

The Texas Natural Resource Conservation Commission (TNRCC or commission) adopts amendments to §331.14, Prohibition of Class I Salt Cavern Solid Waste Disposal Wells and Associated Caverns in Geologic Structures or Formations Other Than Salt Stocks of Salt Domes and Prohibition of Disposal of Hazardous Waste into Certain Geological Formations; §331.121, Class I Wells; §331.161, Applicability; and §331.163, Well Construction Standards. Sections 331.14, 331.121, 331.161, and 331.163 are adopted *without changes* to the proposed text as published in the February 1, 2002 issue of the *Texas Register* (27 TexReg 725) and will not be republished.

BACKGROUND AND SUMMARY OF THE FACTUAL BASIS FOR THE ADOPTED RULES

The purpose of this rulemaking is three-fold: 1) to implement legislation prohibiting the storage, processing, or disposal of hazardous waste in a solution-mined salt dome cavern or a sulphur mine; 2) to amend and clarify the information required to establish the geologic suitability of a proposed location for a salt cavern disposal well; and 3) to reinstate technical requirements administratively omitted in 1992.

House Bill (HB) 2912 (an act relating to the continuation and functions of the Texas Natural Resource Conservation Commission; providing penalties), §9.02, 77th Legislature, 2001, amended Texas Health and Safety Code (THSC), §361.114, Prohibition of Disposal of Hazardous Waste Into Certain Geological Formations. The legislation mandates the commission to prohibit, by rule, the storage, processing, or disposal of hazardous waste in a solution-mined salt dome cavern or a sulphur mine.

The adoption also amends and clarifies the information required to establish the geologic suitability of a proposed location for a salt cavern disposal well. On June 5, 2000, Baker Botts, L.L.P. (Baker Botts),

on behalf of Secured Environmental Management, Inc., (SEM) filed a petition for rulemaking requesting revision of 30 TAC §331.121(d)(1) to clarify and amend the requirements for information necessary to establish the geologic suitability of a proposed site for a salt cavern Class I injection well. The petitioner requested that the requirement to submit three-dimensional (3-D) seismic survey data sufficient to delineate the edge of the salt stock and image underneath all suspected overhangs be deleted from the rule and that it be replaced with a requirement to conduct a 3-D seismic survey over the cavern location. SEM, in its petition, interpreted the current language as requiring a 3-D seismic survey of the salt dome in its entirety. SEM argued that such a requirement would thwart applicants from proposing Class I salt cavern injection wells in large salt domes, and noted the difficulty in obtaining surface access to neighboring properties to conduct the survey.

By order dated September 11, 2000, the commission directed the executive director to examine the issues in the petition and initiate rulemaking if deemed necessary. As a result of the examination, the executive director determined that the current requirements for the 3-D seismic survey are ambiguous, and amended rules were drafted. On February 21, 2001, proposed amended rules were approved by the commission for publication in the *Texas Register*. The proposed rules were published on March 9, 2001, followed by a 73-day comment period (including extensions) that concluded on May 22, 2001. During the time executive director staff was preparing the response to comments, the Texas Legislature passed HB 2912 which, in part, directs the commission to prohibit by rule the storage, processing, or disposal of hazardous waste in a solution-mined salt dome cavern or a sulphur mine. Because it would have been inconsistent for the commission to adopt amended rules pertaining to activities prohibited by new legislation, on July 11, 2001, the commission withdrew the proposal to adopt the amended rules based on its decision to consider reproposal at the same time rules are proposed implementing §9.02 of

HB 2912. The commission followed through with that plan in the proposal of this rulemaking which was published February 1, 2002 in the *Texas Register*.

The commission adopts amendments to §331.14 implementing the statutory prohibition of the storage, processing, or disposal of hazardous waste in a solution-mined salt dome cavern or a sulphur mine, by adding new subsection (b) to reflect this prohibition.

The commission adopts amendments and clarifications to §331.121(d)(1)(A), concerning establishing geologic suitability of proposed salt cavern locations. The commission also adopts reformatting changes to §331.121(d)(1)(A) to improve readability. Adopted §331.121(d)(1)(B) requires an applicant to submit a thorough characterization of the salt dome to establish the geologic suitability of the location, including a surface-recorded 3-D seismic survey, the lateral extent of which is to be determined by the executive director, which must provide information as part of demonstrating that the location is geologically suitable for the purpose of meeting the performance standard in 30 TAC §331.162, relating to Performance Standard.

This rulemaking also reinstates technical requirements administratively omitted in 1992, when the agency submitted the rules to the Office of the Secretary of State.

SECTION BY SECTION DISCUSSION

The commission adopts amended §331.14 to implement legislation prohibiting the storage, processing, or disposal of hazardous waste in a solution-mined salt dome cavern or a sulphur mine. The adopted amendment implements this legislation by creating new subsection (b) to reflect the prohibition in

THSC, §361.114. The previous language in §331.14 is retained within new subsection (a). Also, the title of the section is amended to add the phrase “and Prohibition of Disposal of Hazardous Waste into Certain Geological Formations” at the end of the title.

References to hazardous waste disposal in salt cavern disposal wells occur in 30 TAC §§331.2(81)(B), 331.142(b), 331.165(a)(10)(B), 335.1(63), 335.1(64), and 335.204. These references to hazardous waste disposal in salt cavern disposal wells are not being amended, because adopted §331.14(b), which states, “Notwithstanding any provision to the contrary in this chapter or Chapter 335 of this title (relating to Industrial Solid Waste and Municipal Hazardous Waste), or any other chapter of this title, the storage, processing, or disposal of hazardous waste in a solution-mined salt dome cavern or a sulphur mine is prohibited” globally removes the effectiveness of these references to hazardous waste disposal in salt caverns without deleting each individual occurrence of the term.

The commission adopts §331.121 to clarify information which must be submitted as part of the technical report of the application to perform a thorough characterization of the salt dome to establish the geologic suitability of the location. This information is required as part of the demonstration required by §331.162. In amended §331.121(d)(1)(A), data and interpretation from all appropriate geophysical methods (such as well logs, seismic surveys, and gravity surveys), subject to approval by the executive director, must be provided. The information required for a thorough geologic characterization of a salt dome is specified in §331.121(d)(1)(A)(i) - (viii). In adopted new §331.121(d)(1)(B), a surface-recorded 3-D seismic survey is required, subject to the following minimum requirements: 1) the lateral extent of the survey must be determined by the executive director; and 2) the survey must provide information as part of demonstrating that the location is

geologically suitable for the purpose of meeting the performance standard in §331.162. Depending on the information submitted with the application and the geology of the location, the executive director will determine the lateral extent of the 3-D seismic survey necessary to support the demonstration of geologic suitability. This provision incorporates flexibility in the use of the 3-D seismic survey to serve the most geologically-relevant purpose at a given site. The information must be provided before completion of technical review and before a draft permit may be issued.

The commission adopts a correction in §331.121(d)(1)(C) by adding the words “identification of” at the beginning of the paragraph for proper grammatical formatting of the subparagraph.

The adopted amendments to §331.161 and §331.163 are revisions which were inadvertently omitted, through an administrative error, when the agency originally submitted these rules to the Office of the Secretary of State in 1992. All of these changes were adopted at that time as a result of comments during the 1992 public comment period. The amendments under §331.161 and §331.163 are the same as those originally adopted, except: 1) the type of vertical seismic profile (VSP) is no longer specified; and 2) the purpose and use of the VSP is no longer stated.

The commission adopts amended §331.161 to make clear that the rules contained in Subchapter J, Standards for Class I Salt Cavern Solid Waste Disposal Wells, apply only to salt caverns located in the salt stocks of salt domes. The term “horizontally bedded salt formation” was not specifically defined previously, and the prohibition on salt cavern disposal wells and associated caverns was not specified for “geologic structures or formations other than salt stocks of salt domes.” The commission adopts this clarification to provide consistency with the requirements in §331.14.

The commission adopts amended §331.163(b)(1) to add the words “and waste” to the phrase “to prevent the movement of fluids” to clarify that all Class I salt cavern disposal wells must be cased and the casings must be constructed to prevent all fluids and waste from moving into underground sources of drinking water or freshwater aquifers, and to prevent potential leaks of fluid and waste from the well. The word “period” is also added to modify the term “post-closure care.”

The adopted amendment to §331.163(c) includes clarification of the requirement that two concentric and removable injection tubings are to be utilized for injection activities. Subsection (c)(1) is amended to replace the term “corrosion inhibiting” with the word “non-corrosive.” Subsection (c)(2) is amended to replace the phrase “removable injection tubing” with the phrase “the inner tubing.”

The adopted amendment to §331.163(d)(2) includes the addition of the words “and waste” to clarify that the requirements for a tubing and packer system must consider both the fluid and the waste in stabilized form.

The adopted amendment to §331.163(e)(1)(F) adds the requirement for a VSP that is slightly altered from the version originally adopted by the commission, but inadvertently omitted from the Secretary of State’s published rules. The original rule required a three-component offset VSP, which would be required after drilling the cavern pilot hole, to depict the 3-D nature of the salt-sediment interface. In this adoption, a VSP is required without specifying its objective and type (field geometry). This will give the flexibility to select the appropriate VSP survey to provide the most relevant and needed geologic information. The VSP would supplement or confirm information submitted to demonstrate compliance with the performance standard under §331.162, to gain approval of the well construction

stage under §331.163(i), or to gain approval of the completion of the cavern construction stage under §331.164(f)(2).

The adopted amendment to §331.163(e)(2)(A) concerns the modification of the pressure testing requirements for the surface casing to specify a more commonly accepted engineering practice.

Previously existing §331.163(e)(3)(D), which allowed the executive director to waive or modify future coring projects, is deleted.

FINAL REGULATORY IMPACT ANALYSIS DETERMINATION

The commission reviewed the rulemaking in light of the regulatory analysis requirements of Texas Government Code, §2001.0225, and determined that the rulemaking is not subject to that section because it does not meet the definition of a “major environmental rule” as defined in the statute. A “major environmental rule” is a rule the specific intent of which is to protect the environment or reduce risks to human health from environmental exposure and that may adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, or the public health and safety of the state or a sector of the state.

The primary purpose of this rulemaking is to clarify the information to be submitted in the technical report under §331.121(d)(1); to remove prescriptive language that may not be applicable to all proposed sites; to emphasize the purpose and use of the data as they relate to the performance standard of no release of hazardous constituents from the salt cavern and to the geologic suitability of a proposed site; and to implement the statutory prohibition on storage, processing, or disposal of hazardous waste in a solution-mined salt dome cavern or a sulphur mine. There is, however, a potential new technical

requirement for persons granted permits for salt dome cavern waste disposal wells. Adopted new §331.163(e)(1)(F) requires that permittees perform a VSP.

The commission concludes that the amendments are as protective as those which previously existed in the agency's rules. The goal under either set of rules is to maximize protection of human health and the environment by establishing the geologic suitability of a proposed site for a salt cavern Class I injection well. By clarifying what information is required in the application, and by tying the information to current construction and performance standards, the commission has determined that the amendments provide appropriate flexibility while maintaining the level and degree of protectiveness of the permitting process.

The rulemaking is not a "major environmental rule" because it is not expected to adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, or the public health and safety of the state. The amendments should not have a materially adverse effect on any of the listed categories. The amendments are intended primarily to clarify requirements which already previously existed in the commission's regulations; eliminate prescriptive language relating to the requirement for a 3-D seismic survey, and relate the demonstrations required in a permit application to the geologic suitability of a specific site, in order to ensure there will be no release of hazardous constituents from the proposed salt cavern injection zone; and to implement the statutory prohibition on storage, processing, or disposal of hazardous waste in a solution-mined salt dome cavern or a sulphur mine. Because the rulemaking does not constitute a "major environmental rule," a full regulatory impact analysis under Texas Government Code, §2001.0225 is not required.

Furthermore, the rulemaking does not meet any of the four applicability requirements listed in Texas Government Code, §2001.0225(a). Section 2001.0225 only applies to a major environmental rule, the result of which is to: 1) exceed a standard set by federal law, unless the rule is specifically required by state law; 2) exceed an express requirement of state law, unless the rule is specifically required by federal law; 3) exceed a requirement of a delegation agreement or contract between the state and an agency or representative of the federal government to implement a state and federal program; or 4) adopt a rule solely under the general powers of the agency instead of under a specific state law. This rulemaking does not meet any of these four applicability requirements.

TAKINGS IMPACT ASSESSMENT

The commission evaluated these adopted rules and performed an assessment of whether these rules constitute a takings under Texas Government Code, Chapter 2007. The purposes of the rules are to remove prescriptive language relating to which methodologies must be employed to make specific demonstrations of geologic suitability; clarify the information to be submitted in the technical report to support an application for a Class I salt cavern injection well; add requirements inadvertently left out of the agency's transmission to the Secretary of State in 1992; and implement the statutory prohibition on storage, processing, or disposal of hazardous waste in a solution-mined salt dome cavern or a sulphur mine. The commission has determined that the adopted amendments will substantially advance these purposes by more specifically describing which geologic features of a salt dome are to be analyzed, and authorizing the executive director to specify the lateral extent of the 3-D seismic survey as needed to ensure that a proposed cavern location and any subsequently constructed caverns meet the performance standard "of no escape of hazardous constituents from the salt cavern injection zone" in §331.162. The adopted rule prohibiting the storage, processing, or disposal of hazardous waste in a solution-mined salt

dome cavern or a sulphur mine implements the statutory mandate to the commission in THSC, §361.114, to prohibit this activity by rule. THSC, §361.002, provides that it is the state's policy and purpose of the Solid Waste Disposal Act to safeguard the health, welfare, and physical property of the people and to protect the environment by controlling the management of solid waste.

Promulgation and enforcement of these adopted rules will be neither a statutory nor a constitutional taking of private real property. Specifically, the subject rules do not burden real property, nor restrict or limit the owner's right to property and reduce its value by 25% or more beyond that which would otherwise exist in the absence of the regulations. These rules mainly clarify the technical requirements and submissions for applications for authorization of waste disposal in a salt dome and implement the statutory prohibition of storage, processing, or disposal of hazardous waste in a solution-mined salt dome or sulphur mine. Although the rules affect the ability to use real property for hazardous waste treatment, storage, and disposal in a solution-mined salt dome cavern or sulphur mine, the commission has determined that there are off-setting benefits to the value of real property because the possibility of property damage from this type of waste management technique is reduced. The benefits to society from the rulemaking are the protection of health, welfare, and the environment. Because this rulemaking implements a statutory mandate to prohibit the storage, processing, or disposal of hazardous waste in solution-mined salt dome caverns or sulphur mines, there is no alternative action that could accomplish this specific purpose.

CONSISTENCY WITH THE COASTAL MANAGEMENT PROGRAM

The commission reviewed this rulemaking and found that the rule amendments are neither identified in Coastal Coordination Act Implementation Rules, 31 TAC §505.11, Actions and Rules Subject to the

Texas Coastal Management Program (CMP), nor will they affect any action or authorization identified in Coastal Coordination Act Implementation Rules, 31 TAC §505.11. Therefore, the rules are not subject to the CMP.

HEARINGS AND COMMENTERS

Public hearings on the proposed rules were held in Wharton on February 19, 2002, and Mont Belvieu on February 26, 2002; and scheduled to be held in Austin on February 28, 2002. Public comments were received at the Wharton and Mont Belvieu hearings. No public comment was offered at the scheduled Austin hearing, so the hearing was not held. Chambers County Judge Jimmy Sylvia (Judge Sylvia); City of Mont Belvieu Mayor Lonnie Follis (Mayor Follis); Wharton County Judge Lawrence Naiser (Judge Naiser); Wharton County Commissioner Mickey Reynolds, speaking as the commissioner for Precinct 1 and as pastor of Iago Federated Church, and speaking for the Wharton County Commissioners in Precincts 1, 3, and 4 (Commissioner Reynolds); Bobby Burns, Boling Independent School District Board President, representing the Board of Trustees (Bobby Burns); Ronald Gertson, Coastal Bend Groundwater Conservation District; Harold McVey, President, Concerned Citizens Against Pollution (CCAP); Dr. Frank Mann, Wharton County Citizens for a Clean Environment; Merrell Barfield, Wharton Chamber of Commerce; and 29 individuals presented oral comments. Sixteen commenters submitted written comments during the comment period which closed at 5:00 p.m., March 4, 2002. Written comments were submitted by Judge Sylvia; Bobby Burns; the Boling Independent School District (Boling ISD); Harold McVey, President, CCAP; the Office of Public Interest Counsel of the TNRCC (OPIC); Blackburn Carter, P.C. on behalf of CCAP (Blackburn Carter); the El Campo Chamber of Commerce and Agriculture; the Wharton Chamber of Commerce and Agriculture; and eight individuals.

RESPONSE TO COMMENTS

General - Support for Protective Standards

Judge Sylvia endorsed the requirement that an applicant conduct a thorough characterization of a salt dome to establish geologic suitability of the location. Judge Sylvia endorsed the most protective standards for salt dome disposal, and commented that disposal of any type of waste in salt domes should be very closely scrutinized, if not prohibited. An individual encouraged the commission to develop the rules so that they will be as stringent as necessary for no contamination to occur.

The commission agrees with these commenters. The commission has developed rules for salt dome disposal of nonhazardous waste to require that an applicant must demonstrate that the site is geologically suitable, that any proposed salt cavern disposal well must meet stringent construction standards, and that the design and operation of any project permitted by the commission must preclude the escape of hazardous constituents from the salt cavern injection zone. The commission has made no change to the proposed text in response to these comments.

General - Opposition to Salt Dome Disposal

Bobby Burns commented that the Board of Trustees of the Boling ISD expresses its strong and unanimous opposition to any waste disposal facility in the Boling area, and that the use of the salt dome formation in the area of Boling for a waste disposal well would be detrimental to the citizens of the Boling ISD. Among other concerns, the commenter stated that there would be substantial risk of fresh water pollution from seepage into groundwater, runoff, and spills; and that the people of the Boling ISD would be subjected to significant personal health risks from environmental pollution. This commenter opposed any facility that would propose to dispose of waste in a salt dome formation, and stated that the

Wharton County Commissioners Court is adamantly opposed to a waste disposal site in Wharton County. Many other commenters expressed opposition to a particular facility that would propose to dispose of waste in a salt dome formation. Judge Sylvia commented that, from a policy standpoint, Chambers County is opposed to any disposal of waste in salt dome caverns or sulphur mines. Mayor Follis and nine individuals commented that there should be no disposal of any type of waste in salt domes. Still other commenters, including the Boling ISD, provided comments concerning issues beyond the scope of this rulemaking, such as the effects that increased traffic resulting from a permitted facility may have on roads and surrounding communities.

The commission has made no changes to the proposed text in response to these comments. The commission has developed rules for salt dome disposal of nonhazardous waste to require that an applicant must demonstrate that the site is geologically suitable, that any proposed salt cavern disposal well must meet stringent construction standards, and that the design and operation of any project permitted by the commission must preclude the escape of hazardous constituents from the salt cavern injection zone. The commission notes that it is responding to public comments relating to the proposed rules, and is not responding to comments regarding whether or not a particular facility should be permitted or allowed, nor is it responding to comments which go beyond the scope of this rulemaking.

General - Opposition to Rule Amendments

An individual commented that no rule changes should be recommended or adopted.

The commission does not agree with this comment. First, the commission is required by HB 2912, §9.02, 77th Legislature, 2001, to prohibit, by rule, the storage, processing, or disposal of hazardous waste in a solution-mined salt dome cavern or a sulphur mine. The adopted amendment to §331.14 implements this legislation by creating new §331.14(b) to reflect the prohibition in THSC, §361.114. Other technical amendments to the rules are needed, as discussed earlier in this preamble.

General - Opposition to Executive Director Decision-Making Powers

Mayor Follis, Commissioner Reynolds, Dr. Frank Mann, Blackburn Carter, and 17 individuals commented that the executive director should not be given discretion under the rules to determine the adequacy of information which must be submitted in the technical report of the application, including information which must be submitted as part of demonstrating that the facility will meet the performance standard in §331.162 and the well construction standards under §331.163. These commenters objected to proposed provisions that give the executive director authorization to make decisions at his sole discretion, including the proposed provision which would allow the executive director to determine the lateral extent of the required surface-recorded 3-D seismic survey. Blackburn Carter commented that this judgment process involving the discretion of the executive director removes the basic characterization of the dome from the public eye, especially since the executive director has been removed as a required party to the public hearing process. Blackburn Carter also stated that demotion of the question of a 3-D seismic survey to the discretion of the executive director is a fundamental error, eliminates the degree of safety required, and thus will not be protective of public health, welfare, physical property, and the environment. An individual commented that the proposed rules essentially give the executive director full discretion in determining permitting requirements of

Class I injection wells, and objected to several provisions in the proposal which give the executive director discretionary or approval powers.

The commission does not agree with these comments and has made no changes to the proposed text in response to these comments. Review of a permit application by the executive director's staff is a crucial part of the permitting process. Texas Water Code (TWC), §27.013 already requires an underground injection control permit applicant to furnish "any information" the executive director considers necessary to discharge his duties under TWC, Chapter 27 and rules of the commission. Further, the authority to issue underground injection control (UIC) permits is vested with the *commission* under TWC, §27.011 and §27.051. In non-contested matters, the commission may delegate authority to the executive director to act on an application under TWC, §5.122. In contested matters, the commission may act on a permit application after consideration of information from the applicant, protestants, OPIC, and the executive director, and in cases referred to the State Office of Administrative Hearings, an administrative law judge. In a permit application contested hearing, the permit applicant has the burden of proof whether or not the executive director participates as a party in the hearing, and information relating to characterization of the dome can be explored in the hearing process.

General - Location Standard for Waste Injection Wells

Eight individuals commented that the rules should prohibit any waste injection well within five miles of a residential or commercial drinking water well. One of these commenters stated that the Chapter 331 Underground Injection Control rules provide no protection for the public in the event of an accidental contamination of an underground source of drinking water by an injection well permitted for the

purpose of disposing of solidified commercial industrial waste. CCAP commented that the rules should prohibit any injection well, permitted for the purpose of disposing of solidified commercial industrial waste, within a minimum three-mile lateral surface radius of a residential or commercial drinking water well, and that a five-mile buffer zone is more appropriate. CCAP also commented that, without an adequate buffer zone, lethal contaminants could be accidentally introduced into the underground source of drinking water and kill thousands before most citizens can be notified not to use water from their water wells.

The commission has made no change to the proposed text in response to these comments. The commission adopts these rules for salt dome disposal of nonhazardous waste to require that an applicant must demonstrate that the site is geologically suitable, that any proposed salt cavern disposal well must meet stringent construction standards, and that the design and operation of any project permitted by the commission must preclude the escape of hazardous constituents from the salt cavern injection zone. Therefore, a three- or five-mile buffer zone is not necessary to protect public health, safety, and the environment, nor is it specifically required by statute.

General - Preamble

An individual commented that Wharton County will see a drastic reduction of property value greater than 25%, and stated that if a waste injection site is permitted in the Boling area, residents will not be able to give their property away.

The commission does not agree with this comment. The commission has no evidence that the adoption of the proposed rules will result in a reduction of property value. These rules mainly

clarify the technical requirements and submissions for applications for authorization of waste disposal in a salt dome and implement the statutory prohibition of storage, processing, or disposal of hazardous waste in a solution-mined salt dome cavern or sulphur mine. Although the proposed rules affect the ability of an applicant to use real property for hazardous waste treatment, storage, and disposal in a solution-mined salt dome cavern or sulphur mine, the commission asserts that there are offsetting benefits to the value of real property because the possibility of property damage from this type of waste management technique is reduced. The commission has made no change to the proposed text in response to these comments.

Section 331.14 - Prohibition of Class I Cavern Solid Waste Disposal Wells and Associated Caverns in Geologic Structures or Formations Other Than Salt Stocks of Salt Domes and Prohibition of Disposal of Hazardous Waste into Certain Geological Formations

Judge Sylvia commented that Chambers County is very supportive of the proposed amendment to §331.14(b), which implements the statutory prohibition on the storage, processing, or disposal of hazardous waste in a solution-mined salt dome cavern or sulphur mine. Mayor Follis expressed full support for the rule prohibiting hazardous waste in salt domes. The Wharton Chamber of Commerce and Agriculture strongly opposed changes to the rule, but commented that it understood that HB 2912 prohibited hazardous waste in salt domes, including the Boling salt dome. The El Campo Chamber of Commerce and Agriculture stated that the Chamber Board of Directors and the county commissioners oppose the changes to the rule, and commented that the commission should enforce the code in accordance with the intent of the law passed by the Texas Legislature. Six individuals also expressed support for the hazardous waste prohibition, but opposed the other technical amendments to the rule as proposed.

The commission agrees with the comments supporting the rule implementing the statutory prohibition under HB 2912. The commission does not agree that other changes to the rule should not be made. The other rule amendments are needed to clarify the information required to establish the geologic suitability of a proposed location for a salt cavern disposal well. By order dated September 11, 2000, the commission directed the executive director to examine the issues in a petition for rulemaking which had been filed requesting revision of §331.121(d)(1) to clarify and amend the requirements for information necessary to establish the geologic suitability of a proposed site for a salt cavern Class I injection well, and to initiate rulemaking if deemed necessary. As a result of the examination, the executive director determined that the current requirements for the 3-D seismic survey were ambiguous, and amended rules were drafted.

The commission now adopts amendments and clarifications to §331.121(d)(1)(A), concerning establishing geologic suitability of proposed salt cavern locations. The commission also adopts reformatting changes to §331.121(d)(1)(A) to improve readability. Adopted §331.121(d)(1)(B) requires an applicant to submit a thorough characterization of the salt dome to establish the geologic suitability of the location, including a surface-recorded 3-D seismic survey, the lateral extent of which is to be determined by the executive director, which must provide information as part of demonstrating that the location is geologically suitable for the purpose of meeting the performance standard in §331.162. Other rule amendments are also needed to reinstate technical requirements administratively omitted in 1992, when the agency submitted the adopted rules to the Office of the Secretary of State. The commission has made no change to the proposed text in response to these comments.

Blackburn Carter commented that modifying and retaining hazardous waste rules for salt dome caverns is an effort to prepare the way for a repeal of the prohibition.

The commission has made no change to the proposed text in response to this comment. The standards for establishing the geologic suitability of a proposed location for salt cavern waste disposal were the same for both hazardous and nonhazardous waste. The rules referencing hazardous waste disposal in salt cavern disposal wells are primarily definitions of terminology or requirements that apply to hazardous constituents, which could be contained within nonhazardous waste, as well as hazardous waste. Deletion of these references to hazardous waste disposal in salt cavern disposal wells is not necessary to implement the intent of the legislation.

Blackburn Carter expressed support of the legislature's decision to prohibit the disposal of hazardous waste in salt dome caverns and would end the rulemaking with that prohibition language. This commenter also questioned that, if hazardous waste disposal is now to be prohibited, why have any rules at all, other than the prohibition? Blackburn Carter stated that it is clear that disposal of nonhazardous waste in caverns is a separate issue requiring careful consideration, not as an afterthought in a prohibition.

The commission has made no change to the proposed text in response to these comments. Along with implementing the legislation, the commission is using this rulemaking as an opportunity to reinstate technical requirements administratively omitted in 1992, and was doing so prior to the prohibition. Other amendments and clarifications are also needed as discussed previously in the preamble. Regarding rules for disposal of nonhazardous waste, Chapter 331, Subchapter J is

titled “Standards for Class I Salt Cavern Solid Waste Disposal Wells,” and these standards applied to both hazardous and nonhazardous waste disposal prior to the legislative prohibition of storage, processing, or disposal of hazardous waste in a solution-mined salt dome cavern or a sulphur mine. Because storage, processing, or disposal of nonhazardous waste in solution-mined salt dome caverns has not been prohibited, Subchapter J and other rules pertaining to waste disposal in salt cavern disposal wells must be retained.

An individual commented that the United States Environmental Protection Agency (EPA) adds new materials to its hazardous waste list, and noted that nonhazardous wastes injected into a salt cavern injection well today, could be on the EPA list of hazardous wastes next year.

The commission notes that this adoption implements the aforementioned statutory requirement, prohibiting the activities of storage, processing, or disposal of hazardous waste in a solution-mined salt dome cavern or a sulphur mine. If a waste material is listed by EPA as a hazardous waste, then storage, processing, or disposal of the hazardous waste in a solution-mined salt dome cavern or a sulphur mine is not authorized. It is not possible to know which nonhazardous wastes may be defined as hazardous wastes in the future. The commission does not interpret the statutory prohibition to apply retroactively to nonhazardous wastes that have already been disposed and subsequently listed as hazardous wastes. Therefore, the commission has made no changes to the proposed text in response to this comment.

Section 331.121 - Class I Wells

OPIC commented that the proposed rule change to §331.121 is not protective of human health and the environment, and recommended that the proposed rule change be withdrawn. OPIC further commented in the alternative, that if the proposed rule is adopted, certain changes to the language in §331.121(d)(1)(B) be made to more specifically describe the type of 3-D seismic survey to be required, and to remove the discretionary authority of the executive director to determine the lateral extent of the survey. OPIC also expressed the belief that a surface-recorded 3-D seismic grid survey sufficient to image underneath all suspected overhangs and delineate the edge of the salt stock is necessary in order to ensure compliance with the performance standard set forth in §331.162. Blackburn Carter also commented that the 3-D seismic requirement covering the cavern and the technically relevant edge should remain a part of the amended rules. This commenter maintained that salt domes are complex 3-D geologic structures that require a thorough 3-D characterization using state-of-the-art seismic technology as a basic framework, before consideration of the ultimate performance standard of no escape. Blackburn Carter noted that the realistic underlying concern and purpose for the previously existing rule is that some anomaly about the salt dome edge near the cavern area could threaten the integrity of the caverns, that this edge then becomes the focus of the investigation, and that to eliminate 3-D over the edge is folly. Blackburn Carter suggested that, at the least, the rules should require a 3-D seismic swath sufficiently wide to image the salt dome to the extent that the problems listed in the previously existing regulations are thoroughly investigated. Blackburn Carter also stated that the simplistic characterization suggested by the proposed rules is unacceptable, and that the proposed rule and discussion supporting it does not envision any 3-D seismic survey imaging the edge of a salt dome ever again.

The commission has made no changes to the proposed text in response to this comment, and does not agree that a surface-recorded 3-D seismic grid survey sufficient to image underneath all suspected overhangs and delineate the edge of the salt stock is necessary in every case to ensure compliance with the performance standard set forth in §331.162. The commission notes that the adopted rule requires a surface-recorded 3-D seismic survey which must provide information as part of demonstrating that the location is geologically suitable for the purpose of meeting the performance standard in §331.162, and requires that the lateral extent of the survey be determined by the executive director. The commission has determined that requiring in every situation a 3-D seismic grid survey sufficient to image underneath all suspected overhangs and delineate the edge of the salt stock is unnecessarily prescriptive. Such a requirement may be appropriate in certain cases, and in these cases, the commission anticipates that the executive director would require the appropriate, technically relevant, imaging to be performed.

The commission has determined that confirming the geologic suitability of a salt dome for the construction, operation, and closure of a solution-mined cavern to dispose of solid waste is a site-specific and ongoing process. Each salt dome is unique and will have its own individual shape, size, depth below ground level, movement through geologic history, exploration and development of natural resources, and a variety of other issues and concerns. The determination of geologic suitability is performed using a variety of geological and geophysical surveys such as gravity surveys, 2-D seismic, 3-D seismic, well logs, cores, and VSP to mention the most common. Each survey gives a unique piece of information that should be used in a collective manner to answer the overall question of geologic suitability. Furthermore, the review of geologic suitability does not end when a permit is issued. During the drilling of the pilot well-bore and construction of the

cavern, surveys are being taken (conventional cores, geophysical logs, sonar surveys, etc.) and evaluated, providing additional information. As provided in §331.163(i), the permittee must submit information collected during construction of the well to obtain the executive director's approval after completion of the well construction stage before cavern construction can begin. Likewise, §331.164(f) requires the permittee to obtain the executive director's approval after completion of the cavern construction stage prior to waste emplacement. Further, during operation of the facility, if information submitted to the executive director indicates loss of mechanical integrity, the executive director could require the permittee to properly plug and abandon the pilot well-bore and cavern (refer to §331.4). Last, the commission notes that under existing §331.121(a)(5), the commission shall consider any additional information required by the executive director for the evaluation of the proposed injection well before issuing a Class I injection well permit. This allows the executive director to require submittal of any information necessary to establish geologic suitability.

Blackburn Carter commented that, under proposed §331.121(d)(1)(A)(ii), an applicant must use some combination of measurements to “demonstrate the existence of 500 feet between the boundaries of the proposed salt cavern injection zone and the boundaries of the salt stock.” This commenter expressed concern that the 500-foot requirement will become a performance standard, stated that this setback requirement is far too close for a general preliminary characterization of the geology, and further stated that it is an arbitrary number that fails to recognize the uniqueness of each salt dome. An individual commented that the proposal requires the cavern to be 500 feet from the edge of the salt dome, and stated that this distance should be at least 3,000 feet.

The commission has made no change to the proposed text in response to these comments.

Proposed §331.121(d)(1)(A)(ii) is a restatement of §331.164(b)(1), relating to cavern construction standards, which requires an applicant to demonstrate that there is a minimum distance of 500 feet between the salt cavern injection zone and the boundaries of the salt stock in all directions (i.e., top, bottom, and sides). The commission notes that agency staff has studied the subject of the appropriate placement of salt caverns with regard to the edge of the salt stock, and further notes that this industry is well established, dating back to the 1940's in this country. The United States has over 1,000 solution-mined salt caverns, most of which are located in Texas. Past operational history and studies in salt rock mechanics indicate that a value of 300 feet is a typical guideline for the separation between a cavern wall and the nearest salt edge. The commission has increased the setback to require a minimum distance of 500 feet between the salt cavern injection zone and the boundaries of the salt stock. The salt cavern injection zone includes the cavern, the disturbed salt zone surrounding the cavern, and a buffer zone of undisturbed salt. Published work on the 300-foot setback can be found in the literature involving the design of the Strategic Petroleum Reserve (SPR) caverns. These SPR caverns are used to store the nation's oil reserves. Also, permitted salt dome caverns in Louisiana typically require a minimum of 300 feet into the salt with the final casing string.

Blackburn Carter and 14 individuals commented that the rule concerning the 3-D seismic survey requirement should not be changed. Five individuals commented that the 3-D seismic survey should be conducted over the entire salt dome.

The commission does not agree with these comments. The commission has determined that the previously existing 3-D seismic survey requirement is flawed and ambiguous. One possible interpretation of the previously existing requirement could be to require the 3-D seismic survey to only image all suspected overhangs and the edge of the salt stock. The previously existing rule does not mention or include the top of the salt stock, which is the site for proposed caverns. In essence, this interpretation would result in a 3-D seismic survey shaped like a doughnut with the hole, for which there would be no data, being the top of the salt dome and the cake, or the seismic image, being the salt edge, including any overhangs. The commission cannot conclude it was the intention of the original rule writers for the 3-D seismic survey to have these limitations.

Others may interpret the previously existing rule language to mean a 3-D seismic survey must cover the entire dome (top and sides) and nothing less. However, the commission has determined that the need for a 3-D seismic survey over an entire dome should be determined on a case-by-case basis. Such a case could involve salt domes limited in areal extent or where the number and placement of proposed caverns in relation to the salt edge would make this prudent. The commission does not agree that full 3-D seismic coverage over all targeted salt domes for proposed waste disposal caverns be an absolute. For example, some salt domes are very large in areal extent, and with proposed caverns located in the middle of such domes, excluding any other geologic concerns, a 3-D seismic survey over the entire dome may not be warranted, especially if there is other data (logs, core, 2-D seismic, gravity surveys, etc.) to support this decision.

Blackburn Carter supported the language of the previously existing 3-D seismic requirement, quoting Dr. Bob Hardage, a geophysicist of the Texas Bureau of Economic Geology (BEG), as follows, at that

time (1992), “He recommended that the regulations specify a surface recorded three-dimensional seismic grid survey sufficient to image underneath all suspected overhangs....” Blackburn Carter stated that the question of the specifics of a survey was considered then, and the wisdom of the recommendation is not questioned now; that nothing has changed; and that Dr. Hardage still advocates 3-D seismic for imaging underneath suspected overhangs. Blackburn Carter referred to the commission’s order denying the Hunter Industrial Facilities, Inc. (HIFI) application and stated that mapping the salt stock edge substituting a combination of 2-D seismic, drill logs, and gravity survey coverage has already been considered and rejected by the commission. Blackburn Carter commented that the commissioners found that the imprecision offered by this combination was inexcusable in light of the protection demanded by the rules.

The commission agrees with Blackburn Carter, Dr. Hardage, and the commission order denying the HIFI applications if the purpose or objective of a 3-D seismic survey is needed to image the salt dome edge and overhangs. The commission acknowledges that a 3-D seismic survey would be an excellent choice for such an undertaking, especially when existing data is limited. However, some salt domes may not have overhangs. Therefore, a 3-D seismic requirement restricted only to this purpose would greatly limit the usefulness of the 3-D seismic survey. The commission has made no change to the proposed text in response to these comments.

Although Blackburn Carter supported the previously existing seismic rule language, they favor the interpretation or amended rule, “The 3-D seismic requirement covering the caverns and technically relevant edge.”

The commission has determined that for all proposed waste disposal cavern locations, the 3-D seismic survey should cover the area of the cavern locations, and the lateral extent, or how far and in what direction the survey reaches, will be determined by the executive director. Factors involved in determining the lateral extent of the 3-D seismic survey may include a number of geologic concerns such as: the proximity of the salt edge, overhangs, faults, subsidence, or the existence of a minimum distance of 500 feet between the cavern injection zone and the edge of the salt stock.

By incorporating by reference their comments to the previously proposed (March 2001) salt cavern rules, Blackburn Carter commented that the commission should not lower its standards for establishing geologic suitability for the benefit of one applicant.

The commission disagrees that the adoption represents a lowering of standards for establishing geologic suitability. Furthermore, the amendments are being adopted, as explained earlier in this preamble, in response to a petition for rulemaking and the executive director's determination that amendment of the rule is needed. The amendments are being made primarily to clarify requirements, eliminate unnecessarily prescriptive language relating to the requirement for a 3-D seismic survey, and relate the demonstrations required in a permit application to the geologic suitability of a specific site, to ensure there will be no release of hazardous constituents from any proposed salt cavern injection zone. The commission adopts these amendments to make the rules more reasonable and equally protective.

Blackburn Carter commented that it is clear that the immense value of a comprehensive 3-D seismic survey is recognized by all stakeholders. This commenter stated that the clause "...lateral extent of which is to be determined by the executive director" means that the executive director may reduce the survey to the point where the information envisioned by the logic of the rule is obviated. Along with this comment, Blackburn Carter cited the preamble to the previously existing salt dome cavern rules which were published in the *Texas Register* on June 5, 1992 (17 TexReg 4098 - 4106); statements from Dr. Bob Hardage of the BEG; minutes of the May 8, 1992 commissioner agenda pertaining to the HIFI application; the Proposal for Decision from the HIFI contested case hearing; professional journals, such as *Geophysics*; and a BEG publication characterizing the Boling salt dome.

The commission has determined that the adopted rule supports the value of 3-D seismic survey data by making it mandatory and by requiring it as part of demonstrating that the location is geologically suitable for the purpose of meeting the performance standard. A minimal survey (i.e., lateral extent of zero as mentioned in Blackburn Carter's comments) 3-D seismic survey clearly would not meet the requirements of adopted §331.121(d)(1)(B)(ii). The executive director has the authority to require 3-D seismic survey data, to whatever extent is necessary, to establish the geologic suitability of a proposed site.

With reference to §331.121(d)(1)(A)(ii) which requires the applicant to demonstrate the existence of a minimum distance of 500 feet between the boundaries of the proposed salt cavern injection zone and the boundaries of the salt stock, Blackburn Carter commented that this is another plan for executive director discretion with the goal of only assuring an arbitrary 500-foot distance necessary to meet the requirement. Blackburn Carter stated that this is no longer described as the performance standard, but

it will serve as the de facto limit of what is to be required of the applicant. Blackburn Carter expressed the belief that the setback requirement is far too close for a general preliminary characterization of the geology. Blackburn Carter proposed, in the alternative, that the 3-D seismic survey required over the technically relevant portion of the dome must assure a setback of a reasonable distance into realistically pure salt as a part of the application. This commenter also asserted that the assurance of 500 feet of salt should be new information developed from a specific survey at a borehole at each individual salt cavern.

The commission does not agree with these comments. Adopted §331.121(d)(1)(A)(ii) quotes the cavern construction standard stated in §331.164(b)(1) to emphasize that the ability of the proposed site to meet that standard must be demonstrated as a part of establishing geologic suitability prior to permitting. The commission considers it unnecessary to prescribe a specific method to achieve this demonstration. The importance of demonstrating that the location is geologically suitable for the purpose of meeting the performance standard in §331.162 is not reduced by restating the cavern construction standard as one component of the demonstration. Regarding Blackburn Carter's alternative proposal, a setback of a reasonable distance into realistically pure salt would be part of demonstrating the geologic suitability of a proposed site.

Section 331.163 - Well Construction Standards

Blackburn Carter commented, regarding the requirement for a VSP, that a three-component VSP survey at each cavern location performed to image the three-dimensional salt sediment interface at the technically relevant salt dome edge should be a required part of the permit process. Six individuals commented that they did not agree with the proposed rule simply stating that a VSP is required. One of

the individuals commented that the proposed rule would allow the permittee to decide what VSP is to be used. Blackburn Carter also commented that the new VSP rule involves neither specifications nor a performance standard objective and, as such, it becomes another means to avoid doing the quality work necessary to meet the requirements of an ultimate performance standard.

The commission has made no change to the proposed text in response to these comments. The previously existing VSP requirement (adopted by the commission in 1992, but inadvertently omitted from the official version of the rules), a downhole three-component offset VSP to be analyzed to depict the 3-D nature of the salt-sediment interface, was adopted from the recommendation of Dr. Hardage, and the commission agrees with this language when the objective or purpose of the VSP is to image the salt-sediment interface, if this is the technically relevant concern. However, the commission has determined that, like the 3-D seismic survey, the objective of a required VSP can be different at individual salt domes and different for caverns within the same salt dome. The commission asserts that flexibility is needed to determine what geologic concern or concerns should be the focus of a VSP and to determine the type or field geometry (e.g., zero offset, offset, and walk-away) of the VSP.

The commission notes that VSPs are performed for different objectives. The most popular and traditional VSP is a zero-offset VSP to “tie” or correlate logs, recorded in depth, with surface seismic data recorded in time. More specifically, the VSP would correlate the electric logs and core taken at the cavern location with the 3-D seismic survey recorded over the cavern area location. Another situation may need an offset VSP to image an overhang, a salt-sediment interface, or confirm continuous salt between the survey points. Lastly, an extreme case could

involve an offset walk-away survey to give several planes of image instead of one plane as provided by zero-offset and offset VSPs. The amended VSP requirement in §331.163(e)(1)(F) provides the flexibility, subject to the executive director's approval, to determine the objective and type of survey needed on a case-by-case basis. If needed at a given site, the adopted rule does not preclude the executive director requiring a downhole three-component offset VSP to be analyzed to depict the 3-D nature of the salt-sediment interface as stated in the originally adopted (1992) version of the rules.

Blackburn Carter pointed out that the present VSP rule is not found at the Secretary of State's website, and is not found in the current printed version of the rules and that the proposed rule does not contain the parenthetic old rule that is to be replaced. Blackburn Carter further stated that an examination of the VSP rule was included in the Order denying the HIFI application, and that the commission found that VSP is an independent requirement to be accomplished before a permit is granted, and thus should be considered as part of an administrative hearing.

The commission has made no change to the proposed text in response to these comments. As explained in the preamble for the proposed rule, the adopted amendments to §331.161 and §331.163 are revisions which were inadvertently omitted, through an administrative error, when the agency originally submitted these rules to the Office of the Secretary of State in 1992. Thus, these amendments are not part of the official, published rules existing prior to this adoption under Texas Government Code, §2001.037. In reviewing the text in the commission order referenced by Blackburn Carter, the commission notes that the adopted rule is consistent with the commission's statements in the 1993 Order that the burden of proof is on the applicant to establish a thorough

geologic characterization of the salt dome, prior to permitting, as part of demonstrating that it can achieve the no-escape performance standard under §331.162.

An individual commented, with regard to the surface-casing requirements, that the commission could not guarantee that any such structure is going to contain whatever is disposed for any certain number of years or period of time, and asked how long a period of time is the life of the well and the post-closure care period. Another individual commented that it is unclear how long a period of time the life expectancy of the well and the post-closure care period is. Another individual provided anecdotal comments about a brine solution-mining well in which the casing failed, resulting in releases of brine, and questioned how serious this failure would have been in the case of a Class I injection well.

For each proposed salt cavern waste disposal well, the engineering design of the well and cavern are evaluated to establish that the design, construction, and operation of the facility will comply with existing Class I waste disposal well and salt cavern disposal well construction standards to preclude the escape of waste from the salt cavern injection zone. The life expectancy of a well and the post-closure care period are established on a case-by-case basis for each well or site. Prior to permitting, each proposed project must demonstrate that it will comply with the standards in the existing rules for all stages of the project, construction, operation, maintenance, monitoring, closure, and post-closure care. As stated in the preamble to this rulemaking, the adopted pressure testing requirement for surface casing was amended in response to comments made in 1992 to specify a more commonly accepted engineering practice. The commission has made no change to the proposed text in response to these comments.

SUBCHAPTER A: GENERAL PROVISIONS

§331.14

STATUTORY AUTHORITY

The amendment is adopted under Texas Water Code (TWC), §5.103, which provides the commission authority to adopt any rules necessary to carry out its powers and duties under this code and other laws of this state and to adopt rules when adopting, repealing, or amending any agency statement of general applicability that interprets or prescribes law or policy, or describes the procedure or practice requirements of an agency; §5.105, which authorizes the commission to establish and approve all general policy of the commission by rule; §27.019, which requires the commission to adopt rules reasonably required for the regulation of injection wells; and THSC, §336.114, which requires the commission to prohibit by rule the storage, processing, or disposal of hazardous waste in a solution-mined salt dome cavern or a sulphur mine.

§331.14. Prohibition of Class I Salt Cavern Solid Waste Disposal Wells and Associated Caverns in Geologic Structures or Formations Other Than Salt Stocks of Salt Domes and Prohibition of Disposal of Hazardous Waste into Certain Geological Formations.

(a) Construction and operation of Class I salt cavern solid waste disposal wells and associated caverns in geologic structures or formations other than salt stocks of salt domes is prohibited until such time at which this section is amended to provide for authorization of such facilities and activities, and specific rules for such facilities and activities are promulgated.

(b) Notwithstanding any provision to the contrary in this chapter, Chapter 335 of this title (relating to Industrial Solid Waste and Municipal Hazardous Waste), or any other chapter of this title, the storage, processing, or disposal of hazardous waste in a solution-mined salt dome cavern or a sulphur mine is prohibited.

SUBCHAPTER G: CONSIDERATION PRIOR TO PERMIT ISSUANCE

§331.121

STATUTORY AUTHORITY

The amendment is adopted under TWC, §5.103, which provides the commission authority to adopt any rules necessary to carry out its powers and duties under this code and other laws of this state and to adopt rules when adopting, repealing, or amending any agency statement of general applicability that interprets or prescribes law or policy, or describes the procedure or practice requirements of an agency; §5.105, which authorizes the commission to establish and approve all general policy of the commission by rule; §27.019, which requires the commission to adopt rules reasonably required for the regulation of injection wells; and THSC, §336.114, which requires the commission to prohibit by rule the storage, processing, or disposal of hazardous waste in a solution-mined salt dome cavern or a sulphur mine.

§331.121. Class I Wells.

(a) The commission shall consider the following before issuing a Class I Injection Well Permit:

(1) all information in the completed application for permit;

(2) all information in the Technical Report submitted with the application for permit in accordance with §305.45(a)(8) of this title (relating to Contents of Application for Permit) including, but not limited to:

(A) a map showing the location of the injection well for which a permit is sought and the applicable area of review. Within the area of review, the map must show the number, or name, and location of all producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, mines (surface and subsurface), quarries, water wells, and other pertinent surface features, including residences and roads. The map should also show faults, if known or suspected. Only information of public record is required to be included on this map;

(B) a tabulation of all wells within the area of review which penetrate the injection zone or confining zone, and for salt cavern disposal wells, the salt cavern injection zone, salt cavern confining zone and caprock. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of plugging and/or completion, and any additional information the executive director may require;

(C) the protocol followed to identify, locate, and ascertain the condition of abandoned wells within the area of review which penetrate the injection or the confining zones;

(D) maps and cross-sections indicating the general vertical and lateral limits of underground sources of drinking water (USDWs) and freshwater aquifers, their positions relative to the injection formation and the direction of water movement, where known, in each USDW or freshwater aquifer which may be affected by the proposed injection;

(E) maps, cross-sections, and description of the geologic structure of the local area;

(F) maps, cross-sections, and description of the regional geologic setting;

(G) proposed operating data:

(i) average and maximum daily injection rate and volume of the fluid or waste to be injected over the anticipated life of the injection well;

(ii) average and maximum injection pressure;

(iii) source of the waste streams;

(iv) an analysis of the chemical and physical characteristics of the waste streams;

(v) for salt cavern waste disposal, the bulk waste density, permeability, porosity, and compaction rate, as well as the individual physical characteristics of the wastes and transporting media;

(vi) for salt cavern waste disposal, the results of tests performed on the waste to demonstrate that the waste will remain solid under cavern conditions; and

(vii) any additional analyses which the executive director may reasonably require;

(H) proposed formation testing program to obtain an analysis of the chemical, physical, and radiological characteristics of formation fluids, and other information on the injection zone and confining zone;

(I) proposed stimulation program, if needed;

(J) proposed operation and injection procedures;

(K) engineering drawings of the surface and subsurface construction details of the system;

(L) contingency plans, based on a reasonable worst case scenario, to cope with all shut-ins; loss of cavern integrity, or well failures so as to prevent migration of fluid into any USDW;

(M) plans (including maps) for meeting the monitoring requirements of this chapter, such plans shall include all parameters, test methods, sample methods, and quality assurance procedures necessary and used to meet these requirements;

(N) for wells within the area of review which penetrate the injection zone or confining zone but are not adequately constructed, completed, or plugged, the corrective action proposed to be taken;

(O) construction procedures including a cementing and casing program, contingency cementing plan for managing lost circulation zones and other adverse subsurface conditions, well materials specifications and their life expectancy, logging procedures, deviation checks, and a drilling, testing, and coring program;

(P) delineation of all faults within the area of review, together with a demonstration, unless previously demonstrated to the commission or to the United States Environmental Protection Agency, that the fault is not sufficiently transmissive or vertically extensive to allow migration of hazardous constituents out of the injection zone;

(3) whether the applicant will assure, in accordance with Chapter 37, Subchapter Q of this title (relating to Financial Assurance for Underground Injection Control Wells), the resources necessary to close, plug, abandon, and if applicable, provide post-closure care for the well and/or waste disposal cavern as required;

(4) the closure plan, corrective action plan, and post-closure plan submitted in the technical report accompanying the permit application;

(5) any additional information required by the executive director for the evaluation of the proposed injection well.

(b) In determining whether the use or installation of an injection well is in the public interest under Texas Water Code, §27.051(a)(1), the commission shall also consider:

(1) the compliance history of the applicant in accordance with Texas Water Code, §27.051(e) and §281.21(d) of this title (relating to Draft Permit, Technical Summary, Fact Sheet, and Compliance Summary);

(2) whether there is a practical, economic and feasible alternative to an injection well reasonably available to manage the types and classes of hazardous waste;

(3) if the injection well will be used for the disposal of hazardous waste, whether the applicant will maintain liability coverage for bodily injury and property damage to third parties that is caused by sudden and nonsudden accidents in accordance with Chapter 37 of this title (relating to Financial Assurance); and

(4) that any permit issued for a Class I injection well for disposal of hazardous wastes generated on site requires a certification by the owner or operator that:

(A) the generator of the waste has a program to reduce the volume or quantity and toxicity of such waste to the degree determined by the generator to be economically practicable; and

(B) injection of the waste is that practicable method of disposal currently available to the generator which minimizes the present and future threat to human health and the environment.

(c) The commission shall consider the following minimum criteria for siting before issuing a Class I injection well permit.

(1) All Class I injection wells shall be sited such that they inject into a formation that is beneath the lowermost formation containing, within 1/4 mile of the wellbore, a USDW or freshwater aquifer.

(2) The siting of Class I injection wells shall be limited to areas that are geologically suitable. The executive director shall determine geologic suitability based upon:

(A) an analysis of the structural and stratigraphic geology, the hydrogeology, and the seismicity of the region;

(B) an analysis of the local geology and hydrogeology of the well site, including, at a minimum, detailed information regarding stratigraphy, structure, and rock properties, aquifer hydrodynamics, and mineral resources; and

(C) a determination that the geology of the area can be described confidently and that limits of waste fate and transport can be accurately predicted through the use of analytical and numerical models.

(3) Class I injection wells shall be sited such that:

(A) the injection zone has sufficient permeability, porosity, thickness, and areal extent to prevent migration of fluids into USDWs or freshwater aquifers;

(B) the confining zone:

(i) is laterally continuous and free of transecting, transmissive faults or fractures over an area sufficient to prevent the movement of fluids into a USDW or freshwater aquifer;
and

(ii) contains at least one formation of sufficient thickness and with lithologic and stress characteristics capable of preventing initiation and/or propagation of fractures.

(4) The owner or operator shall demonstrate to the satisfaction of the executive director that:

(A) the confining zone is separated from the base of the lowermost USDW or freshwater aquifer by at least one sequence of permeable and less permeable strata that will provide an added layer of protection for the USDW or freshwater aquifer in the event of fluid movement in an unlocated borehole or transmissive fault; or

(B) within the area of review, the piezometric surface of the fluid in the injection zone is less than the piezometric surface of the lowermost USDW or freshwater aquifer,

considering density effects, injection pressures, and any significant pumping in the overlying USDW or freshwater aquifer; or

(C) there is no USDW or freshwater aquifer present;

(D) the commission may approve a site which does not meet the requirements in subparagraphs (A), (B), or (C) of this paragraph if the owner or operator can demonstrate to the commission that because of the geology, nature of the waste, or other considerations, that abandoned boreholes or other conduits would not cause endangerment of USDWs, and fresh or surface water.

(d) The commission shall also consider the following additional information, which must be submitted in the technical report of the application as part of demonstrating that the facility will meet the performance standard in §331.162 of this title (relating to Performance Standard), before issuing a salt cavern Class I injection well permit:

(1) a thorough characterization of the salt dome to establish the geologic suitability of the location, including:

(A) data and interpretation from all appropriate geophysical methods (such as well logs, seismic surveys, and gravity surveys), subject to the approval of the executive director, necessary to:

(i) map the overall geometry of the salt dome, including all edges and any suspected overhangs of the salt stock;

(ii) demonstrate the existence of a minimum distance of 500 feet between the boundaries of the proposed salt cavern injection zone and the boundaries of the salt stock;

(iii) define the composition and map the top and thickness of the sedimentary rock units between the caprock and surface, including the flanks of the salt stock;

(iv) define the composition and map the top and thickness of the caprock overlying the salt stock;

(v) map the top of the salt stock;

(vi) calculate the movement and the salt loss rate of the salt stock;

(vii) define any other caverns and other uses of the salt dome, and address any conditions that may result in potential adverse impact on the salt dome; and

(viii) satisfy any other requirement of the executive director necessary to demonstrate the geologic suitability of the location;

(B) a surface-recorded three-dimensional seismic survey, subject to the following minimum requirements:

(i) the lateral extent of the survey will be determined by the executive director; and

(ii) the survey must provide information as part of demonstrating that the location is geologically suitable for the purpose of meeting the performance standard in §331.162 of this title;

(C) identification of any unusual features, such as depressions or lineations observable at the land surface or within or detectable within the subsurface, which may be indicative of underlying anomalies in the caprock or salt stock, which might affect construction, operation, or closure of the cavern;

(D) the petrology of the caprock, salt stock, and deformed strata; and

(E) for strata surrounding the salt stock, information on their nature, structure, hydrodynamic properties, and relationships to USDWs, including a demonstration that the proposed salt cavern injection zone will not be in or above a formation which within 1/4 mile of the salt cavern injection zone contains a USDW;

(2) establishment of a pre-development baseline for subsidence and groundwater monitoring, over the area of review;

(3) characterization of the predicted impact of the proposed operations on the salt stock, specifically the extent of the disturbed zone;

(4) demonstration of adequate separation between the outer limits of the injection zone and any other activities in the domal area. The thickness of the disturbed zone, as well as any additional safety factors will be taken into consideration; and

(5) the commission will consider the presence of salt cavern storage activities, sulfur mining, salt mining, brine production, oil and gas activity, and any other activity which may adversely affect or be affected by waste disposal in a salt cavern.

(e) Information requirements for Class I hazardous waste injection well permits.

(1) The following information is required for each active Class I hazardous waste injection well at a facility seeking an underground injection control permit:

(A) dates well was operated; and

(B) specification of all wastes that have been injected in the well, if available.

(2) The owner or operator of any facility containing one or more active hazardous waste injection wells must submit all available information pertaining to any release of hazardous waste or constituents from any active hazardous waste injection well at the facility.

(3) The owner or operator of any facility containing one or more active Class I hazardous waste injection wells must conduct such preliminary site investigations as are necessary to determine whether a release is occurring, has occurred, or is likely to have occurred.

(f) Interim Status under the RCRA for Class I hazardous waste injection wells. The minimum state standards which define acceptable injection of hazardous waste during the period of interim status are set out in this chapter. The issuance of an underground injection well permit does not automatically terminate RCRA interim status. A Class I well's interim status does, however, automatically terminate upon issuance of a RCRA permit for that well, or upon the well's receiving a RCRA permit-by-rule under §335.47 of this title (relating to Special Requirements for Persons Eligible for a Federal Permit by Rule). Thus, until a Class I well injecting hazardous waste receives a RCRA permit or RCRA permit-by-rule, the well's interim status requirements are the applicable requirements imposed under this chapter, including any requirements imposed in the UIC permit.

(g) Before issuing a permit for a hazardous waste injection well in a solution-mined salt dome cavern, the commission by order must find that there is an urgent public necessity for the hazardous waste injection well. The commission, in determining whether an urgent public necessity exists for the permitting of the hazardous waste injection well in a solution-mined salt dome cavern, must find that:

(1) the injection well will be designed, constructed, and operated in a manner that provides at least the same degree of safety as required of other currently operating hazardous waste disposal technologies;

(2) consistent with the need and desire to manage the state hazardous wastes generated in the state, there is a substantial or obvious public need for additional hazardous waste disposal capacity and the hazardous waste injection well will contribute additional capacity toward servicing that need;

(3) that the injection well will be constructed and operated in a manner so as to safeguard public health and welfare and protect physical property and the environment;

(4) the applicant has demonstrated that groundwater and surface waters, including public water supplies, will be protected from the release of hazardous waste from the salt dome waste containment cavern; and

(5) any other criteria required by the commission to satisfy that the test of urgency has been met.

**SUBCHAPTER J: STANDARDS FOR CLASS I SALT CAVERN SOLID WASTE
DISPOSAL WELLS**

§331.161, §331.163

STATUTORY AUTHORITY

The amendments are adopted under TWC, §5.103, which provides the commission authority to adopt any rules necessary to carry out its powers and duties under this code and other laws of this state and to adopt rules when adopting, repealing, or amending any agency statement of general applicability that interprets or prescribes law or policy, or describes the procedure or practice requirements of an agency; §5.105, which authorizes the commission to establish and approve all general policy of the commission by rule; and §27.019, which requires the commission to adopt rules reasonably required for the regulation of injection wells.

§331.161. Applicability.

The sections of this subchapter apply to all Class I salt cavern solid waste disposal wells and their associated salt caverns located in the salt stocks of salt domes, and not to such facilities in horizontally bedded or non-domal salt. As provided by §331.14 of this title (relating to Prohibition of Class I Salt Cavern Solid Waste Disposal Wells and Associated Caverns in Geologic Structures or Formations Other Than Salt Stocks of Salt Domes and Prohibition of Disposal of Hazardous Waste into Certain Geological Formations), salt cavern solid waste disposal wells and associated caverns in geologic structures or formations other than salt stocks of salt domes are prohibited until such time at which §331.14 of this title and this subchapter are amended to allow the subject facilities, and any

necessary specific rules for such facilities are added by amendment to this subchapter or promulgated as a new subchapter.

§331.163. Well Construction Standards.

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

(b) Casing and cementing.

(1) All Class I salt cavern disposal wells shall be cased and all casings which extend to the surface shall be cemented to the surface to prevent the movement of fluids and waste into or between underground sources of drinking water (USDWs) or freshwater aquifers, and to prevent potential leaks of fluids and waste from the well. Cementing shall be by the pump and plug or other method approved by the commission, and cement circulated shall be of a volume equivalent to at least 120% of the calculated volume needed to fill the annular space between the hole and casing and between casing strings to the surface of the ground. Circulation of cement may be accomplished by staging. The executive director may approve an alternative method of cementing in cases where the cement cannot be recirculated to the surface, provided the owner or operator can demonstrate by using logs that the cement is continuous or does not allow any fluid and waste movement behind the well

casings. 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.

(A) Surface casing shall be set to a minimum subsurface depth, as determined by the executive director, which extends into a confining bed below the lowest formation containing a USDW or freshwater aquifer.

(B) At least one string of intermediate casing, using a sufficient number of centralizers, shall extend at least 100 feet into the salt stock.

(C) At least one long string casing, using a sufficient number of centralizers, shall extend into the salt stock, to the following depths, whichever is greater:

(i) 500 feet into the salt stock; or

(ii) 500 feet below any rock type of recognizable thickness as determined by logging, which is different from salt, and that is hydraulically connected to formations outside the salt stock. For the purposes of this rule, all rock types of recognizable thickness on logs which are different from salt shall be assumed to be in hydraulic connection unless demonstrated otherwise.

(2) 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; and
- (J) quantity and chemical composition of the injected fluid;

(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.

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

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

(2) All injection of waste into a salt cavern shall be performed through the inner tubing with a packer to seal the annulus between the tubing and long string casing near the bottom of the long string casing.

(d) Well annulus system factors for consideration. All elements of the design of the well's tubing-long string casing annulus system, including the outer tubing and packer, shall be approved by permit or by the executive director's approval that any proposed modifications to the plans and specifications in the permit application will provide protection equivalent to or greater than the original plans and specifications. In determining and specifying requirements for a tubing and packer system, the following factors shall be considered:

(1) depth of setting;

- (2) characteristics of injection fluid and waste;
- (3) injection pressure;
- (4) annular pressure;
- (5) rate, temperature, and volume of injected fluid;
- (6) size of casing; and
- (7) tensile, burst, and collapse strengths of the tubing.

(e) 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. A minimum of 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 for all formations overlying the caprock;

(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;

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

(F) a vertical seismic profile.

(2) Pressure tests.

(A) After installation and cementing of casings, and prior to 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 prior to 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) Full-hole continuous cores shall be taken beginning at the top of the caprock, or if caprock is not encountered, from the top of the salt stock, to a total investigated depth of 1,000 feet below the intended cavern floor. Cores shall be analyzed at sufficient frequency to provide representative data for the caprock, salt cavern confining zone, and the salt cavern injection zone, including permeability, porosity, bulk density, compressive strength (uniaxial), shear strength (triaxial), water content, and compatibility with permitted waste material. The full-hole, continuous cores shall be photographed for permanent records. The photographs of the cores shall be submitted to the commission as a part of the well completion report as required by §331.167(a)(1) of this title (relating to Reporting Requirements). The cores shall be archived at a facility approved by the executive director. The photos and cores will be maintained as public records.

(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.

(C) Prior to commencement of injection for cavern construction, the pilot hole or core hole shall be filled with salt-saturated cement from total investigated depth back to the designed depth of the salt cavern floor.

(4) Well integrity testing. The mechanical integrity of a well must be demonstrated prior to 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.

(f) **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 (API), the American Society for Testing Materials (ASTM), or comparable standards acceptable to the executive director.

(g) **Surface facilities.**

(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) Surface facilities, 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.

(h) Construction supervision. All phases of well construction and all phases of any well workover shall be supervised by a professional engineer, with current registration pursuant to the Texas Engineering 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.

(i) Approval of completion of the well construction stage. Prior to beginning cavern construction, 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 professional engineer with current registration pursuant to the Texas Engineering Practice Act:

(1) final construction, "as-built" plans and specifications, reservoir data, and an evaluation of the considerations set out in §331.45(1) 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;

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