

**SUBCHAPTER N: STANDARDS FOR CLASS I BEDDED SALT CAVERN  
DISPOSAL WELLS  
§§331.241 - 331.251  
Effective August 16, 2012**

**§331.241. Applicability.**

(a) The sections of this subchapter apply to all Class I disposal wells located in horizontally bedded or non-domal salt and their associated salt caverns, and not to such facilities located in the salt stocks of salt domes.

(b) The receipt, processing or disposal of radioactive material under this subchapter is subject to the applicable requirements of Chapter 336 of this title (relating to Radioactive Substance Rules).

Adopted July 25, 2012

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**§331.242. Bedded Salt Cavern Disposal Well Performance Standard and Siting Requirements.**

(a) Performance standard. The operator and permittee shall assure for construction, operation, maintenance, monitoring, closure, and post-closure of a Class I disposal well located in horizontally bedded or non-domal salt and associated cavern, the continuous attainment of a performance standard to prevent the movement of fluids that would result in the pollution of an underground source of drinking water.

(b) 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 disposal well located in horizontally bedded or non-domal salt 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.

(c) Siting. In addition to the minimum siting criteria for Class I disposal wells, each permit applicant for a Class I bedded salt cavern disposal well and associated cavern shall identify potential risks to the waste disposal operation within the area of review.

Adopted July 25, 2012

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**§331.243. Bedded Salt Cavern Disposal Well Construction Standards.**

(a) Wells shall be sited in such a fashion that they inject into a formation which is beneath the lowermost formation containing, within one quarter mile of the well bore, an underground source of drinking water (USDW).

(b) Plans and specifications. Except as specifically required in the terms of the disposal well permit, the drilling and completion of the well shall be done in accordance with all permit application plans and specifications.

(c) Any proposed changes to the plans and specifications must be in accordance with §331.62(a)(3) of this title (relating to Construction Standards).

(d) Casing and cementing.

(1) Wells shall be cased and cemented to prevent the movement of fluids into or between USDW. The casing and cement used in the construction of each newly drilled well shall be designed for the life expectancy of the well. In determining and specifying casing and cementing requirements, the following factors shall be considered:

- (A) depth of lowermost USDW or freshwater aquifer;
- (B) depth to the injection zone;
- (C) injection pressure, external pressure, internal pressure, and axial loading;
- (D) hole size;
- (E) size and grade of all casing strings (wall thickness, diameter, nominal weight, length, joint specification, and construction material);
- (F) the maximum burst and collapse pressures, and tensile stresses which may be experienced at any point along the length of the casings at any time during the construction, operation, and closure of the well;
- (G) corrosive effects of injected materials, formation fluids, and temperatures;
- (H) lithology of injection and confining zones;
- (I) types and grades of cement;
- (J) quantity and chemical composition of the injected fluid; and

(K) cement and cement additives which must, at a minimum, be of sufficient quality and quantity to maintain integrity over the design life of the well.

(2) Surface casing shall be set to a minimum subsurface depth which extends into a confining bed below the lowest formation containing a USDW or freshwater aquifer.

(3) A second or long string casing, using a sufficient number of centralizers, shall be set into the salt formation.

(4) The cement for that part of the casing opposite a salt formation shall be prepared with salt-saturated cementing material.

(e) Injection tubings. Except for circulation of drilling fluids during well construction, all injection activities for bedded salt cavern construction and waste disposal in a bedded salt cavern shall be performed using removable injection tubing(s) suspended from the wellhead.

(1) All injection activities during bedded salt cavern construction shall be performed with the annulus between the tubing and long string casing filled with a noncorrosive fluid sufficient to protect the long string casing seat.

(2) All injection of waste into a bedded salt cavern shall be performed through tubing with a packer to seal the annulus between the tubing and casing near the bottom of the casing, or tubing with an approved fluid seal as an alternative. The tubing, packer, and fluid seal shall be designed for the expected service.

(f) Well annulus system factors for consideration. In determining and specifying requirements for a tubing and packer system or tubing with a fluid seal, the following factors shall be considered and addressed:

- (1) depth of setting;
- (2) characteristics of injection fluid and waste;
- (3) injection pressure;
- (4) annular pressure;
- (5) rate, temperature, and volume of injected waste;
- (6) size of casing; and

(7) tensile, burst, and collapse strengths of the tubing.

(g) Logs and tests.

(1) Geophysical logging. Appropriate logs and other tests shall be conducted during the drilling and construction phases of the well including drilling into the salt. All logs and tests shall be interpreted by the service company which processed the logs or conducted the test, or by other qualified persons. At a minimum the following logs and tests shall be conducted:

(A) deviation checks on all holes, conducted at sufficiently frequent intervals to assure that avenues for fluid migration in the form of diverging holes are not created during drilling;

(B) a spontaneous potential and resistivity log;

(C) from the ground surface or from the base of conductor casing to the total investigated depth including all core hole or pilot hole:

(i) natural gamma ray log;

(ii) compensated density and neutron porosity logs;

(iii) acoustic or sonic log;

(iv) inclination (directional) survey; and

(v) caliper log (open hole);

(D) from the ground surface or from the base of conductor casing to the lowermost casing seat:

(i) cement bond with variable density log;

(ii) temperature log (cased hole); and

(iii) casing inspection log; and

(E) fracture detector log from the base of the surface casing to the total investigated depth including all core hole or pilot hole.

(2) Pressure tests.

(A) After installation and cementing of casings, and before drilling out the cemented casing shoe, surface casing shall be pressure tested at mill test pressure or 80% of the calculated internal pressure at minimum yield strength, and the intermediate and long string casing shall be tested to 1,500 pounds per square inch (psi) for 30 minutes, unless otherwise specified by the executive director.

(B) After drilling out the cemented long string casing shoe, and before drilling more than 100 feet of core hole or pilot hole below the long string casing shoe, the bond between the salt, cement, and casing shall be tested at a pressure of 0.8 psi per foot of depth.

(C) The pilot hole and/or core hole shall be tested between the long string casing shoe and the total investigated depth, at a casing seat pressure of 0.8 psi per foot of depth.

(3) Coring.

(A) Core samples. Full-hole cores shall be taken from selected intervals of the injection zone and lowermost overlying confining zone; or, if full-hole coring is not feasible or adequate core recovery is not achieved, sidewall cores shall be taken at sufficient intervals to yield representative data for selected parts of the injection zone and lowermost overlying confining zone. Core analysis shall include a determination of permeability, porosity, and bulk density.

(B) In situ permeability, lithostatic gradients, and fracture pressure gradients shall be determined in the core hole for the salt, within the cavern injection interval.

(4) Before commencement of injection for cavern construction, any portion of the pilot hole or core hole that extends beyond the intended wall of the cavern shall be filled with salt-saturated cement from total investigated depth back to the designed cavern boundary.

(5) Well integrity testing. The mechanical integrity of a well must be demonstrated before initiation of injection activities. A mechanical integrity test shall consist of:

(A) a pressure test with liquid or gas;

(B) a temperature, noise log, or oxygen activation log;

(C) a casing inspection log, if required by the executive director; and

(D) any other test required by the executive director.

(h) **Compatibility.** All well materials must be compatible with formations and fluids with which the materials may be expected to come into contact. A well shall be deemed to have compatibility as long as the materials used in the construction of the well meet or exceed standards developed for such materials by the American Petroleum Institute, the American Society for Testing Materials, or comparable standards acceptable to the executive director.

(i) **Pre-injection units.**

(1) The injection pump system shall be designed to assure that the surface injection pressure limitations authorized by the well permit shall not be exceeded.

(2) Instrumentation shall be installed to continuously monitor changes in annulus pressure and annulus fluid volume for the purpose of detecting well malfunctions.

(3) Pre-injection units, while allowing for pressure release, shall be designed to prevent the release of unauthorized cavern contents to the atmosphere.

(4) To protect the ground surface from spills and releases, the wellhead will have secondary containment in the form of a diked, impermeable pad or sump.

(j) **Construction supervision.** All phases of well construction and all phases of any well workover shall be supervised by a licensed professional engineer or licensed professional geoscientist, as appropriate, with current registration under the Texas Engineering Practice Act or Texas Geoscience Practice Act, who is knowledgeable and experienced in practical drilling engineering and who is familiar with the special conditions and requirements of waste disposal well construction.

(k) **Approval of completion of the well construction stage.** Before beginning cavern construction and operation, the permittee shall obtain written approval from the executive director which states that the well construction is in compliance with the applicable provisions of the permit. To obtain approval, the permittee shall submit to the executive director within 90 days of completion of well construction, including all logging, coring, and testing of the pilot hole, the following reports and certifications prepared and sealed by a licensed professional engineer or licensed professional geoscientist with current registration under the Texas Engineering Practice Act or Texas Geoscience Practice Act:

(1) final construction, "as-built" plans and specifications, reservoir data, and an evaluation of the considerations set out in §331.45(3) of this title (relating to Executive Director Approval of Construction and Completion);

(2) certification that construction of the well has been completed in accordance with the provisions of the disposal well permit and with the design and construction specifications of the permittee's application; and

(3) certification that actual reservoir data obtained will not result in the need for a change in the operating parameters specified in the permit.

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**§331.244. Bedded Salt Cavern Construction Standards.**

(a) Plans and specifications. Except as specifically required in the terms of the disposal well permit, construction of the cavern shall be done in accordance with all permit application plans and specifications. Any proposed changes to the plans and specifications must be certified in writing by the executive director that said changes provide protection standards equivalent to or greater than the original design criteria.

(b) Standards for bedded salt cavern construction.

(1) The creation of waste disposal caverns within bedded salt shall be accomplished by the controlled dissolution of the sidewalls of the well bore to a specified maximum diameter, between selected elevations specified in the permit as the top and bottom of the injection interval.

(2) The enlargement of a portion of the original well bore to serve as the cavern shall be done according to the cavern construction plans which shall be submitted as a part of the permit application. The cavern construction plans shall demonstrate at a minimum, the following:

(A) adjacent caverns shall be separated by a minimum pillar to cavern diameter ratio of 2.0 to ensure a sufficient amount of separation for cavern safety and stability;

(B) that cavern dimensions have been designed by a qualified professional engineer and geologist, to ensure the structural integrity of the cavern;

(C) if an applicant proposes to conduct solution-mining activities concurrent with waste disposal, a plan for the controlled expansion of the cavern;

(D) plans for continual monitoring of the volumes of materials injected and produced during cavern development and waste injection;

(E) plans for cavern pressure tests and sonar surveys to determine the cavern dimensions, volume, geometric shape, and characterization of anomalies;

(F) the cavern construction process shall be conducted under the supervision of a qualified professional engineer, with current registration under the Texas Engineering Practice Act, in accordance with accepted practices in the cavern construction industry; and

(G) all brines displaced from the cavern shall be managed and/or disposed of in facilities authorized for such purpose.

(c) Injection tubing. Except for circulation of drilling fluids during well construction, all injection activities for bedded salt cavern construction and waste disposal in a bedded salt cavern shall be performed through removable injection tubing(s) installed inside the cemented long string casing and extending from the wellhead at ground surface to the bedded salt cavern below the long string casing seat.

(d) Logs and Tests.

(1) The permit applicant shall submit, as part of its construction plan, information identifying the tests which it will use to verify cavern dimensions. This information shall include at a minimum, the following:

(A) a description of surveys, logs, and tests to be run and analyzed, including any quantitative performance standards appropriate for any such procedure; and

(B) the frequency of such surveys or logs.

(2) Before waste disposal, the integrity of the cavern shall be tested in accordance with §331.43(b) of this title (relating to Mechanical Integrity Standards).

(e) Workovers.

(1) The permittee shall notify the executive director before commencing any workover operation or corrective maintenance which involves taking the disposal well out of service. The notification shall be in writing and shall include plans for the proposed work. The executive director may grant an exception of the prior written notification when immediate action is required. Approval by the executive director shall be obtained before the permittee may begin any workover operation or corrective

maintenance that involves taking the well out of service. Pressure control equipment shall be installed and maintained during workovers which involve the removal of tubing.

(2) Well mechanical integrity shall be demonstrated following any major operations which involve removal of the injection tubing, recompletions, or unseating of the packer. Cavern integrity demonstration may be required by the executive director in instances where the integrity of the casing seat or cavern may be compromised.

(f) Reports and approval.

(1) Initial cavern integrity report. The operator shall submit a report with the results of all tests regarding cavern integrity, within 30 days of completion of the bedded salt cavern construction stage.

(2) Notification of completion of the cavern construction stage. Within 90 days of completion of cavern construction, the permittee shall provide notification to the executive director which states that the cavern construction is in compliance with the applicable provisions of the permit. The permittee shall submit to the executive director the following reports and certifications prepared and sealed by a professional engineer with current registration under the Texas Engineering Practice Act:

(A) final construction, "as-built" plans and specifications, injection and confining zone data, and an evaluation of the considerations under §331.45(3) of this title (relating to Executive Director Approval of Construction and Completion);

(B) certification that the construction of the cavern has been completed in accordance with the provisions of the disposal well permit and with the design and construction specifications of the permittee's application;

(C) certification that actual confining and injection zone data obtained will not result in need for a change in the operating parameters specified in the permit; and

(D) certification that the bedded salt cavern injection zone will not be in or above a formation which within 1/4 mile of the bedded salt cavern injection zone contains an underground source of drinking water.

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**§331.245. Bedded Salt Cavern Disposal Well Operating Requirements.**

(a) General operating requirements.

(1) A maximum allowable operating pressure and test pressure shall not exceed 0.8 pounds per square inch per foot of depth measured at the higher elevation of either the long string casing seat or the highest interior elevation of the cavern roof, but in no case shall it disrupt the bond between the salt, cement, and the casing seat, initiate new fractures or propagate existing fractures in the cavern or the confining zone, or cause movement of fluid or waste out of the injection zone.

(2) A minimum operating pressure that is protective of bedded salt cavern integrity shall be maintained.

(3) Injection between the outermost casing protecting underground sources of drinking water (USDWs), and fresh or surface water and the wellbore is prohibited.

(4) Unless an alternative to a packer has been approved under §331.243(e) of this title (relating to Bedded Salt Cavern Disposal Well Construction Standards), the annulus between the tubing and long string casing shall be filled with a noncorrosive fluid approved by the commission. The annulus pressure, at all times that the well is in service, shall be at least 100 pounds per square inch greater than the injection tubing pressure, to detect well malfunctions, unless the executive director determines that such a requirement might harm the integrity of the well.

(5) Chemical and physical characteristics of all injected materials and cavern contents shall protect and be compatible with the disposal well, associated facilities, and injection zone, and shall ensure proper operation of the facility to meet the performance standard of §331.242 of this title (relating to Bedded Salt Cavern Disposal Well Performance Standard and Siting Requirements).

(6) All injection of waste into a bedded salt cavern shall be performed through removable tubing(s) with a packer or fluid seal to seal the annulus between the outer tubing and long string casing, near the bottom of the long string casing.

(7) Unauthorized releases of cavern contents to the atmosphere are prohibited.

(8) Before beginning waste disposal operations, a blanket material shall:

(A) be placed into the salt cavern to prevent unwanted leaching of the cavern roof;

(B) consist of crude oil, mineral oil, or other fluid possessing similar noncorrosive, nonsoluble, low-density properties;

(C) be sufficient to protect the integrity of the cement and formation bond at the long string casing seat; and

(D) be of sufficient volume to contact the entire cavern roof.

(9) The cavern roof and level of the blanket material shall be monitored at least once every five years by running a density interface survey or using an alternative method.

(10) If an automatic alarm or shutdown is triggered, the owner or operator shall immediately investigate and identify as expeditiously as possible the cause of the alarm or shutoff. If, upon such investigation, the well or cavern appears to be lacking integrity, or if monitoring required under §331.246(c) of this title (relating to Bedded Salt Cavern and Well Monitoring and Testing Requirements) otherwise indicates that the well or cavern lacks integrity, the owner or operator shall:

(A) immediately cease injection of waste unless authorized by the executive director to continue or resume injection;

(B) take all necessary steps to determine the presence or absence of a leak; and

(C) notify the executive director within 24 hours after the alarm or shutdown.

(11) If the loss of integrity is discovered under paragraph (4) of this subsection or during periodic integrity testing, or if unauthorized communication is established between bedded salt caverns, the owner or operator shall:

(A) immediately cease injection of waste;

(B) take all steps required to determine whether there may have been a release of wastes into any unauthorized zone;

(C) notify the executive director within 24 hours after loss of mechanical integrity is discovered;

(D) notify the executive director when injection can be expected to resume; and

(E) restore and demonstrate well mechanical integrity and/or cavern integrity before resuming injection of waste.

(12) Whenever the owner or operator obtains evidence that there may have been a release of injected wastes or brine into an unauthorized zone:

(A) the owner or operator shall immediately cease injection of waste, and:

(i) notify the executive director within 24 hours of obtaining such evidence;

(ii) take all necessary steps to identify and characterize the extent of any release;

(iii) propose a remediation plan for executive director review and approval;

(iv) comply with any remediation plan specified by the executive director;

(v) implement any remediation plan approved by the executive director; and

(vi) where such release is into a USDW or freshwater aquifer currently serving as a water supply, within 24 hours notify the local health department, place a notice in a newspaper of general circulation and notify by mail the adjacent landowners.

(B) The executive director may allow the operator to resume injection before completing cleanup action if the owner or operator demonstrates that the injection operation will not endanger USDWs or freshwater aquifers.

(13) All fluids displaced from the cavern after injection of any waste shall be managed under applicable state and federal regulations.

(b) Workovers.

(1) The permittee shall notify the executive director before commencing any workover operation or corrective maintenance which involves taking the disposal well out of service. The notification shall be in writing and shall include plans for the proposed work. The executive director may grant an exception of the prior written notification when immediate action is required. Approval by the executive director shall be obtained before the permittee may begin any workover operation or corrective maintenance that involves taking the well out of service. Pressure control equipment shall be installed and maintained during workovers which involve the removal of tubing.

(2) Mechanical integrity of the well shall be demonstrated following any major operations which involve removal of the injection tubing, recompletions, or unseating of the packer.

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**§331.246. Bedded Salt Cavern and Well Monitoring and Testing Requirements.**

(a) Waste analysis plan. All material injected into or produced from the cavern shall be sampled and analyzed in accordance with the approved written waste analysis plan as specified by 40 Code of Federal Regulations §146.68(a).

(b) Pressure gauges. Pressure gauges shall be installed and maintained in proper operating conditions at all times on the tubing string(s) and on any annulus extending to the wellhead.

(c) Continuous recording devices. Continuous recording devices and instruments shall be installed in weatherproof enclosures, used, and maintained in proper operating condition at all times to record:

- (1) tubing string pressures;
- (2) the pressure and volume of any annular space that extends to the wellhead;
- (3) injection and production fluid flow rates, volume, and density;
- (4) the volume and composition of displaced gases; and
- (5) any other data specified by the permit.

(d) Automatic Alarms. The owner or operator shall also install and use:

(1) automatic alarm and automatic shutoff systems, designed to sound and shut-in the well when pressures and flow rates or other parameters approved by the executive director exceed a range and/or gradient specified in the permit; or

(2) automatic alarms designed to sound when the pressures, flow rates, or other parameters approved by the executive director exceed a rate and/or gradient specified in the permit, in cases where the owner or operator certifies that a trained

operator will be on location and able to immediately respond to alarms at all times when the well is operating.

(e) Testing and calibration of monitoring instruments. All gauges, and pressure sensing and recording devices shall be tested and calibrated semi-annually.

(f) Mechanical integrity. The owner or operator shall maintain mechanical integrity of the disposal well and bedded salt cavern at all times that the well and cavern are in service.

(1) Mechanical integrity of the well must be demonstrated:

(A) before the well is initially placed in service;

(B) within five-year intervals during the operating life of the well to test for fluid movement along the borehole;

(C) after each workover which involves removal of the injection tubing, recompletions, or unseating of the packer; and

(D) before the well is plugged, unless the mechanical integrity test has been performed in the last five years.

(2) Mechanical integrity of the cavern must be demonstrated:

(A) before the cavern is initially placed in service;

(B) within five-year intervals during the operating life of the cavern;  
and

(C) in instances where the integrity of the casing seat or cavern may be compromised.

(3) Mechanical integrity test methods.

(A) Each bedded salt cavern disposal well shall be tested for mechanical integrity using a nitrogen-brine interface method.

(B) Each bedded salt cavern shall be tested for mechanical integrity using a hydrostatic brine test.

(C) A sonar survey, or other test approved by the executive director, shall be conducted for each bedded salt cavern.

(D) A pressure test shall be performed on each bedded salt cavern disposal well and cavern.

(4) The owner or operator may use an alternative cavern integrity test if the alternative integrity test is substantially equivalent to the integrity tests specified in paragraph (3) of this subsection. The owner or operator shall submit the following information for the executive director's consideration:

(A) A description of the test method and the theory of operation, including the test sensitivities, a justification for the test parameters, and the pass and fail criteria for the test;

(B) a description of the well and cavern conditions under which the test can be conducted;

(C) the procedure for interpreting the test results; and

(D) an interpretation of the test upon completion of the test.

(5) The well and cavern integrity testing shall be conducted at the maximum allowable operating pressure.

(g) Corrosion monitoring.

(1) Corrosion monitoring of well materials shall be conducted quarterly. Test materials shall be the same as those used in the injection tubing, packer, and long string casing, and will be continuously exposed to the waste with the exception of when the well is taken out of service.

(2) Corrosion monitoring may be waived if the disposal well owner or operator demonstrates that the waste will not be corrosive to the well materials with which the waste is expected to come into contact throughout the life of the well. The demonstration shall include a description of the methodology used to make that determination.

(h) Ambient monitoring.

(1) The owner or operator shall comply with ambient monitoring requirements in accordance with §331.64(h) of this title (relating to Monitoring and Testing Requirements).

(2) The owner or operator shall conduct subsidence monitoring (elevation surveys) over the area of review and any other type of ambient monitoring necessary to comply with §331.242 of this title (relating to Bedded Salt Cavern Disposal Well Performance Standard and Siting Requirements). Elevation surveys shall be conducted by a licensed professional land surveyor.

(i) Hydrogeologic compatibility determination. The owner or operator shall submit information demonstrating that the waste stream and its anticipated reaction products will not alter the permeability, thickness, or other relevant characteristics of the bedded salt cavern confining zone or bedded salt cavern injection zone such that they would no longer meet the requirements specified in §331.121 of this title (relating to Class I Wells).

(j) Other monitoring and testing. The owner or operator shall conduct any other monitoring and testing requirements, including determination of composition and volume of leachate.

(k) All testing and monitoring of the bedded salt disposal cavern and well shall be planned and supervised, and test results shall be reviewed by qualified individuals acting under the responsible charge of a licensed professional engineer or licensed professional geoscientist, as appropriate, with current registration under the Texas Engineering Practice Act or Texas Geoscience Practice Act.

(l) Notification of scheduled logging and testing. The executive director or his designated representative shall have the opportunity to witness all logging and testing. The owner or operator shall submit a written schedule of such activities to the executive director at least seven days before conducting tests.

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**§331.247. Bedded Salt Cavern Disposal Well Reporting Requirements.**

(a) Pre-operation reports.

(1) Start-up date and time. At least 24 hours before beginning drilling and cavern construction operations, the permittee shall notify the executive director in writing of the anticipated well construction and cavern construction start-up dates. Compliance with all pre-operation terms of the permit must occur before beginning injection operations.

(2) Notice of Completion. The permittee shall submit notice of completion of construction to the executive director as specified in §331.65(e)(1) of this title (relating to Reporting Requirements).

(3) Well completion report. Within 90 days after the completion of the well, the permittee shall submit a Well Completion Report to the executive director addressing the considerations and standards in §331.45(3) of this title (relating to Executive Director Approval of Construction and Completion) and §331.243 of this title (relating to Bedded Salt Cavern Disposal Well Construction Standards), and including a completed copy of the commission's Well Data Form, and a surveyor's plat showing the exact location and giving the latitude and longitude of the well. The report will also include a certification that a notation on the deed to the facility property or on some other instrument which is normally examined during title search has been made stating the surveyed location of the well, and the well permit number.

(4) Cavern completion report. Within 90 days after the completion of the cavern, the permittee shall submit a Cavern Completion Report to the executive director addressing the considerations and standards in §331.45(3) of this title and §331.244 of this title (relating to Bedded Salt Cavern Construction Standards), and including a surveyor's plat showing the exact location and giving the latitude and longitude of the cavern. The report will also include a certification that a notation on the deed to the facility property or on some other instrument which is normally examined during title search has been made stating the surveyed location of the cavern, the well permit number, the depth of the cavern floor and ceiling, the cavern diameter, the dates of operation, and its permitted waste streams.

(5) Local authorities. The permittee shall provide written notice to the executive director in a manner specified by the executive director that a copy of the permit has been properly filed with the health and pollution control authorities of the county, city, and town where the well is located.

(b) Operating reports.

(1) Injection operation quarterly report.

(A) For noncommercial facilities only, within 20 days after the last day of the months of March, June, September, and December, the permittee shall submit to the executive director a quarterly report of injection operation on forms supplied by the executive director. These forms will comply with the reporting requirements of 40 Code of Federal Regulations §146.69(a).

(B) The owner or operator shall submit inventory balance data measuring the volume of waste and brine injected into or withdrawn from each bedded salt cavern well, including methods for measuring and verifying volume.

(C) The executive director may require more frequent reporting.

(2) Injection zone annual report. For all facilities, the permittee shall submit annually with the December report of injection operation an updated graphic or other acceptable report and description of the effects of the well and cavern on the area of review, including a report on monitoring required by §331.246(j) of this title (relating to Bedded Salt Cavern and Well Monitoring and Testing Requirements). To the extent such information is reasonably available the report shall also include:

(A) locations of newly constructed or newly discovered wells within the area of review if such wells were not included in the technical report accompanying the permit application or in later reports;

(B) a tabulation of data as required by §331.121(a)(2)(B) of this title (relating to Class I Wells) for all such wells within the area of review that penetrate the injection zone or confining zone; and

(C) for noncommercial facilities only, a current injection fluid analysis.

(3) Workover reports. Within 30 days after the completion of the workover, a report shall be filed with the executive director including the reason for well workover and the details of all work performed.

(4) Well mechanical integrity, cavern integrity, and other reports. The permittee shall submit within 30 days after test completion a report including both data and interpretation on the results of:

(A) periodic tests of well and cavern integrity; and

(B) any other test of the injection well or cavern if required by the executive director.

(5) Emergency report of leak or other failure. The permittee shall notify the underground injection control staff of the Austin office and the local district office of the commission, within 24 hours of any significant change in monitoring parameters or of any other observations which could reasonably be attributed to a leak or other failure of the well equipment or cavern integrity.

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**§331.248. Additional Requirements and Conditions for Bedded Salt Cavern Disposal Wells.**

(a) A permit for a Class I bedded salt cavern disposal well shall include expressly or by reference the following conditions.

(1) A sign shall be posted at the well site which shall show the name of the company, company well number, and commission permit number. The sign and identification shall be in the English language, clearly legible, and shall be in numbers and letters at least one inch high.

(2) An all-weather road shall be installed and maintained to allow access to the disposal well and related facilities.

(3) The wellhead and associated facilities shall be painted, if appropriate, and maintained in good working order without detectable leaks.

(4) Secondary containment of the wellhead shall consist of a diked, impermeable pad or sump.

(5) The executive director may prescribe additional requirements for Class I bedded salt cavern disposal wells in order to protect underground sources of drinking water, and fresh or surface water from pollution.

(6) The obligation to implement the plugging and abandonment plan and the post-closure plan survives the termination of a permit or the cessation of injection activities. The requirement to maintain an approved plan is directly enforceable regardless of whether the requirement is a condition of the permit.

(b) Pressure control equipment including blowout preventers or a wellhead with closeable valves shall be required to be installed and maintained in proper operating condition at all times at the casing head, extending from the time of advancing the surface casing hole after conductor casing is set, to the time of well closure, to safeguard against any pressure imbalance which might cause a backflow, blowout, or fracturing of the salt to occur.

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**§331.249. Record-Keeping Requirements for Bedded Salt Cavern Disposal Wells.**

(a) The permittee shall keep complete and accurate records of, but not limited to:

(1) all required monitoring, including continuous records of:

(A) tubing string pressures;

(B) the pressure and volume of any annular space that extends to the wellhead;

(C) injection and production fluid flow rates, volume and density;

(D) the volume and composition of displaced gases; and

(E) any other data specified by the permit.

(2) all periodic well tests, including but not limited to:

(A) analyses of injected and produced materials;

(B) cavern integrity;

(C) well mechanical integrity; and

(D) casing inspection surveys;

(3) all shut-in periods and times that emergency measures were used for handling injection fluid or waste; and

(4) any additional information on conditions that might reasonably affect the operation of the disposal well.

(b) All records shall be made available promptly on location for review upon request from a representative of the commission.

(c) The permittee shall retain on location, for a period of three years following abandonment, records of all information resulting from any monitoring activities, including the chemical and physical characteristics of injected waste, or other records required by the permit. The executive director may require a permittee to submit copies of the records at any time before conclusion of the retention period.

Adopted July 25, 2012

Effective August 16, 2012

**§331.250. Bedded Salt Cavern Closure.**

(a) The owner or operator of a Class I bedded salt cavern disposal well shall prepare, maintain, and comply with a plan for cavern closure that meets the following minimum requirements:

(1) The owner or operator shall submit the plan as a part of the permit application and, upon approval, or approval with modifications by the executive director, such plan shall be a condition of any permit issued.

(2) The owner or operator shall submit all proposed revisions to the plan and obtain any necessary permit amendments, as appropriate, over the life of the well and cavern.

(3) The plan shall include, at a minimum, the following information:

(A) Upon cessation of waste disposal, and before cavern sealing, the operator shall:

(i) Conduct a gamma-density log to determine the cavern top, salt top and to check for fluid behind the casing.

(ii) Conduct a sonar caliper survey on the storage cavern if no sonar has been run within the past five years. The owner or operator may use another similar proven technology designed to determine cavern configuration and measure cavern capacity as a substitute for a sonar survey.

(B) All brine displaced from the well or flushed from waste lines during the plugging operation shall be managed and disposed of under applicable state and federal regulations.

(b) The well shall be closed in accordance with §331.46 of this title (relating to Closure Standards).

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**§331.251. Post-Closure Care for Bedded Salt Cavern Disposal Wells.**

The owner or operator of a Class I bedded salt cavern disposal well shall prepare, maintain, and comply with a plan for post-closure care that meets the requirements of §331.68(b) of this title (relating to Post-Closure Care).

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