

**SUBCHAPTER D: STANDARDS FOR CLASS I WELLS OTHER THAN
SALT CAVERN DISPOSAL WELLS
§§331.61 - 331.68
Effective August 16, 2012**

§331.61. Applicability.

The sections of this subchapter apply to all Class I injection wells, other than salt cavern disposal wells, unless otherwise noted.

Adopted July 25, 2012

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§331.62. Construction Standards.

(a) All Class I wells shall be designed, constructed, and completed to prevent the movement of fluids that could result in the pollution of an underground source of drinking water (USDW). The following standards apply to all Class I wells except those wells authorized to inject only nonhazardous desalination concentrate or nonhazardous drinking water treatment residuals.

(1) Design criteria. Casing and cement used in the construction of each newly drilled well shall be designed for the life expectancy of the well, including the post-closure care period. The well shall be designed and constructed to prevent potential leaks from the well, to prevent the movement of fluids along the wellbore into or between USDWs, to prevent the movement of fluids along the wellbore out of the injection zone, to permit the use of appropriate testing devices and workover tools, and to permit continuous monitoring of injection tubing, long string casing, and annulus, as required by this chapter. All well materials must be compatible with 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.

(A) Casing design. Surface casing shall be set to a minimum subsurface depth, as determined by the executive director, which extends into the confining bed below the lowest formation containing a USDW or freshwater aquifer. At least one long string casing, using a sufficient number of centralizers, shall extend to the injection interval. In determining and specifying casing and cementing requirements, the following factors shall be considered:

- (i) depth of lowermost USDW or freshwater aquifer;

- (ii) depth to the injection interval;
- (iii) injection pressure, external pressure, internal pressure, and axial loading;
- (iv) hole size;
- (v) size and grade of all casing strings (wall thickness, diameter, nominal weight, length, joint specification, and construction material);
- (vi) 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;
- (vii) corrosive effects of injected fluids, formation fluids, and temperatures;
- (viii) lithology of injection and confining intervals;
- (ix) presence of lost circulation zones or other subsurface conditions that could affect the casing and cementing program;
- (x) types and grades of cement; and
- (xi) quantity and chemical composition of the injected fluid.

(B) Tubing and packer design. All Class I injection wells shall inject fluids through tubing with a packer, set at a depth specified by the executive director. Fluid seal systems will not be approved by the commission. The annulus system shall be designed and constructed to prevent the leak of injection fluids into any unauthorized zones. In determining and specifying requirements for tubing and packer, the following factors shall be considered:

- (i) depth to the injection zone;
- (ii) characteristics of injection fluid (chemical content, corrosiveness, temperature, and density);
- (iii) injection pressure;
- (iv) annular pressure;

(v) rate (intermittent or continuous), temperature, and volume of injected fluid;

(vi) size of casing; and

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

(2) 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 the requirements of this chapter and all permit application plans and specifications.

(3) Changes to plans and specifications. Any proposed changes to the plans and specifications must be approved in writing by the executive director that said changes provide protection standards equivalent to or greater than the original design criteria.

(A) If during the drilling and/or completion of the well, the operator proposes to change the cementing of the surface casing, the executive director shall require a written description of the proposed change, including any additional data necessary to evaluate the request. The operator may not execute the change until the executive director gives written approval. The operator may change the setting depth of the surface casing to a depth greater than that specified in the permit, either during drilling and/or completion, without approval from the executive director. Approval for setting depths shallower than specified in the permit will not be authorized.

(B) If the operator proposes to change the injection interval to one not reviewed during the permit application process, the operator shall submit an application to amend the permit. The operator may not inject into any unauthorized zone.

(C) Any other changes, including but not limited to the number of casing strings, changes in the size or material of intermediate and production casings, changes in the completion of the well, changes in the exact setting of screens or injection intervals within the permitted injection zone, and changes in the type of cement used, or method of cementing shall be considered minor changes. If minor changes are requested, the executive director may give immediate oral and subsequent written approval or written approval for those changes. The operator is required to submit a detailed written description of all minor changes, along with the information required in §331.65 of this title (relating to Waste Disposal Operating Requirements), before approval for operation of the well may be granted.

(4) Drilling requirements.

(A) The well shall be drilled according to sound engineering practices to minimize problems which may jeopardize completion attempts, such as deviated holes, washouts and stuck pipe.

(B) As much as technically practicable and feasible, the hole should be drilled under laminar flow conditions, with appropriate fluid loss control, to minimize hole washouts.

(C) Immediately prior to running casing, the drilling fluid in the hole is to be circulated and conditioned to establish rheological properties commensurate with proper cementing practices.

(5) Construction performance standard. All Class I wells shall be cased and all casings shall be cemented to prevent the movement of fluids along the borehole into or between USDWs or freshwater aquifers, and to prevent movement of fluids along the borehole out of the injection zone.

(6) Cementing requirements, for all Class I wells constructed after the promulgation of this rule, including wells converting to Class I status.

(A) Cementing shall be by the pump and plug or other method approved by the executive director. Cementing may be accomplished by staging. Cement pumped shall be of a volume equivalent to at least 120% of the volume calculated necessary to fill the annular space between the hole and casing and between casing strings to the surface of the ground. The executive director may require more than 120% when the geology or other circumstances warrant it. A two-dimensional caliper shall be used to measure the hole diameter. If the two-dimensional caliper can not measure the diameter of the hole over an interval, then the minimum amount of cement needed for that interval shall be a volume calculated to be equivalent to or greater than 150% of the space between the casing and the maximum measurable diameter of the caliper.

(B) If lost circulation zones or other subsurface conditions are anticipated and/or encountered, which could result in less than 100% filling of the annular space between the casing and the borehole or the casings, the owner/operator shall implement the approved contingency plan submitted according to §331.121(a)(2)(O) of this title (relating to Class I Wells).

(7) Logs and tests.

(A) Integrity testing. Appropriate logs and other tests shall be conducted during the drilling and construction of Class I wells. All logs and tests shall be

interpreted by the service company which processed the logs or conducted the test; or by other qualified persons. A minimum of the following logs and tests shall be conducted:

(i) 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;

(ii) for surface casing;

(I) spontaneous potential, resistivity, natural gamma, and caliper logs before the casing is installed;

(II) cement bond with variable density log, and temperature logs after casing is set and cemented; and

(III) any other test required by the executive director;

(IV) the executive director may allow the use of an alternate to subclauses (I) and (II) of this clause when an alternative will provide equivalent or better information; and

(iii) for intermediate and long string casing:

(I) spontaneous potential, resistivity, natural gamma, compensated density and/or neutron porosity, dipmeter/fracture finder, and caliper logs, before the casing is installed;

(II) a cement bond with variable density log, casing inspection, and temperature logs after casing is set and cemented, and an inclination survey; and

(III) any other test required by the executive director;
and

(iv) a mechanical integrity test consisting of:

(I) a pressure test with liquid or gas;

(II) a radioactive tracer survey;

(III) a temperature or noise log;

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

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

(B) Pressure tests. Surface casing shall be pressure tested to 1,000 pounds per square inch, gauge (psig) for at least 30 minutes, and long string casing shall be tested to 1,500 psig for at least 30 minutes, unless otherwise specified by the executive director.

(C) 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, bulk density, and other necessary tests.

(8) Injectivity tests. After completion of the well, injectivity tests shall be performed to determine the well capacity and reservoir characteristics. Surveys shall be performed to establish preferred injection intervals. Prior to performing injectivity tests, the bottom hole pressure, bottom hole temperature, and static fluid level shall be determined, and a representative sample of formation fluid shall be obtained for chemical analysis. Information concerning the fluid pressure, temperature, fracture pressure and other physical and chemical characteristics of the injection and confining zones shall be determined or calculated.

(9) Construction and workover supervision. All phases of well construction and all phases of any well workover shall be supervised 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, who is knowledgeable and experienced in practical drilling engineering and who is familiar with the special conditions and requirements of injection well construction.

(10) The executive director shall have the opportunity to witness all cementing of casing strings, logging and testing. The owner or operator shall submit a schedule of such activities to the executive director at least 30 days prior to commencing drilling of the well. The executive director shall be given at least 24 hour notice before each activity in order that a representative of the executive director may be present.

(b) Class I wells authorized to inject only nonhazardous desalination concentrate or nonhazardous drinking water treatment residuals shall be constructed in compliance with the following standards:

(1) 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.

(2) Wells shall be cased and cemented to prevent the movement of fluids into or between underground sources of drinking water. 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 to the injection zone;
- (B) Injection pressure, external pressure, internal pressure, and axial loading;
- (C) Hole size;
- (D) Size and grade of all casing strings (wall thickness, diameter, nominal weight, length, joint specification, and construction material);
- (E) Corrosiveness of injected fluid, formation fluids, and temperatures;
- (F) Lithology of injection and confining intervals; and
- (G) Type or grade of cement.

(3) Injection wells, except those municipal wells injecting non-corrosive wastes or those using an alternative as provided by subparagraph (A) of this paragraph shall inject fluids through tubing with a packer set immediately above the injection zone, or tubing with an approved fluid seal as an alternative. The tubing, packer, and fluid seal shall be designed for the expected service.

(A) The use of other alternatives to a packer may be allowed with the written approval of the executive director. To obtain approval, the operator shall submit a written request to the executive director, which shall set forth the proposed alternative and all technical data supporting its use. The executive director shall approve the request if the alternative method will reliably provide a comparable level of protection to underground sources of drinking water. The executive director may approve an alternative method solely for an individual well or for general use.

(B) In determining and specifying requirements for tubing, packer, or alternatives the following factors shall be considered:

- (i) Depth of setting;
- (ii) Characteristics of injection fluid (chemical content, corrosiveness, and density);
- (iii) Injection pressure;
- (iv) Annular pressure;
- (v) Rate, temperature and volume of injected fluid; and
- (vi) Size of casing.

(4) Appropriate logs and other tests shall be conducted during the drilling and construction of new Class I wells. A descriptive report interpreting the results of such logs and tests shall be prepared by a knowledgeable log analyst and submitted to the executive director. At a minimum, such logs and tests shall include:

(A) Deviation checks on all holes constructed by first drilling a pilot hole, and then enlarging the pilot hole by reaming or another method. Such checks shall be at sufficiently frequent intervals to assure that vertical avenues for fluid migration in the form of diverging holes are not created during drilling; and

(B) Such other logs and tests as may be needed after taking into account the availability of similar data in the area of the drilling site, the construction plan, and the need for additional information, that may arise from time to time as the construction of the well progresses. In determining which logs and tests shall be required, the following logs shall be considered for use in the following situations:

(i) For surface casing intended to protect underground sources of drinking water:

(I) Resistivity, spontaneous potential, and caliper logs before the casing is installed; and

(II) A cement bond, temperature, or density log after the casing is set and cemented.

(ii) For intermediate and long strings of casing intended to facilitate injection:

(I) Resistivity, spontaneous potential, porosity, and gamma ray logs before the casing is installed;

(II) Fracture finder logs; and

(III) A cement bond, temperature, or density log after the casing is set and cemented.

(5) At a minimum, the following information concerning the injection formation shall be determined or calculated for new Class I wells authorized to inject only nonhazardous desalination concentrate or nonhazardous drinking water treatment residuals:

(A) Fluid pressure;

(B) Temperature;

(C) Fracture pressure;

(D) Other physical and chemical characteristics of the injection matrix; and

(E) Physical and chemical characteristics of the formation fluids.

Adopted June 18, 2008

Effective July 10, 2008

§331.63. Operating Requirements.

(a) Applicability. Subsections (b) - (m) of this section apply to Class I wells except for those Class I wells authorized to inject only nonhazardous desalination concentrate or nonhazardous drinking water treatment residuals. For Class I wells authorized to inject only nonhazardous desalination concentrate or nonhazardous drinking water treatment residuals only subsections (b) - (d) and (n) of this section apply.

(b) All Class I wells shall be operated to prevent the movement of fluids that could result in the pollution of an underground source of drinking water (USDW) and to prevent leaks from the well into unauthorized zones.

(c) Except during well stimulation, injection pressure at the wellhead shall not exceed a maximum which shall be calculated so as to assure that the pressure in the injection zone during injection does not initiate new fractures or propagate existing

fractures in the injection zone, initiate new fractures or propagate existing fractures in the confining zone, or cause movement of fluid out of the injection zone that may pollute USDWs or surface water.

(d) Injection between the outermost casing protecting USDWs and fresh or surface water and the wellbore is prohibited.

(e) The annulus between the tubing and long string casing shall be filled with a non-corrosive or corrosion-inhibiting fluid approved by the commission. The annulus pressure shall be at least 100 psi greater than the injection tubing pressure to prevent leaks from the well into unauthorized zones and to detect well malfunctions, unless the executive director determines that such a requirement might harm the integrity of the well.

(f) Monthly average and maximum instantaneous rates of injection, and annual and monthly volumes of injected fluids shall not exceed limits specified by the commission.

(g) All gauges, pressure sensing, and recording devices shall be tested and calibrated quarterly.

(h) Any chemical or physical characteristic of the injected fluids shall be maintained within specified permit limits for the protection of the injection well, associated facilities, and injection zone and to ensure proper operation of the facility.

(i) The permittee shall notify the executive director before commencing any workover operation. The notification shall be in writing and shall include plans for the proposed work. Approval by the executive director shall be obtained before the permittee may begin the workover. The executive director may grant an exception to the prior written notification and permission requirements when immediate action is required to comply with subsection (b) of this section.

(j) Pressure control equipment shall be installed and maintained during workovers which involve the removal of tubing.

(k) For workovers or testing operations on hazardous waste disposal wells, all hazardous fluids shall be flushed from the wellbore with a nonhazardous fluid before conducting any portion of the operations which would result in the exposure of the hazardous wastes to the environment or the public.

(l) The owner or operator shall maintain mechanical integrity of the injection well at all times.

(m) The owner or operator of an injection well that has ceased operations for more than two years and is subject to §305.154(a)(7) of this title (relating to Standards) shall notify the executive director in writing 30 days prior to resuming operation of the well.

(n) For Class I wells authorized to inject only nonhazardous desalination concentrate or nonhazardous drinking water treatment residuals, unless an alternative to a packer has been approved under §331.62(b)(3)(A) of this title (relating to Construction Standards), the annulus between the tubing and the long string of casings shall be filled with a fluid approved by the executive director and a pressure, also approved by the executive director, shall be maintained on the annulus.

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§331.64. Monitoring and Testing Requirements.

(a) Applicability. Subsections (b) - (j) of this section apply to all Class I wells except for those Class I wells authorized to inject only nonhazardous desalination concentrate or nonhazardous drinking water treatment residuals.

(b) Injection fluids shall be sampled and analyzed with a frequency sufficient to yield representative data of their characteristics.

(1) The owner or operator shall develop and follow an approved written waste analysis plan that describes the procedures to be carried out to obtain a detailed chemical and physical analysis of a representative sample of the waste, including the quality assurance procedures used. At a minimum, the plan shall specify:

(A) the parameters for which the waste will be analyzed and the rationale for the selection of these parameters;

(B) the test methods that will be used to test for these parameters;
and

(C) the sampling method that will be used to obtain a representative sample of the waste to be analyzed.

(2) The owner or operator shall repeat the analysis of the injected wastes as described in the waste analysis plan and when process or operating changes occur that may significantly alter the characteristics of the waste stream.

(3) The owner or operator shall conduct continuous or periodic monitoring of selected parameters as required by the executive director.

(4) The owner or operator shall assure that the plan remains accurate and the analyses remain representative.

(c) Pressure gauges shall be installed and maintained, at the wellhead, in proper operating conditions at all times on the injection tubing and on the annulus between the tubing and long-string casing, and/or annulus between the tubing and liner.

(d) Continuous recording devices shall be installed, used, and maintained in proper operating condition at all times to record injection tubing pressures, injection flow rates, injection fluid temperatures, injection volumes, tubing-long string casing annulus pressure and volume, and any other data specified by the permit. The instruments shall be housed in weatherproof enclosures. 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 and 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.

(3) If an automatic alarm or shutdown is triggered, the owner or operator shall immediately investigate as expeditiously as possible the cause of the alarm or shutoff. If, upon investigation, the well appears to be lacking mechanical integrity, or if monitoring otherwise indicates that the well may be lacking mechanical integrity, the owner or operator shall:

(A) cease injection of waste fluids 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.

(4) If the loss of mechanical integrity is discovered by monitoring or during periodic mechanical integrity testing, the owner or operator shall:

(A) immediately cease injection of waste fluids;

(B) take all steps reasonably necessary to determine whether there may have been a release of hazardous wastes or hazardous waste constituents into any unauthorized zone;

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

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

(E) restore and demonstrate mechanical integrity to the satisfaction of the executive director prior to resuming injection of waste fluids.

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

(A) the owner or operator shall immediately cease injection of waste fluids; 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 authority, place a notice in a newspaper of general circulation, and send notification by mail to adjacent landowners;

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

(e) Mechanical integrity testing.

(1) The integrity of the long string casing, injection tube, and annular seal shall be tested annually by means of an approved pressure test with a liquid or gas and whenever there has been a well workover. The integrity of the bottom-hole cement shall be tested annually by means of an approved radioactive tracer survey. A radioactive tracer survey may be required after workovers that have the potential to damage the cement within the injection zone.

(2) A temperature log, noise log, oxygen activation log, or other approved log shall be required by the executive director at least once every five years to test for fluid movement along the borehole.

(3) A casing inspection, casing evaluation, or other approved log shall be run whenever the owner or operator conducts a workover in which the injection string is pulled, unless the executive director waives this requirement due to well construction or other factors which limit the test's reliability, or based upon the satisfactory results of a casing inspection log run within the previous five years. The executive director may require that a casing inspection log be run every five years, if there is sufficient reason to believe the integrity of the long string casing of the well may be adversely affected by naturally occurring or man-made events.

(4) The executive director may allow the use of a test to demonstrate mechanical integrity other than those listed in paragraph (1) of this subsection with the written approval of the administrator of the United States Environmental Protection Agency (EPA) or his authorized representative. To obtain approval, the executive director shall submit a written request to the EPA administrator, which shall set forth the proposed test and all technical data supporting its use. The EPA administrator shall approve the request if it will reliably demonstrate the mechanical integrity of wells for which its use is proposed. Any alternate method approved by the EPA administrator shall be published in the *Federal Register* and may be used unless its use is restricted at the time of approval by the EPA administrator.

(f) Any wells within the area of review selected for the observation of water quality, formation pressure, or any other parameter, shall be monitored at a frequency sufficient to protect underground sources of drinking water (USDWs) and fresh or surface water.

(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 shall be continuously exposed to the waste fluids with the exception of when the well is taken out of service. The owner or operator shall demonstrate that the waste stream will be compatible with the well materials with which the waste is expected to come into contact, and to submit to the executive director a description of the methodology used to make that determination. Compatibility for purposes of this requirement is established if contact with injected fluids will not cause the well materials to fail to satisfy any design requirement imposed under §331.62(1) of this title (relating to Construction Standards). Testing shall be by:

(A) placing coupons of the well construction materials in contact with the waste stream; or

(B) routing the waste stream through a loop constructed with the material used in the well; or

(C) using an alternative method approved by the executive director.

(2) The test shall use materials identical to those used in the construction of the well, and those materials must be continuously exposed to the operating pressures and temperatures (measured at the wellhead) and flow rates of the injection operation; and

(3) The owner or operator shall monitor the materials for loss of mass, thickness, cracking, pitting and other signs of corrosion on a quarterly basis to ensure that the well components meet the minimum standards for material strength and performance set forth in §331.62(1) of this title.

(4) Corrosion monitoring may be waived by the executive director if the injection well owner or operator satisfactorily demonstrates, before authorization to conduct injection operations, that the waste streams 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) Based on a site-specific assessment of the potential for fluid movement from the well or injection zone and on the potential value of monitoring wells to detect fluid movement, the executive director shall require the owner or operator to develop a

monitoring program. When prescribing a monitoring system, the executive director may also require:

(A) Continuous monitoring for pressure changes in the first aquifer overlying the confining zone. When a monitor well is installed, the owner or operator shall, on a quarterly basis, sample the aquifer and analyze for constituents specified by the executive director;

(B) the use of indirect, geophysical techniques to determine the position of the waste front, the water quality in a formation designated by the executive director, or to provide other site specific data;

(C) periodic monitoring of the ground water quality in the first aquifer overlying the injection zone;

(D) periodic monitoring of the ground water quality in the lowermost USDW; and

(E) any additional monitoring necessary to determine whether fluids are moving into or between USDWs.

(2) The pressure buildup in the injection zone shall be monitored annually, including at a minimum, a shut down of the well for a time sufficient to conduct a valid observation of the pressure fall-off curve.

(i) Any other monitoring and testing requirements which the executive director determines to be necessary including, but not limited to, monitoring for seismic activity.

(j) The owner or operator shall submit information demonstrating to the satisfaction of the executive director that the waste stream and its anticipated reaction products will not alter the permeability, thickness, or other relevant characteristics of the confining or injection zones such that they would no longer meet the requirements specified in §331.121(c) of this title (relating to Class I Wells).

(k) Class I Wells authorized to inject only nonhazardous desalination concentrate or nonhazardous drinking water treatment residuals shall comply with the following monitoring and testing requirements:

(1) Monitoring requirements. Monitoring requirements shall, at a minimum, include:

(A) The analysis of the injected fluids with sufficient frequency to yield representative data of their characteristics;

(B) Installation and use of continuous recording devices to monitor injection pressure, flow rate and volume, and the pressure on the annulus between the tubing and the long string of casing;

(C) Installation and use of monitoring wells within the area of review if required by the executive director, to monitor any migration of fluids into and pressure in the underground sources of drinking water. The type, number and location of the wells, the parameters to be measured, and the frequency of monitoring must be approved by the executive director;

(D) A demonstration of mechanical integrity pursuant to paragraph (4) of this subsection at least once every five years during the life of the well; and

(E) The type, number and location of wells within the area of review to be used to monitor any migration of fluids into and pressure in the underground sources of drinking water, the parameters to be measured and the frequency of monitoring.

(2) When the executive director determines that an injection well lacks mechanical integrity pursuant to paragraph (4) of this subsection, the executive director shall give written notice of his determination to the owner or operator. Unless the executive director requires immediate cessation, the owner or operator shall cease injection into the well within 48 hours of receipt of the executive director's determination. The executive director may allow plugging of the well in accordance with the requirements of §331.46 of this title (relating to Closure Standards) or require the owner or operator to perform such additional construction, operation, monitoring, reporting and corrective action as is necessary to prevent the movement of fluid into or between USDWs caused by the lack of mechanical integrity. The owner or operator may resume injection upon receipt of written notification from the executive director that the owner or operator has demonstrated mechanical integrity under paragraph (4) of this subsection.

(3) The executive director may allow the owner or operator of a well which lacks mechanical integrity under paragraph (4) of this subsection to continue or resume injection if the owner or operator has made a satisfactory demonstration that there is no movement of fluid into or between USDWs.

(4) Mechanical Integrity Testing. An injection well has mechanical integrity if:

(A) There is no significant leak in the casing, tubing or packer; and

(B) There is no significant fluid movement into an underground source of drinking water through vertical channels adjacent to the injection well bore.

(5) One of the following methods shall be used to evaluate the absence of significant leaks under paragraph (4)(A) of this subsection:

(A) Following an initial pressure test, monitoring of the tubing-casing annulus pressure with sufficient frequency to be representative, as determined by the executive director, while maintaining an annulus pressure different from atmospheric pressure measured at the surface; or

(B) Pressure test with liquid or gas.

(6) The results of a temperature or noise log must be used to determine the absence of significant fluid movement under paragraph (4)(B) of this subsection.

(7) The executive director may allow the use of a test to demonstrate mechanical integrity other than those listed in paragraph (5)(A) and (B) of this subsection with the written approval of the executive director. To obtain approval, the permittee shall submit a written request to the executive director, which shall set forth the proposed test and all technical data supporting its use. The executive director shall approve the request if it will reliably demonstrate the mechanical integrity of wells for which its use is proposed.

(8) In conducting and evaluating the tests enumerated in this section or others to be allowed by the executive director, the owner or operator and the executive director shall apply methods and standards generally accepted in the industry. When the owner or operator reports the results of mechanical integrity tests to the executive director, he shall include a description of the test(s) and the method(s) used. In making his evaluation, the executive director shall review monitoring and other test data submitted since the previous evaluation.

(9) The executive director may require additional or alternative tests if the results presented by the owner or operator under §331.64(k)(5) of this title (relating to Monitoring and Testing Requirements) are not satisfactory to the executive director to demonstrate that there is no movement of fluid into or between USDWs resulting from the injection activity.

(10) Ambient monitoring.

(A) Based on a site-specific assessment of the potential for fluid movement from the well or injection zone and on the potential value of monitoring wells to detect such movement, the executive director shall require the owner or operator to

develop a monitoring program. At a minimum, the executive director shall require monitoring of the pressure buildup in the injection zone annually, including a shut down of the well for a time sufficient to conduct a valid observation of the pressure fall-off curve.

(B) When prescribing a monitoring system the executive director may also require:

(i) Continuous monitoring for pressure changes in the first aquifer overlying the confining zone. When such a well is installed, the owner or operator shall, on a quarterly basis, sample the aquifer and analyze for constituents specified by the executive director;

(ii) The use of indirect, geophysical techniques to determine the position of the waste front, the water quality in a formation designated by the executive director, or to provide other site specific data;

(iii) Periodic monitoring of the ground water quality in the first aquifer overlying the injection zone;

(iv) Periodic monitoring of the ground water quality in the lowermost USDW; and

(v) Any additional monitoring necessary to determine whether fluids are moving into or between USDWs.

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§331.65. Reporting Requirements.

(a) Applicability. Subsections (b) - (d) of this section apply to all Class I wells except for those Class I wells authorized to inject only nonhazardous desalination concentrate or nonhazardous drinking water treatment residuals.

(b) Pre-operation reports. For new wells, including wells converting to Class I status, the requirements are as follows.

(1) Completion report. Within 90 days after the completion or conversion of the well, the permittee shall submit a Completion Report to the executive director. The report must include a surveyor's plat showing the exact location and giving the latitude and longitude of the well. The report must 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, the well permit number, and its permitted waste streams. The permittee shall also include in the report the following, 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:

- (A) actual as-built drilling and completion data on the well;
- (B) all logging and testing data on the well;
- (C) a demonstration of mechanical integrity;
- (D) anticipated maximum pressure and flow rate at which the permittee will operate;
- (E) results of the injection zone and confining zone testing program as required in §331.62 of this title (relating to Construction Standards) and this subsection;
- (F) adjusted formation pressure increase calculations, fluid front calculations and updated cross- sections of the confining and injection zones, based on the data obtained during construction and testing;
- (G) the actual injection procedure;
- (H) the compatibility of injected wastes with fluids in the injection zone and minerals in both the injection zone and the confining zone and materials used to construct the well;
- (I) the calculated area of review and cone of influence based on data obtained during logging and testing of the well and the formation, and where necessary, revisions to the information submitted under §331.121 of this title (relating to Class I Wells);
- (J) the status of corrective action required for defective wells in the area of review;
- (K) a Well Data Report on forms provided by the executive director;
- (L) compliance with the casing and cementing performance standard in §331.62(5) of this title; and
- (M) compliance with the cementing requirements in §331.62(6) of this title.

(2) 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.

(3) Start-up date and time. The permittee shall notify the executive director in writing of the anticipated well start-up date. Compliance with all pre-operation terms of the permit must occur prior to beginning injection operations. The permittee shall notify the executive director at least 24 hours prior to beginning drilling operations.

(4) Approval of construction and completion. Prior to beginning operations, the permittee must obtain written approval from the executive director, according to §331.45 of this title (relating to Executive Director Approval of Construction and Completion).

(c) Operating reports.

(1) Injection operation quarterly report. For non-commercial 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 (CFR) §146.69(a). The executive director may require more frequent reporting.

(2) Injection operation monthly report. Commercial facilities shall meet the following requirements.

(A) The permittee shall submit within 30 days after the last day of each month a report to the commission including the following information for wastes received and injected during the month:

(i) names and locations of the companies and plants generating the wastes;

(ii) chemical and physical characteristics and volume of waste received from each company including pH;

(iii) names of companies transporting the wastes; and

(iv) a log of injection operations for each injection episode including but not limited to time of injection, injection rate, injection pressures, injection fluid volume, injection fluid pH, and injection fluid density.

(B) The permittee shall submit to the commission within 20 days of the last day of each month a report of injection operations on forms provided by the commission. These forms shall comply with the reporting requirements of 40 CFR §146.69(a). The executive director may require more frequent reporting.

(3) 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 of the pressure effects of the well upon its injection zone as required by §331.64(h) of this title (relating to Monitoring and Testing Requirements). To the extent this information is reasonably available, the report must also include:

(A) locations of newly constructed or newly discovered wells that penetrate the confining and/or injection zone within the area of review if those 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 for wells within the area of review that penetrate the injection zone or confining zone;

(C) the condition of the wells identified in subparagraph (A) of this paragraph and their effect on the injection activities;

(D) the protocol followed to identify, locate, and ascertain the condition of the wells identified in subparagraph (A) of this paragraph;

(E) a corrective action plan for wells not adequately constructed, completed, or plugged; and

(F) for non-commercial facilities only, a current injection fluid analysis.

(4) Mechanical 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 mechanical integrity; and

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

(5) Emergency report of leak or other failure. The permittee shall notify the Underground Injection Control (UIC) Unit of the Austin 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 injection zone integrity.

(d) 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.

(e) Class I Wells authorized to inject only nonhazardous desalination concentrate or nonhazardous drinking water treatment residuals shall comply with the following reporting requirements:

(1) Completion Reports. A new injection well may not commence injection until construction is complete, and

(A) The permittee has submitted notice of completion of construction to the executive director; and

(B) The executive director has inspected or otherwise reviewed the new injection well and finds it is in compliance with the conditions of the permit; or

(C) The permittee has not received notice from the executive director of his intent to inspect or otherwise review the new injection well within 13 days of the date of the notice in paragraph (1)(A) of this subsection, in which case prior inspection or review is waived and the permittee may commence injection. The executive director shall include in his notice a reasonable time period in which he shall inspect the well.

(2) Operating Reports. The owner or operator shall submit reports to the executive director as follows:

(A) Quarterly reports on:

(i) The physical, chemical, and other relevant characteristics of the injection fluids;

(ii) Monthly average, maximum, and minimum values for injection pressure, flow rate and volume, and annular pressure;

(iii) The results from ground-water monitoring wells prescribed in paragraph §331.64(k)(10) of this title (relating to Monitoring and Testing Requirements);

(iv) The results of any test of the injection well conducted by the owner or operator during the reported quarter if required by the executive director; and

(v) Any well work over performed during the reported quarter.

(B) Annual Reports. An annual report to the executive director summarizing the results of monitoring required under §331.64(k)(1)(B) of this title. This summary shall include monthly records of injected fluids and any major changes in characteristics or sources of injected fluid. Previously submitted information may be included by reference.

Adopted June 18, 2008

Effective July 10, 2008

§331.66. Additional Requirements and Conditions.

(a) This section applies to all Class I wells except for those Class I wells authorized to inject only nonhazardous desalination concentrate or nonhazardous drinking water treatment residuals.

(b) A permit for a Class I 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 injection well and related facilities.

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

(4) The commission may prescribe additional requirements for Class I wells to protect USDWs, and fresh or surface water from pollution.

(c) Permit requirements for owners or operators of disposal wells which inject wastes which have the potential to react with the injection formation to generate gases shall include:

(1) conditions limiting the temperature, pH, or acidity of the injected wastes; and

(2) procedures necessary to assure that pressure imbalances which might cause a backflow or blowout do not occur.

Adopted June 18, 2008

Effective July 10, 2008

§331.67. Recordkeeping Requirements.

(a) The permittee shall keep complete and accurate records of:

(1) All monitoring required by the permit, including:

(A) continuous records of surface injection pressures,

(B) continuous records of the tubing-long string annulus pressures and volumes,

(C) continuous records of injection flow rates,

(D) monthly total volume of injected fluids.

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

(A) injection fluid analyses,

(B) bottom hole pressure determinations,

(C) mechanical integrity, and

(D) casing inspection surveys.

(3) All shut-in periods and times that emergency measures were used for handling injection fluid.

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

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

(c) The permittee shall retain, for a period of three years following the completion of any plugging and abandonment procedures, records of all monitoring information including the nature and composition of all injected fluids or other records required by the permit. The executive director may require a permittee to submit copies of the records at any time prior to conclusion of the retention period.

Adopted November 1, 2000

Effective November 23, 2000

§331.68. Post-Closure Care.

(a) The owner or operator of a Class I hazardous well shall prepare, maintain, and comply with a plan for post-closure care that meets the requirements of subsection (b) of this section, and is acceptable to the executive director. The obligation to implement 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.

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

(2) The owner or operator shall submit any proposed significant revision to the plan as appropriate over the life of the well, but no later than the date of the closure report required under §331.46 of this title (relating to Closure Standards).

(3) The plan shall provide financial responsibility as required in Subchapter I of this chapter (relating to Financial Responsibility). The owner or operator shall demonstrate and maintain financial assurance in the amount of the post closure cost estimate to cover post-closure care in a manner that meets the requirements of Chapter 37, Subchapter Q of this title (relating to Financial Assurance for Underground Injection Wells). The amount of the funds available shall be no less than the amount identified in paragraph (4)(F) of this subsection. The obligation to maintain financial responsibility for post-closure care survives the termination of a permit or the cessation of injection.

(4) The plan shall include the following information:

(A) the pressure in the injection zone before injection began;

(B) the anticipated pressure in the injection zone at the time of closure;

(C) the predicted time until pressure in the injection zone decays to the point that the well's cone of influence no longer intersects the base of the lowermost USDW or freshwater aquifer;

(D) predicted position of the waste front at closure;

(E) the status of any corrective action required under §331.44 of this title (relating to Corrective Action Standards); and

(F) the estimated cost of proposed post-closure care.

(5) At the request of the owner or operator, or on his own initiative, the executive director may modify the post-closure plan after submission of the plugging and abandonment report following the procedures in §305.72 of this title (relating to UIC Permit Modification at the Request of the Permittee).

(b) The owner or operator shall:

(1) continue and complete any corrective action required under §331.44 of this title;

(2) continue to conduct any groundwater monitoring required under the permit until pressure in the injection zone decays to the point that the well's cone of influence no longer intersects the base of the lowermost USDW or freshwater aquifer. The executive director may extend the period of post-closure monitoring if he determines that the well may endanger a USDW or freshwater aquifer;

(3) submit a survey plat to the local zoning authority designated by the executive director. The plat shall indicate the location of the well relative to permanently surveyed benchmarks. A copy of the plat shall be submitted to the Underground Injection Control (UIC) program at the Austin office of the commission;

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

(5) Retain, for a period of three years following well closure, records reflecting the nature, composition, and volume of all injected fluids. The owner or operator must deliver the records to the executive director at the conclusion of the

retention period, and the records shall thereafter be retained at a location designated by the executive director for that purpose.

Adopted November 1, 2000

Effective November 23, 2000