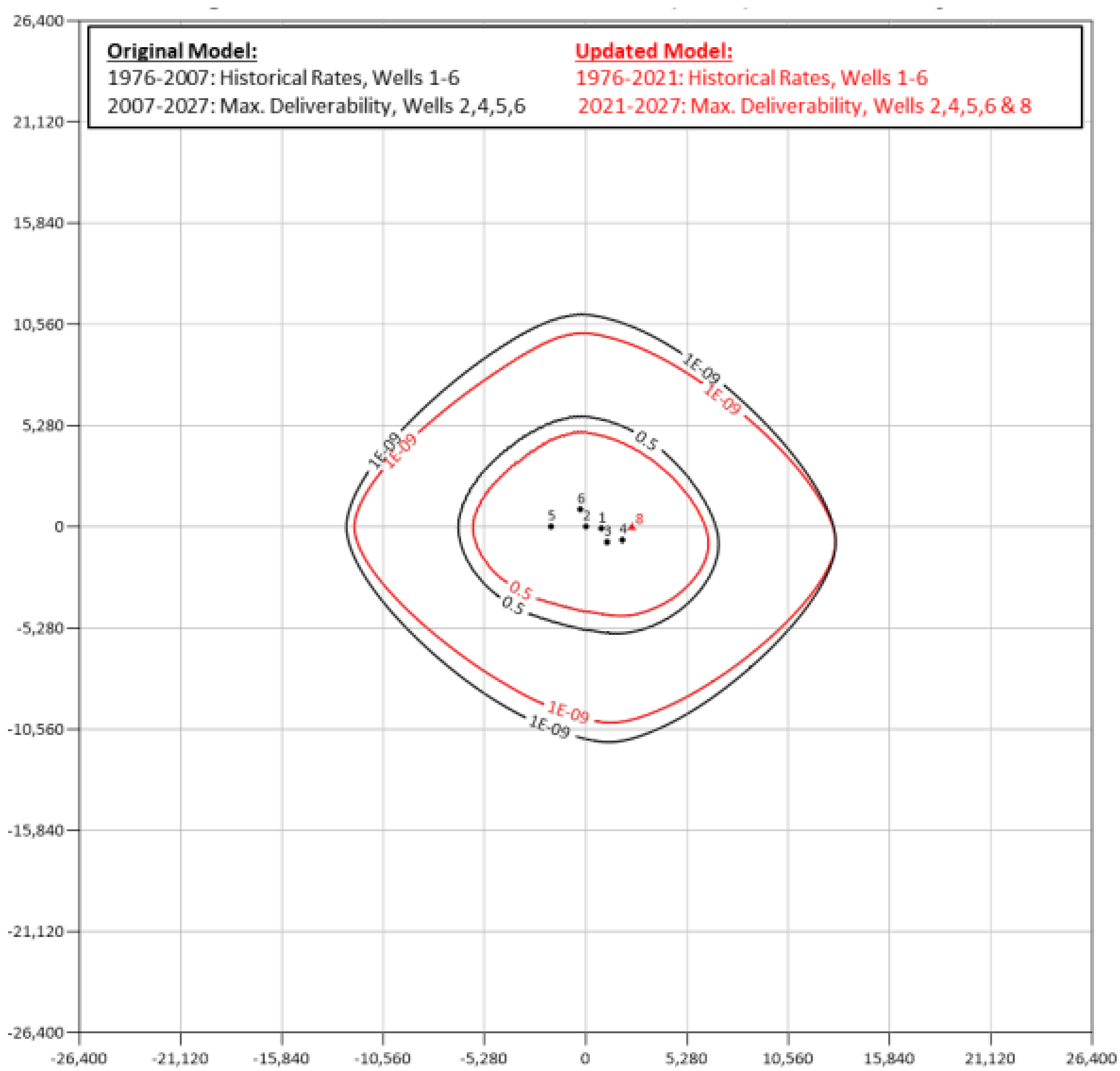

Figure 2. Plume concentration (C/C_0) after 10,000 years