

# Texas Commission on Environmental Quality

## Permit Application for Underground Injection Control Class I Injection Wells Technical Report - Supplemental Information for Salt Cavern Disposal Wells and Associated Caverns

Instructions

**Introduction:** This portion of the application is generally a reorganized summary of the 30 Texas Administrative Code (TAC) Chapter 331, Subchapters G and J. Additional information may be requested before a permit is issued if regulatory requirements change. Applicants should consult with Underground Injection Control (UIC) Permits staff prior to initiating an application for a waste disposal well permit to: (1) determine if the waste is a candidate for subsurface disposal and (2) review the detailed information to be included in the technical report prior to collection of data. Those applicants needing legal and technical assistance should seek assistance from individuals and/or firms which are knowledgeable in Class I UIC regulations and salt cavern disposal technology. In addition to using data that is currently available, it may be necessary that the applicant perform additional original work, such as field investigations, geologic mapping or geophysical surveys.

The original application plus two (2) copies should delivered to the following mailing address or physical address:

Mailing address:

Texas Commission on Environmental Quality

Attn: Underground Injection Control (UIC) Permits Section

Radioactive Materials Division

Mail Code 233

P.O Box 13087

Austin Texas 78711-3087

Physical address:

Texas Commission on Environmental Quality

Attn: Underground Injection Control (UIC) Permits Section

Radioactive Materials Division

Mail Code 233

12100 Park 35 Circle Building F

Austin Texas 78753

**Telephone Inquiries**:

(512) 239-6466 - Technical - Underground Injection Control Permits Section

(512) 239-0600 - Legal - Environmental Law Division

(512) 239-0300 - Fees - Financial Administration Division

(512) 239-6833 - Registration - Registration and Reporting Section

(512) 239-2335 - Surface Facility - Industrial & Hazardous Waste Permits Section

(512) 239-0300 - Financial Assurance - Financial Assurance Section

**Application Review Prohibition:** The Texas Commission on Environmental Quality (TCEQ) shall not review an application for a new commercial hazardous waste facility, and the application shall be deemed not to have been received, until the emergency response information required by Section III.F. of the TCEQ Permit Application for Industrial and Hazardous Waste Storage / Processing / Disposal Facility with Compliance Plan Part B ([Form TCEQ-00376](https://www.tceq.texas.gov/permitting/waste_permits/ihw_permits/HW_Permiteeupdate.html)) has been reviewed and declared by TCEQ staff to be complete and satisfactory. [30 TAC §281.26, 30 TAC §§305.50(a)(12)(C) and (D)]

**Permit Issuance Prohibited**: The TCEQ shall **not** issue a permit for:

1. a proposed or existing wellbore of a Class I injection well if a fault exists within two and one-half (2.5) miles or within the cone of influence, whichever is greater, unless the applicant can demonstrate that the fault is not sufficiently transmissive or vertically extensive to allow migration of hazardous constituents out of the injection zone, as found in 30 TAC §331.121(a)(2)(P);
2. a new hazardous waste management facility or an areal expansion of an existing facility if the facility or expansion does not meet the requirements of 30 TAC §335.204 (relating to Unsuitable Site Characteristics). [30 TAC §335.205(a)(1)]
3. a new commercial hazardous waste management facility as defined in 30 TAC §335.202 (relating to Definitions) or the subsequent areal expansion of such a facility or unit of that facility if the boundary of the unit is to be located within 1/2 of a mile (2,640 feet) of an established residence, church, school, day care center, surface water body used for a public drinking water supply, or dedicated public park. [30 TAC §335.205(a)(3)]
4. a new commercial hazardous waste management facility that is proposed to be located at a distance greater than 1/2 mile (2,640 feet) from an established residence, church, school, day care center, surface water body used for a public drinking water supply, or dedicated public park unless the applicant demonstrates to the satisfaction of the commission that the facility will be operated so as to safeguard public health and welfare and protect physical property and the environment, at any distance beyond the facility's property boundaries. [30 TAC §335.205(a)(4)]
5. a proposed hazardous waste management facility, or a capacity expansion of an existing hazardous waste management facility if a fault exists within 3,000 feet of the proposed hazardous waste management facility or of the capacity expansion of an existing hazardous waste management facility unless the applicant performs the demonstration found in 30 TAC §335.205(a)(5).

See 30 TAC Chapter 331 Subchapter G: Consideration Prior to Permit Issuance for additional details and information.

**Additional Conditions for Permit Approval:** Before issuing a permit for a hazardous waste injection well in a solution-mined salt dome cavern, the commission by order must find that there is an urgent public necessity for the hazardous waste injection well. [Texas Water Code §27.051(g)(2)] The commission, in determining whether an urgent public necessity exists for the permitting of the hazardous waste injection well in a solution-mined salt dome cavern, must find that:

1. the injection well will be designed, constructed, and operated in a manner that provides at least the same degree of safety as required of other currently operating hazardous waste disposal technologies;
2. consistent with the need and desire to manage the state hazardous wastes generated in the state, there is a substantial or obvious public need for additional hazardous waste disposal capacity and the hazardous waste injection well will contribute additional capacity toward servicing that need;
3. that the injection well will be constructed and operated in a manner so as to safeguard public health and welfare and protect physical property and the environment;
4. the applicant has demonstrated that groundwater and surface waters, including public water supplies, will be protected from the release of hazardous waste from the salt dome waste containment cavern; and
5. any other criteria required by the commission to satisfy that the test of urgency has been met.

**Completing This Application:** The technical report must be prepared under the direction of a professional engineer, registered in Texas, and a geologist or geoscientist, registered in Texas. All engineering and geoscience plans, specifications, calculations, analyses, reports and other related engineering and geoscience documents must be prepared, sealed, signed, and dated by a Texas professional engineer (P.E.) or a Texas professional geoscientist (P.G.), as appropriate. Additionally, all engineering and geoscience documents released, issued or submitted by a licensee, including preliminary documents, shall clearly indicate the firm name and registration number of the engineering or geoscience firm by which the engineer or geoscientist is employed. Please refer to the Texas Engineering Practice Act (Occupations Code Chapter 1001), the Rules Concerning the Practice of Engineering and Professional Engineering Licensure (22 TAC Part 6 Chapters 133, 135 and 137), the Geoscience Practice Act (Occupations Code Chapter 1002), and the Rules For Geoscientist Licensure And The Practice Of Geoscience (22 TAC Part 39 Chapters 850 and 851). [30 TAC §305.45(a)(8), §305.50(a)(7) and §331.21]

The technical report supervisor must be competent and experienced in the Class I UIC program and thoroughly familiar with the operation or project for which the application is made. The technical report must contain, at a minimum, the following information, which will be submitted as part of the application. (These technical requirements may be adjusted by the technical staff if justified, as in the case of a minor amendment.) The application must be able to function as a stand-alone document. If it is necessary to cite another document, such as a no-migration petition, then the applicable portions of the document need to be reproduced in the text of the application.

All maps must be generated from a base map, which presents the proposed location, facility boundaries, survey lines, and up to date well locations (both active and inactive). All maps must be prepared to professional geologic standards and shall indicate scale, orientation, contour intervals, legends, the preparer's name, profession (ex. geologist, geological engineer) and date of preparation.

Maps, bluelines, and drawings that cannot be folded to 8-1/2" x 11" may be submitted as separate documents. Engineering plans and specifications submitted with an application must be approved and sealed by a Registered Professional Engineer, with current registration required by the Texas Engineering Practice Act.

Facilities which will inject industrial and/or hazardous wastes from off-site sources must also provide information on these wastes in accordance with 30 TAC §335.2.

**Submittal:** Submit with the information required by Technical Report - Engineering and Geology as "Attachment J" with the application. If several amendments are submitted as one application, the application review will proceed at rate of the amendment which has the longest timeframe.

**Application Revisions:** Please submit any application revisions with a revised date and page numbers at the bottom of the page(s).

**Waivers:** Any request for waiver of any of the applicable requirements of this permit application must be fully documented.

**Designation of Material as Confidential:** The designation of material as confidential is frequently carried to excess. The Commission has a responsibility to provide a copy of each application to other review agencies and to interested persons upon request and to safeguard confidential material from becoming public knowledge. Thus, the Commission requests that the applicant (1) be prudent in the designation of material as confidential and (2) submit such material only when it might be essential to the staff in their development of a recommendation.

The Commission suggests that the applicant **not** submit confidential information as part of the permit application. However, if this cannot be avoided, the confidential information should be described in non-confidential terms throughout the application, cross-referenced to Section V: Confidential Material, and submitted as a separate Section V. document or binder, and conspicuously marked "**Confidential.**"

Reasons of confidentiality include the concept of trade secrecy and other related legal concepts which give a business the right to preserve confidentiality of business information to obtain or retain advantages from its right in the information. This includes authorizations under 5 U.S.C. 5552(b)(4), 18 U.S.C. 1905, and special rules cited in 40 CFR §§552.301-552.309

Section 361.037 of the Texas Health and Safety Code does not allow an applicant for an industrial solid waste permit to claim as confidential any record pertaining to the characteristics of the industrial solid waste.

The applicant may elect to withdraw any confidential material submitted with the application. However, the permit cannot be issued, amended, or modified if the application is incomplete.

**Public Participation Activities:** If a local review committee has been established to facilitate communication between the applicant and the local host community, the applicant should summarize the activities of the committee and submit this summary with the application. Any report completed by the review committee must also be submitted.

**Actions Prior To Submittal:** The TCEQ encourages applicants to hold a pre-application meeting with the public to allow both the applicant and the public to identify potential issues. Applicants are also encouraged to hold a pre-application meeting with TCEQ's Underground Injection Control staff and to notify the Industrial and Hazardous Waste Permits Section of intent to file a permit application. A permit application for the surface facility should be submitted to the Industrial and Hazardous Waste Permits Section at the same time as the filing of this application.

Supplemental information required for inclusion in the technical report is listed below. Additional requirements may be found in 30 TAC Chapters 331 (Underground Injection Control), 305 (Consolidated Permits), and 335 (Industrial Solid Waste and Municipal Hazardous Waste), and Chapter 27 of the Texas Water Code and Chapter 361 of the Health and Safely Code. Some of the items may be redundant to those found in the Technical Report-Geology and Engineering portion of the application. If those items have already been addressed in response to the Technical Report-Geology and Engineering portion, then they need not be repeated. Supporting data, such as well logs, shot point maps, and seismic sections with shot points, should also be submitted.

1. Geology
2. Geologic suitability of the location
3. Thorough characterization of the dome, including, but not limited to:
4. geometry of salt stock
5. salt stock calculated movement
6. calculated salt loss rate
7. 3-D seismic grid survey sufficient to image underneath all suspected overhangs and to delineate the edge of the stock
8. location and delineation of other caverns or co-users of the salt stock
9. Indications of cap rock and/or salt stock anomalies
10. Petrology of the caprock, salt stock and deformed strata
11. Nature, structure, and hydrodynamic properties of strata surrounding the salt stock
12. Demonstration that the (proposed) salt cavern injection zone will not be in or above a formation which within mile of the salt cavern injection zone contains a USDW
13. Establishment of a pre-development baseline for subsidence and groundwater quality monitoring, over the area of review, including locations of data collection points, current groundwater quality values, current subsidence rate values
14. Characterization of the predicted impact of the proposed operations on the salt stock, specifically the extent of the disturbed zone
15. Demonstration of adequate separation between the outer limits of the injection zone and any other activities in the dome
16. Location and nature of other salt cavern storage activities sulfur mining, salt mining, brine production, oil and gas activity, and any other activity which may adversely affect or be affected by waste disposal in a salt cavern.

**Note:**

The applicant is not limited to the technologies required and/or mentioned in the regulations or the application form. Additional techniques, such as salt proximity surveys and vertical seismic profiling, may be used to supplement the required 3-D seismic grid in establishing the geology of the proposal. As in all other cases, supporting data must be submitted in the application.

1. Waste Characteristics
2. Bulk waste density
3. Bulk waste permeability
4. Bulk waste porosity
5. Bulk waste compaction rate
6. Physical characteristics of the waste
7. Physical characteristics of the transporting media
8. Solidification test procedures and results under cavern conditions
9. Engineering
10. Provide the names and credentials of those responsible for design of the cavern. (A solid waste disposal salt cavern is required to be designed by a "qualified professional engineer and geologist"). [30 TAC §§331.164(b)(3) and (6)]
11. Data on construction and completion of the cavern
12. Detailed cavern construction procedures, including plans for pilot hole/core hole and engineering diagrams for subsurface construction details
13. Cavern dimensions and maximum cavern volume
14. Plans for continual monitoring of the volumes of fluids injected and produced during cavern development
15. Whether the cavern will be dewatered
16. Cavern solutioning brines disposal plan
17. Minimum distance between outer edge of the injection zone and salt stock
18. Minimum pillar to cavern diameter P/D ratio
19. Distance of separation of adjacent salt cavern injection zones
20. Cavern pressure test plans, including specifications and design limitations for tools
21. Verification of cavern shape and size
22. description of tests
23. frequency
24. Logs, cores and tests
25. Discuss how will core be sampled and tested to ensure that core is analyzed at sufficient frequency to provide representative data. Describe quality assurance and quality control procedures.
26. permeability
27. porosity
28. bulk density
29. compressive strength (uniaxial)
30. shear strength (triaxial)
31. water content
32. compatibility with waste material
33. Discuss how the core sampling and testing procedures will be supervised? Also discuss how core sampling depths will be determined and how much core will be taken.
34. caprock
35. alternate cavern confining zone
36. salt cavern injection zone
37. Discuss how and where photographs and core samples will be stored and archived. Also state how access to photographs and core samples will be managed.
38. Tests of the pilot/core hole
39. in-situ permeability measurements
40. lithostatic gradients
41. fracture pressure gradients
42. Describe downhole three-component offset VSP program.
43. Operations
44. Maximum and average wellhead injection pressure
45. Description of wastestream stabilization
46. Monitoring plans, including all parameters, test methods, sample methods, and quality assurance procedures
47. annulus pressure
48. tubing string pressures
49. injection flow rates
50. volume of displaced fluids (during construction)
51. composition of displaced fluids (during construction)
52. injection volumes
53. tubing-long string annulus pressure
54. volume of annulus contents
55. automatic alarms
56. testing and calibration of equipment
57. composition of leachate in cavern
58. volume of leachate in cavern
59. corrosion monitoring
60. subsidence monitoring
61. groundwater quality monitoring
62. Well mechanical integrity test procedures
63. Cavern integrity test procedures
64. pressure tests
65. test to determine shape of cavern (before and after dewatering)
66. Hydrogeologic compatibility of waste with salt
67. Contingency plans based on reasonable worst-case scenario
68. Cavern closure plan
69. Pre-closure monitoring
70. cavern pressure
71. cavern fluid volume
72. cavern fluid composition
73. cavern pressure buildup predictions
74. Cavern fill (if necessary)
75. Redundant seals
76. Post-closure monitoring plan
77. Financial responsibility
78. Initial injection zone pressure
79. Projected injection zone pressure at closing
80. Predicted time estimate for pressure equilibrium
81. Waste front prediction
82. Corrective action status
83. Groundwater monitoring
84. Subsidence monitoring
85. Survey plat
86. Notification to state and local drilling authorities
87. Retention of records
88. Performance Standard Demonstration

According to 30 TAC §331.162, "The operator and permittee shall assure for construction, operation, maintenance, monitoring, closure and post-closure of a Class I salt cavern solid waste disposal well and associated cavern, the continuous attainment of a performance standard of no escape of hazardous constituents from the salt cavern injection zone. Demonstration of attainment of this standard may be shown by modeling waste transport over a period of at least 15,000 years. The provisions of this chapter, as well as any permit or order issued by the Commission, shall be construed as minimum operating requirements. To qualify for a permit or to otherwise operate a Class I salt cavern solid waste disposal well and associated cavern, permit applicants and facility operators must demonstrate that this performance standard will be satisfied even if it is necessary to go beyond the minimum operating requirements described in this chapter."

Submit the demonstration as well as all support documentation, including computer codes, calculations, references, etc. The demonstration should consider reasonable worst-case scenario conditions. Include provisions to ensure that future co-use of the dome will not affect the attainment of the performance standard.