MEMORANDUM

TO: Chairman Christi Craddick
    Commissioner David Porter
    Commissioner Barry T. Smitherman

FROM: Cristina Self, Attorney—General Counsel Section
      Office of General Counsel

THROUGH: Lindil C. Fowler, General Counsel

DATE: October 21, 2014

SUBJECT: Adoption of amendments to 16 Tex. Admin. Code §3.9, relating to Disposal Wells, and §3.46, relating to Fluid Injection into Productive Reservoirs; Oil & Gas Docket No. 20-0290951.

Attached is Staff's recommendation to adopt certain amendments to 16 Tex. Admin. Code §3.9, relating to Disposal Wells, and §3.46, relating to Fluid Injection into Productive Reservoirs. These amendments incorporate requirements related to seismic events in connection with disposal well permits, monitoring, and reporting.

On August 12, 2014, the Commission approved the publication of the proposed amendments in the Texas Register for a 30-day public comment period, which ended on September 29, 2014. The Commission received multiple public comments on the proposal. These comments are addressed beginning on the second page of the adoption preamble in your notebook materials.

Staff recommends that the Commission adopt these amendments with certain changes to the proposed text published in the August 29, 2014, issue of the Texas Register (39 TexReg 6775), as described in the attached recommendation.

cc: Gil Bujano, Director — Oil & Gas Division
    Craig Pearson, Acting Deputy Director — Oil & Gas Division
    Milton Rister, Executive Director
    Leslie Savage, Chief Geologist — Oil & Gas Division
    Wei Wang, Chief Financial Officer
The Railroad Commission of Texas (Commission) adopts amendments to §3.9 and §3.46, relating to Disposal Wells, and Fluid Injection into Productive Reservoirs, with changes from the proposed text published in the August 29, 2014, issue of the Texas Register (39 TexReg 6775). The adopted amendments incorporate requirements related to seismic events in connection with disposal well permits, monitoring and reporting.

SUMMARY OF CHANGES FROM THE PROPOSAL LANGUAGE

As proposed, the Commission would have required that applicants for disposal well permits provide with the application the results of a calculation of the estimated five pounds per square inch (psi), 10 year pressure front boundary and use that area to determine whether or not there has been historic seismic activity. In response to comments, the Commission agrees that, in many instances, the assumptions and approximations used by applicants in such calculations would be highly interpretive and difficult for many operators to obtain, particularly for applicants proposing to dispose into non-productive formations. As a result, the results from such calculations could be non-uniform and misleading.

Therefore, the Commission is adopting a simpler and more consistent method of determining the area to be surveyed. The Commission is now requiring that an applicant for a disposal well permit include with the permit application a printed copy or screenshot showing the results of a survey review of information from the United States Geological Survey (USGS) regarding the locations of any historical seismic events within a circular area of 100 square miles (a circle with a radius of 9.08 kilometers) centered around the proposed disposal well location. The language regarding calculation of a pressure front boundary around a proposed disposal well location has been moved to §3.9(3)(C) and §3.46(b)(1)(D) and such calculation will be required only in certain limited circumstances where additional information is necessary to demonstrate that fluids will be confined if the well is to be located in an area where conditions exist that may increase the risk that fluids will not be confined to the injection interval.
Also in response to comments, the Commission has revised the proposed language in §3.9(6)(A)(vi) and §3.46(d)(1)(F) relating to modification, suspension, and termination of a permit to replace the phrase "if injection is suspected of or shown to be causing seismic activity" with the phrase "if injection is likely to be or determined to be causing seismic activity."

The Commission adopts a minor clarifying change in §3.9(11)(A) and (B), and §3.46(l).

COMMENTS

The Commission received 36 comments on the proposed amendments. The Commission appreciates the interest shown by the public in this rulemaking effort. The Commission received timely-filed comments from 20 entities, 10 of which were from groups or associations: Environmental Defense Fund ("EDF"); Neighborhoods of East Fort Worth; Sierra Club, Lone Star Chapter ("Sierra Club"); Texas Alliance of Energy Producers (the "Alliance"); Texas Energy Services Coalition; and a workgroup comprised of the following associations: Texas Oil and Gas Association, the Texas Independent Producers & Royalty Owners Association; the Texas Alliance of Energy Producers, the Permian Basin Petroleum Association, and the Association of Energy Service Companies (the "Workgroup"). The Commission received comments from four groundwater conservation districts (collectively, the "GCDs"): Lone Star Groundwater Conservation District ("Lone Star GCD"); North Texas Groundwater Conservation District ("North Texas GCD"); Prairielands Groundwater Conservation District ("Prairielands GCD"); and Upper Trinity Groundwater Conservation District ("Upper Trinity GCD"). The Commission received timely-filed comments from three other governmental entities: United States Environmental Protection Agency ("EPA"); the City of Southlake; and the United States Geological Survey ("USGS"). The Commission received timely-filed comments from three companies: Chevron USA Inc. ("Chevron"); CrownQuest Operating, LLC ("CrownQuest"); and Pioneer Natural Resources ("Pioneer"). The Commission received 23 comments from individuals. After the September 29, 2014, comment deadline, the Commission received late-filed comments from two companies (Apache
Corporation and Newfield Exploration Company ("Apache/Newfield") and one governmental entity
(Frio County Commissioners Court).

Four commenters expressed support for the proposed rule amendments. Neighborhoods of East
Fort Worth provided a resolution in support of the proposed amendments. One commenter expressed
support for the provisions for §3.9(6) to permit the Commission to respond to an appearance of seismic
activity without conclusive evidence that the activity is triggered or induced by a particular well. This
commenter also expressed support for the proposed amendments in §3.9(11) to allow the Commission to
require closer monitoring and reporting of injection pressure and rate. The Commission appreciates these
comments. The Commission made no change in response to these comments.

Three commenters expressed opposition to hydraulic fracturing in Texas. One expressed
opposition to fossil fuels. Another commenter expressed support for limiting hydraulic fracturing. These
comments are beyond the scope of this rulemaking. The Commission made no change in response to
these comments.

One commenter stated that the proposed amendments lack a methodology to catalogue quakes
and relate them in proximity to existing wells, and that the proposal does not require operators to report
quake events in proximity to their wells.

The Commission notes that seismic activity is reported by the USGS and that Commission staff is
monitoring seismic activity in the state in relation to proximity to existing wells. The Commission made
no change in response to this comment.

Two commenters expressed concern with individual property rights, seismic activity associated
with hydraulic fracturing, and decreased property values. These commenters recommended that the
Commission amend the rules to provide further protection for property owners in areas in which drilling
is to occur. One commenter stated that the commenter's home has been damaged by the earthquakes in
the Azle/Reno area and recommended stronger laws and rules and permits governing the gas industry.
One commenter recommended that the Commission require operators to buy earthquake insurance.

A review of the numerous studies of seismic activity in areas with oil and/or gas exploration and production indicates that seismic activity induced by hydraulic fracturing is not very likely. In addition, the Commission has no statutory authority to require an operator to purchase insurance. The Commission made no change in response to these comments.

USGS commented that the Commission was incorrect in stating that the USGS has the ability to detect and locate all seismic events larger than magnitude 2.0 throughout the continental United States. USGS went on to state that it is currently capable of detecting and locating all Texas earthquakes with magnitudes of about 3.0 and larger and can detect smaller earthquakes in regions with better seismic station coverage. The Commission acknowledges the correction, but no change to the rules is necessary.

Two commenters noted that USGS earthquake locations in Texas are not sufficiently accurate to retrieve data regarding the locations of historical seismic events within an the estimated 10-year, five psi pressure front boundary.

The Commission agrees with the statement concerning USGS earthquake location accuracy; the Commission is simply using the reported earthquake locations as a screening tool for disposal well applications. However, the Commission finds that it is appropriate to require permit applicants to access the USGS database and adopts a change to require a circular survey area of 100 square miles centered on the proposed disposal well location.

Five seismologists (Brian Stump, Heather DeShon, Matthew J. Hornbach, Maria Beatrice Magnini, and Christopher T. Hayward) (Stump et al.) jointly filed comments concerning the proposed fluid calculations, concluding that pressure front predictions will likely be subject to large uncertainties in predicting where the pressure front is located as a function of time.

The Commission agrees with the comments concerning the proposed fluid calculations, concluding that pressure front predictions will likely be subject to large uncertainties in predicting where
the pressure front is located as a function of time. The Commission adopts a change to require that
applicants for a disposal well permit review a defined survey area, and has moved the language regarding
pressure front boundaries to the list of additional information that may be required of an applicant
subsequent to a determination of the existence of complex geology, proximity of the basement rock to the
injection interval, transmissive faults, and/or a history of seismic events in the survey area.

Stump et al. questioned the motivation for choosing a five psi pressure front over 10 years, as the
critical pressure number or time and recommended that the Commission require that an applicant for a
disposal well permit avoid any pressure development near a major fault system that is active or appears
critically stressed.

The Commission proposed five psi as a pressure differential on the lower side of the 1.4 to 14 psi
range mentioned by the commenters as a conservative number. The Commission chose to compute the
pressure front boundary after 10 years of operation at the proposed maximum daily disposal volume to
represent an operational maximum value for fluid injected, because few operators operate disposal wells
at the maximum daily allowed volume over extended periods of time, and large volume disposal wells
are considered to have a lifespan of approximately 10 years. The Commission made no change in
response to this comment.

Stump et al. recommended that the Commission consider situations where the reported pressures
downhole are significantly in excess of five psi due to overpressure as industry studies already suggest
that overpressures sometimes exist in some of the injection formations, and may exceed tens of psi.

The Commission agrees with the comment; however, no change is necessary for calculating the
pressure front boundary as described because of the adopted changes. The Commission made no change
in response to this comment.

Stump et al. noted that the "injected fluids may well stay confined in the injection interval but the
pressure perturbation induced by the injections fluids can have farther reaching effects." These
commenters further stated that the perturbation may be more important in locally changing stress in a manner sufficient to allow earthquakes along pre-existing fault structures. These commenters noted that there are a number of other critical data sets related to the fluids and the rock properties that control fluid migration, including, but not limited to downhole pressures in the injector, static pressures at injection depth, permeability and fault locations including their connection to layers above and below the injection interval. These commenters recommended that the Commission consider requiring annual measurement and reporting of bottom hole shut-in pressures to determine if injected fluids are having far-reaching effects on subsurface stress.

The Commission agrees with the comments, but disagrees that requiring industry to measure and report annually bottom hole shut-in pressures at all disposal wells is warranted. The language of the proposed rule would allow the Commission to add such a condition in reservoirs for which such monitoring and reporting might be warranted. The Commission made no change in response to this comment.

Stump et al. noted that many of the earthquake sequences in Texas, such as those in Azle, DFW and Cleburne, only began after the injectors began operating in the area, and that searching for earthquakes before the injection process begins may not be sufficient. These commenters further stated that any information on the locations of subsurface faults and their orientation relative to the in-situ stress field might provide more effective permitting criteria based on some of the historical earthquake data. These commenters pointed out that imaging and location of subsurface faults may be problematic. Even small offset faults at the limit of high-quality 3D seismic data may generate small magnitude earthquakes based on data analysis in Azle.

The Commission disagrees that these changes are necessary. Because the recurrence rate for these types of sequences is unknown, one cannot with any confidence correlate the onset of an earthquake sequence with any measureable impact of injection well operation. The Commission made no change in
response to this comment.

Stump et al. noted that a characteristic radius for the search might be a better approach rather than one estimated from a model run because: (1) the earthquake locations based on regional observations have a characteristic error in latitude and longitude of approximately 10 kilometers which may be larger than estimated radius; (2) few details are described in models and an assessment of the errors in the calculation may necessitate a larger radius (e.g., the bottom hole pressures and permeability used can greatly influence the estimate radius); and (3) model runs can be influenced by inclusion of faults.

The Commission agrees that a characteristic radius will provide a more straightforward review of historical earthquake occurrence and adopts a circular survey area of 100 square miles centered on the proposed disposal well location in §3.9(3)(B) and §3.46(b)(1)(C).

Stump et al. noted that the "magnitude threshold for the USGS catalog should be checked with the USGS." Chevron pointed to the preamble reference to magnitude 2.0 events as the USGS framework of reference and stated that magnitude 2.5 is a more appropriate threshold for references to USGS given the current seismic monitoring network in Texas. Chevron commented that it is important that seismic monitoring be consistent in both space and time such that a threshold magnitude event can be detected no matter where it occurs in Texas and that an increase in detected threshold events over time as the monitoring network improves is not misinterpreted as an increase in seismic events. Chevron recommended that the Commission lower the threshold once an expanded seismic network is in place.

Similarly, Pioneer recommended that the Commission revise the proposed rule language to include the following: "the results of a review of information from the USGS threshold of 2.5 magnitude on the Richter Scale." Pioneer stated that such language would provide clarity and certainty should specific seismic monitoring of a particular area use technology that would allow measurements to a lower threshold. One commenter stated that the preamble reference to magnitude 2.0 events as the USGS frame of reference is incorrect and suggested that magnitude 2.5 is more appropriate given the current
monitoring capability. One commenter stated that defining a numerical seismic magnitude threshold
would provide precise clarity in the rule and prevent the need to readdress this issue in the future as
technology changes in Texas or in other parts of the country.

Based on these comments submitted by the USGS, Stump et al., Chevron, Pioneer and two others,
the Commission agrees with comments regarding the capability of the USGS monitoring in Texas.
Nonetheless, the Commission retains the option to consider any earthquake reported on the USGS
database. The suggested numerical seismic magnitude threshold would preclude including smaller
earthquakes that might be reported in the future where denser monitoring could detect smaller
earthquakes. Further, earthquakes with magnitudes well below magnitude 2.0 are being used to delineate
basement seated faults in the Reno, Texas, area. The Commission made no change in response to these
comments.

One commenter recommended that the Commission defer action on the requirements proposed
for §3.9(3)(C) and §3.46(b)(1)(D) to require submission of additional information with permit
applications because, given the current state of the science, the information proposed to be requested of an
applicant would not allow the Commission to predict seismic activity and "science is not yet ready to
inform the correct rules." This commenter recommended that the Commission determine whether the
changes in the proposed amendments can be applied to past situations to gather proposed information,
and determine that it would have been of some predictive value and applied to a variety of likely
situations to verify that reliable and consistent collection and reporting is feasible and practical. This
commenter also recommended that the Commission measure the actual cost of compliance.
Apache/Newfield also expressed concern that the apparent simplicity of a statewide, one-size-fits-all
regulation may not be in the best interest of the state or the public, because the natural geologic and
land-use variability that occurs across Texas results in different risk profiles. Consequently,
Apache/Newfield recommended that the Commission consider requiring different actions in different
areas of the state based on seismic risk. Chevron echoed that comment by stating that, because seismicity
that appears to be associated with disposal wells in Texas is concentrated in a limited number of localities,
seismicity would be better addressed through field rules. Chevron stated that addressing seismicity in
statewide rules that need only apply in a few areas would be detrimental to resource development.
The Commission agrees with the commenters that the science is not exact and more study of
natural and induced seismic events is needed. However, the Commission has amended the rules based on
the best information from current science. These rule amendments address disposal wells located in new
areas, or more or higher volume disposal wells located in areas with existing oil and gas activity. In
addition, the rule language is sufficiently broad to allow the Commission to require information based on
advancing science. The Commission made no change in response to this comment.
The Alliance recommended that the Commission consider the basic roles of injection pressure,
depth of injection, and volume of injected fluid, which play a significant role in injection permitting.
Lower injection pressure generally results in lower volumes of fluids being disposed. These lower
volume, lower pressure wells will consistently have a smaller zone of influence on subsurface pore
pressure over time. This smaller zone of influence means less risk of induced seismicity. Therefore, the
Alliance recommended that the Commission revise the rule to exempt disposal wells with an injection
volume of 5,000 barrels per day or less, unless the well falls within 20 circular square miles (2.5 mile
radius) of the radius survey area of an historic seismic event of a magnitude of 2.5 or higher. The
Alliance recommended for higher volume wells (greater than 5,000 barrels per day) a survey area of 40
circular square miles (approximate 4 mile radius).
The Commission agrees that injection pressure, depth of injection, and volume of injected fluid
play a significant role in injection permitting. However, the survey area addressed in this rulemaking is
intended to address increased pressure that could trigger movement of existing stressed faults. No one
knows where all faults are, whether they are under stress, or how much of an increased reservoir pressure
would trigger movement of an existing stressed fault. In addition, the increased impact of several "small volume" disposal wells in one area could have the same impact as one "large volume" disposal well.

However, as previously discussed, the Commission adopts a more appropriate method for surveying the area surrounding the location of a proposed disposal well, requiring the applicant to survey a reasonably conservative area around the proposed disposal well location for historic seismic activity as indicated by USGS. The Commission has determined that a reasonably conservative area for such a survey is a circular area of 100 square miles (a circle with a radius of 9.08 kilometers) centered around the proposed disposal well location. Such review places minimal burden on an applicant. The Commission made no change in response to the request for a survey area based on volume.

One commenter recommended that the Commission combine the proposed changes in §3.9(3)(C) and (D) and §3.46(b)(1)(C) and (D) so that all requirements are included in one amendment. This commenter expressed concern that earthquakes can occur in areas without historic seismic activity. Just because an area has had no prior earthquake activity does not mean that it will not occur when a well is put into operation. This commenter also recommended that the Commission revise the proposed language in §3.9(3)(C) and (D) and §3.46(b)(1)(C) and (D) to substitute the word "will" for the word "may."

The Commission selected the word "may" to indicate that the Commission may require the applicant to provide some or all of the additional information. Commission staff will review the particular well and well location to determine what additional information may be needed. The Commission disagrees that it must require all of the information in every case. The Commission made no change in response to this comment.

One commenter expressed concern about the potential cost to applicants and stated that earthquakes from salt water disposal ("SWD") injection wells are not common to all areas and injection intervals. This commenter recommended that the Commission form a new unit (similar to the Commission's Groundwater Advisory Unit) to advise on the potential for historic earthquakes at the
proposed disposal well location. This commenter stated that the cost of seismic lines for each new
location is prohibitive and will increase the cost of disposal considerably, as well as result in time delays.
The presence of nearby faults at the disposal well location also could be part of the Commission
responsibility by subscribing to the GeoMap mapping service on a statewide basis.

The Commission disagrees with this comment. The Commission's Underground Injection
Control regulations appropriately place the burden on the applicant to provide the Commission with the
information to justify issuance of a permit. In addition, the rule amendments do not require the
placement of seismic lines at every proposed disposal well location. The Commission made no change in
response to this comment.

Apache/Newfield recommended that the Commission and the industry focus in the short-term on
better understanding seismicity issues. This commenter recommended that the Commission undertake a
thorough analysis of known cases where disposal by injection is believed to be coincident with seismicity.
Rather than place the complete burden on one operator to perform the necessary technical work and
possibly collect confidential business information from other operators, the commenter recommended that
the Commission identify specific areas of interest across the state and request funding from the State
Legislature for comprehensive integrated subsurface geological, geophysical, and fluid modeling studies
by Texas institutions of higher learning, with input from industry, for the purpose of creating maps. This
commenter recommended that the Commission consider rule amendments after these studies.

Although the Commission agrees that additional study is warranted, the Commission does not
agree that this rulemaking effort should be postponed. The recommended studies would require vast
amounts of funding and time. Meanwhile, Texas has experienced seismic activity over the past few
years. The Commission made no change in response to this comment.

The Workgroup commended the Commission for being proactive in responding to seismic
activity, including the hiring of a seismologist and proposing reasoned requirements to address the risk of
seismic activity related to disposal well operations. The Workgroup found the following provisions acceptable: (1) using the USGS database as the source for historic seismic activity; (2) amending §3.96(A)(vi) and §3.46(d)(1)(F) to include disposal that is shown to be causing seismic activity to the list of reasons for which the Commission may modify, suspend, or terminate a disposal well permit for just cause and after opportunity for hearing; (3) requiring operators to collect disposal volumes and pressures as requested by the Commission for submittal; and (4) requiring additional technical data such as logs and geologic cross-sections where conditions exist that may increase the risk that fluids will not be confined to the injection interval or being possibly connected to seismic events nearby. Chevron, Pioneer, and Apache/Newfield expressed support for the Workgroup comments. The Commission appreciates these comments.

The Workgroup commented, however, that, while pressure front calculations can be an appropriate part of a robust technical review and risk assessment where there have been seismic events in close proximity to a proposed new disposal well, the Workgroup questioned using five psi pressure front calculations as a tool simply to delineate an area for assessing historic seismic activity. The Workgroup expressed concern that the number of poorly constrained variables that go into such a calculation may lead to underestimating or overestimating the location of the pressure front boundary, thereby rendering a common and consistent review of historic seismic events in a given area unlikely. Further, the Workgroup stated that the methodology and results would not be transparent to all stakeholders, and would also place a substantial burden on small operators by requiring them to retain additional technical resources to perform calculations solely to obtain information on historic seismicity. The Workgroup and Chevron stated that a more transparent, repeatable and risk-appropriate approach would be to require a review of USGS historic seismic activity within a circular area of 40 square miles centered around the proposed location for large disposal wells. The Workgroup recommended that shallow, low volume disposal wells be exempted from this requirement or that the Commission require the use of a smaller area
for referencing historic seismic events. The Texas Energy Services Coalition echoed these concerns, but recommended survey of a circular area of 20 square miles centered around the proposed disposal well location.

Chevron commented that the proposed rule does not state any guidelines for the input data or parameters, or calculation method(s) for determining the pressure front, making the rule somewhat ambiguous and problematic in its application. Without specific guidance regarding verification of the input parameters (some of which are rarely measured and can vary by orders of magnitude) and calculation method, the confidence level in the calculation would be low and the uncertainty high. This commenter stated that the actual pressure front that would be induced in the subsurface would be complicated by the actual injection history, faults, injection horizon parameters, and interaction with other wells.

The Commission agrees that, in many instances, the assumptions and approximations used by applicants in such calculations would be highly interpretive and difficult for many operators to obtain, particularly for applicants proposing to dispose into non-productive formations. As a result, the results from such calculations could be non-uniform and misleading. Therefore, the Commission adopts a simpler and more consistent method of determining the area to be surveyed. The Commission will require that an applicant for a disposal well permit include with the permit application a printed copy or screenshot showing the results of a survey review of information from the United States Geological Survey (USGS) regarding the locations of any historical seismic events within a circular area of 100 square miles (a circle with a radius of 9.08 kilometers) centered around the proposed disposal well location.

The Workgroup recommended that the Commission move the language regarding pressure front calculations to §3.9(3)(C) and §3.46(b)(1)(D) as part of the additional information that may be required by the Commission. Chevron commented that, if pressure front calculation requirement is retained, it
should be placed in §3.9(3)(C) and §3.46(b)(1)(D), as data that may be required on a case-by-case basis.

The Commission agrees with these comments and has made the recommended change.

One commenter stated that he had trouble using the USGS Earthquake Archive Search & URL Builder site. The Commission contacted this person to assist with navigating the USGS website. The Commission made no change in response to this comment.

The GCDs commended the Commission on proposal of the rule and, in general, expressed support for the proposed changes to the rules and the Commission's efforts to ensure fluids from disposal wells are confined to the injection interval and not at risk of migrating to freshwater resources. The Commission appreciates these comments.

The GCDs recommended that the Commission require disposal well applicants to include their calculations for determining pressure front boundary and area of influence for fluid migration in the disposal well application, so that the values they use as parameters for the equations and their calculations can be reviewed by Commission staff and third parties.

The Commission agrees in part with this comment. In cases where the Commission requires the performance of pressure front boundary calculations, the actual input parameters and calculations also would be required. The Commission made no change in response to this comment.

Upper Trinity GCD also suggests that the Commission amend the proposed language to require that all disposal well permit applicants provide the Commission with the additional information, such as logs, geologic cross-sections, and/or structural maps, to demonstrate fluid confinement to the injection interval, rather than leaving this as a permissive option for the Commission staff to review on a case-by-case basis. The GCD recommended that §3.9(3)(C) be changed so that the Commission will require each applicant to submit the information, rather than leaving it as optional. The GCD also noted that the term "basereock" should be "basement rock."

The Commission disagrees with the first recommended change. The existing requirements for
disposal well permit applications are adequate to make such a determination in most instances. The
Commission will require the additional information in §3.9(3)(C) to address instances in which additional
information is necessary to make such a determination. The Commission agrees that the term "basement
rock" is more correct than the term "baserock" originally proposed, and adopts the recommended change.
Pioneer requested clarification that the additional data that could be requested by the Commission
under §3.9(3)(C) or §3.46(b)(1)(D) would be existing data.

Although existing data will be adequate in most cases, the possibility exists where sufficient
information would not allow the Commission to adequately assess seismic threat. Therefore, if the
applicant wishes to pursue a disposal well permit application in such circumstances, new data may be
necessary. The Commission made no change in response to this comment.
Pioneer also requested clarification that in order to comply with the rule amendments, operators
will not be responsible for purchasing and/or installing seismographs, geophones or other monitors
designed to detect seismic activity.
The Commission did not propose the requirement for an operator to purchase and/or install
seismographs, geophones, or other monitors designed to detect seismic activity. However, there could be
an unusual case where an operator would elect to use this equipment. The Commission made no changes
in response to this comment.
The GCDs recommended that the Commission consider providing additional definitional
guidance through the proposed rules on what it will consider to constitute "complex geology" for the
purposes of requiring additional information from permit applicants to demonstrate confinement of fluids.
The Commission declines to define "complex geology" in the rule because an all-inclusive
definition is not possible. However, some examples might include heterogeneity, varying permeability
and porosity, faulting and folding, high stress, unconformities, tilted or rotated fault blocks, and
cross-stratification. The Commission made no change in response to this comment.
The GCDs requested that the Commission continue to take the necessary steps to protect not only freshwater resources, but brackish water as well, in the regulation of disposal wells and potential sources of contamination.

This comment is beyond the scope of this rulemaking. Texas Natural Resources Code, §91.101, relating to rules and orders, requires the Railroad Commission to adopt and enforce rules and orders and issue permits relating to "the production of oil and gas, including...activities associated with the drilling of injection water source wells which penetrate the base of usable quality water." The Commission provides letters of recommendation concerning groundwater protection. For recommendations related to normal drilling operations, shot holes for seismic surveys, and cathodic protection wells, the Commission provides geologic interpretation identifying the base of usable-quality water (generally less than 3,000 milligrams per liter (mg/L) total dissolved solids (TDS), but may include higher levels of TDS if identified as currently being used or identified by the Texas Water Development Board (TWDB) as a source of water for desalination). The geological interpretation may include groundwater protection based on potential hydrological connectivity to usable quality water. For recommendations related to injection into a non-producing zone, the Commission provides geologic interpretation of the base of the underground sources of drinking water (USDW). USDW is defined as an aquifer or its portions which supplies drinking water for human consumption; or in which the groundwater contains fewer than 10,000 milligrams per liter TDS; and which is not an exempted aquifer. The Commission’s UIC program prohibits injection into (unless the EPA has approved an aquifer exemption) or contamination of USDWs. The Commission's Groundwater Advisory Unit coordinates with the TWDB with respect to desalination projects and water use. The Commission also is a member of the Texas Groundwater Protection Committee. The Commission made no change in response to this comment.

The Lone Star GCD stated that §3.9 and §3.46 currently require an applicant for an injection well permit to review an area of a fixed radius of 1/4 mile for abandoned, unplugged, or improperly plugged
wells that could serve as a conduit for migration of injectate to freshwater (area of review). The Lone
Star GCD recommended that the Commission amend the rules to require that an applicant calculate a
site-specific area of review for all injection wells.

The commenter appears to be confusing the "area of review" requirement in the rules and the area
to be surveyed for historic seismicity. When the federal Underground Injection Control (UIC) regulations
were promulgated in 1980 under the Safe Drinking Water Act (SDWA), they required that a review of
wells within a 1/4 mile radius of the proposed injection well be conducted to ensure that surrounding
wells would not serve as a conduit for injected fluids to enter USDWs. This requirement is known as the
area-of-review or AOR requirement. Sections 3.9 and 3.46, adopted in 1981, require a 1/4 mile AOR
unless an applicant shows by computation that a lesser area will be affected by pressure increases. The
"area of review" with respect to the underground injection program is the area surrounding an injection
well that is reviewed during the permitting process to determine if flow between aquifers will be induced
by the injection operation. The area of review defines the area where the injection reservoir pressure
under the influence of injection activity could cause fluid to move into a USDW. The area of review is
determined based on the location at which fluids from the injection zone would rise in a hypothetical well
at a given location. The Commission's UIC program was approved with a fixed radius of 1/4 mile. The
information is used to determine whether corrective action is necessary.

In most cases, the Commission's AOR review involves a review of the map of wells within a 1/4
mile radius of the proposed injection or disposal well and the corresponding "Table of Wells" indicating
the status of all wells within the 1/4 mile radius to verify that the operator has indicated that the wells are
active, have an exception to §3.14 of this title (relating to Plugging), or are properly plugged. For
applications in selected problem areas, the Commission's UIC staff performs the more detailed review.
The more detailed AOR reviews are performed for applications for wells located in areas of highly
pressured formations, highly corrosive formation waters, public concern over injection wells, or where
unplugged abandoned wells are a real or perceived problem. The more detailed review involves pulling
and reviewing all completion and plugging reports for all wells within the 1/4 mile radius to verify that
the wells are properly completed and/or plugged. In addition, in certain areas, such as areas in which the
reservoir pressure is elevated, the Commission has determined that a larger area of review is warranted.

The survey area in this rulemaking is intended to address increased pressure that could trigger
movement of existing stressed faults. In any event, this comment is beyond the scope of the proposed
rulemaking, which is limited to seismicity associated with disposal wells. The Commission made no
change in response to this comment.

The EDF and the Sierra Club expressed general support for the proposed amendments. The
Commission appreciates these comments. The Commission made no change in response to these
comments.

The Sierra Club also recommended more research efforts and appropriate regulation to encourage
operators to move away from underground injection to prevent contamination, and to provide a potential,
available water resource for Texas.

The Commission agrees that produced fluids are a potential source of available water for Texas,
but finds that this comment is beyond the scope of this rulemaking. The Commission encourages the
re-use of these produced fluids when possible, particularly through the Commission's current rules
relating to recycling of these fluids (in §3.8 of this title, relating to Water Protection, and in Chapter 4,
Subchapter B, of this title, relating to Commercial Recycling.) However, current technology, as well as
the storage and transportation costs, with respect to use of these fluids as a potential fresh water source is
not yet economical in all instances. In addition, EPA estimates that there are 144,000 Class II injection
wells in the United States, and the Commission has permitted over 50,000 Class II injection wells in
Texas since the 1930s, with relatively few problems. The Commission made no changes in response to
this comment.
The EDF encouraged the Commission to continue to study the issue and develop protocols for responding to future seismic events. The Sierra Club recommended that the Commission include in the rule: (1) a discussion of the types of information needed, including but not limited to a discussion of radioactive tracer or spinner surveys, well logs, and geological investigation of potential faulting; (2) a requirement for a seismic monitoring plan, such as pre- and post-monitoring of the region for earthquakes; (3) a requirement for monitoring before injection and testing and recording of original bottomhole injection interval pressure; and (4) a requirement for a shut-off device on the injection pump set to allow the maximum allowable injection pressure so that the Commission and operators can assure safe disposal. The Sierra Club also recommended that the Commission develop a seismic monitoring plan for assessing induced seismicity that may be or could be associated with existing permits.

Commission efforts to study issues related to seismic events are ongoing. Commission staff, including the Commission’s seismologist, are participating in the Induced Seismicity by Injection Work Group of the State Oil and Gas Regulatory Exchange established by the Interstate Oil & Gas Compact Commission and the national Ground Water Protection Council, which includes representatives from state regulatory agencies and geological surveys across the country. State agencies participating in this work group are collaborating and sharing science, research, and practical experience to equip the states with the best decision making tools to evaluate the possible connections between seismic events and injection wells, minimize risk, and enhance appropriate readiness when seismic events occur. The State Oil and Gas Regulatory Exchange initiative is part of a larger state-led effort called States First, through which state oil and gas regulatory agencies are collaborating and communicating with one another in an ongoing effort to keep current with rapidly changing technology, as well as to share the very best and innovative practices, procedures, and protocols from state to state. The Commission made no changes in response to these comments.

The Sierra Club expressed support for the ability of the Commission to modify, suspend or
terminate a permit, but recommended that the Commission include additional details in the rule, such as
the right of the Commission to implement graduated maximum allowable injection pressure.

Language regarding the Commission's ability to modify, suspend or terminate an injection well
permit has been included in §3.9 and §3.46 since their initial adoption. The procedure is basically the
same no matter the cause. In addition, the Commission did not enumerate the details with regard to how
the Commission might modify a permit because such modifications would be based on site-specific
conditions. The Commission made no changes in response to this comment.

The Sierra Club recommended that the Commission include certain draft amendments considered
by the Commission in 2013 regarding various issues such as public notice, integrity testing, and casing
and cementing.

The Commission did circulate for informal comment in 2013 certain draft amendments to both
§3.9 and §3.46 relating to issues such as public notice, integrity testing, and casing and cementing.
However, the Commission has suspended work on those proposed amendments in order to address the
issue of seismic activity. The Commission may revisit the issues raised in those earlier draft amendments
at a later date. The Commission made no change in response to this comment.

The Sierra Club recommended that the Commission revise the rule to increase the disposal well
permit application fee to cover the additional work required of Commission staff.

The Commission disagrees with this recommendation, as its application fees are established by
the Texas Legislature in the statutes. The Commission made no change in response to this comment.

The EPA stated that the proposed regulations were reviewed by multiple Ground
Water/Underground Injection Control program engineers and scientists, all of which applaud the
Commission's efforts to ensure it has sufficient regulatory authority to respond to any event of this type
where concerns may arise. The Commission appreciates this comment.

The EPA further commented that the proposed regulations require the permit applicant to
calculate the estimated location of a five psi pressure front boundary after 10 years of injection, which
would be used to define the area to be reviewed for information on seismic events on the USGS website
as part of the application process. While the proposal preamble indicated this estimation is to be
calculated using injection at the maximum requested permit injection volume, this is not stated in the
proposed regulations. The EPA recommended that the Commission consider adding that requirement in
§3.9(3)(B) and §3.46(b)(1)(C). As previously discussed, the Commission adopts wording changes that
render this comment moot. The Commission made no change in response to this comment.

The EPA also expressed concern that the type of information necessary to conduct the pressure
front boundary calculation may not be readily available, because it is difficult to reliably estimate the
pressure front without an in situ measurement of transmissibility (generally a falloff test), and a static
pressure measurement. EPA commented that, in areas where new oil and gas activity creates the need for
new disposal wells, this type of information may not be well documented. If the pressure front is not
realistically estimated, the search area for seismic events might be very small and, given the uncertainties
in the USGS event locations (i.e., +/- 10 miles) this approach would be of limited utility. EPA
recommended that the Commission consider whether more detail needs to be provided on how to conduct
this estimation, or consider establishing a minimum distance to be reviewed (e.g., 10 miles) which the
applicant could opt to use if the formation information is not readily available.

The Sierra Club expressed agreement that the actual available information may not be sufficient
and the distance assumed in the analysis may be too small.

One commenter expressed appreciation for the proposed rule amendments as a first step but was
not convinced of their efficacy. Specifically, the commenter was concerned with calculation of the
"10-year five pounds per square inch pressure front boundary," stating that assumptions and
approximations used by permit applicants can be highly interpretative in nature and difficult for some
operators to obtain and therefore would yield non-uniform and possibly misleading results. The
commenter supports the requirement for reporting historical earthquake activity, the authority to request
timely, detailed pressure and volume information for specific injection wells, and clarification of the
ability of the Commission to modify injection permits. This commenter proposed changes to the
proposed rules that would provide detailed methodology of calculation of the "10-year five pounds per
square inch pressure front boundary" or require a simple, fixed distance search criteria for historical
earthquakes, and detail how the Commission will use specified "additional data" in determination of
earthquake risk.

The Commission appreciates these comments. As previously discussed, the Commission adopts
changes to the rules that address some of the commenters' concerns. Specifically, the Commission agrees
that the 10-year, five pounds per square inch pressure front boundary calculation may be onerous for
some disposal well permit applicants and further agrees that a simpler, fixed-size circular survey centered
on the proposed injection well location will be adequate for the purpose of performing a survey for
historical earthquake occurrence. The Commission adopts changes to require applicants to conduct a
survey of the USGS historical earthquake database in a circular area of 100 square miles centered on the
location of the proposed injection well.

One commenter recommended that the Commission revise the rule to require monthly reporting
of injection volumes and pressures along with maintaining daily injection volumes and pressures that may
be requested at any time; clarify that the Commission may, as the result of an emergency hearing, require
an operator to suspend operations pending further study; and indicate the Commission's commitment to
continue to engage in, support, and review further scientific and engineering studies.

The Commission's rules already require that a permitted disposal well operator monitor the
injection pressure and injection rate of each disposal well on at least a monthly basis and report the results
of the monitoring to the Commission annually. However, the disposal well operator must typically
monitor injection pressure and volume on a daily basis to ensure compliance with the limits on injection
pressure and volume in the operator's permit. In addition, the Commission has the authority to require an
operator to provide the records for injection pressure and volume to the Commission upon request. With
respect to the recommendation that the Commission clarify that, as the result of an emergency hearing,
the Commission may require an operator to suspend operations pending further study, the language
regarding modification, suspension, and termination of a disposal well permit after notice and opportunity
for hearing is sufficiently clear. With respect to the last recommendation of this commenter, the
Commission presently plans to engage in, support, and review further scientific and engineering studies;
however, such a statement is unnecessary in the rule language. The Commission made no change in
response to these comments.

The City of Southlake recommended that the Commission revise the rule to provide for: (1)
adequate public notice to elicit public comment and to engage public involvement through the permitting
process; (2) accompanying hearing procedures; (3) and earnest appeals procedures for property owners
who do not agree with or who are otherwise impacted by the Commission's permit determination in any
case.

The Commission finds these comments are beyond the scope of this rulemaking and made no
change in response to this comment.

With respect to the amendments in §3.96(A)(vi) and §3.46(d)(1)(F'), relating to modification,
suspension or termination of a permit based on increased seismic activity, Chevron recommended that the
Commission establish an appeals provision to allow an operator to present evidence to the Commission.
The Commission's regulations in Chapter 1 of this title (relating to Practice and Procedure), allow
for "appeals" using the Commission's current hearing process and Commission decision, as well as the
existing avenues through the court system. The Commission made no change in response to this
comment.

CrownQuest and an individual expressed concerns with the proposed rule amendments with the
calculation of the "10-year five pounds per square inch pressure front boundary", stating that assumptions
and approximations used by permit applicants can be highly interpretative in nature and difficult for some
operators to obtain and therefore would yield non-uniform and possibly misleading results. The
commenters find the parameters used by the Commission to be arbitrary and not founded in sound science
and engineering.

The Commission disagrees with the comment that the "10-year five pounds per square inch
pressure front boundary" is arbitrary and not founded in sound science and engineering practice.
Published research indicates that inducing earthquakes on preferentially oriented faults requires positive
pressure differentials of as little as one pound per square inch to as much as 75 pounds per square inch.
The Commission proposed five pounds per square inch as a conservative number. Further, calculation of
the pressure front boundary after 10 years of injection at the maximum permitted injection rate was
considered to be a reasonable measure of the lifetime amount of volume injected for a typical disposal
well. Also, while understanding the wide range of possible values for real reservoir characteristics, the
Commission expected operators would enter realistic values in the calculation to yield a first-order
scientific and engineering calculation. Nonetheless, as previously discussed, the Commission adopts
other changes to this wording; the language regarding calculation of a pressure front boundary around a
proposed disposal well location has been moved to §3.9(3)(C) and §3.46(b)(1)(D) and will be required
only in certain limited circumstances where additional information is necessary to demonstrate that fluids
will be confined if the well is to be located in an area where conditions exist that may increase the risk
that fluids will not be confined to the injection interval.

CrownQuest suggested that in §3.9(3)(C) and §3.46(b)(1)(D) the word "may" be deleted and
replaced with the words "will significantly" in the phrase "... may increase the risk that fluids will be
confined to the injection interval."

EPA commented that the transmission of pressure in the subsurface due to the injection of fluids
affects a much greater area than the actual migration of the injected fluids, and expressed concern that not
including language recognizing this pressure influence (which is the primary concern in induced
seismicity events) may inadvertently limit the applicability of these changes.

The Commission agrees with the statement that transmission of pressure in the subsurface due to
the injection of fluids affects a much greater area than the actual migration of the injected fluids, which is
why the Commission originally proposed a pressure front calculation. However, due to other changes
previously discussed, the Commission made no change with regard to these comments.

CrownQuest and Pioneer recommended that the Commission delete the phrase "suspected of or
shown to be" in §3.9(6)(A)(vi) and §3.46(d)(1)(F) and replace it with "demonstrated by reliable scientific
and engineering data" in the phrase "... injection is suspected of or shown to be causing seismic activity."

The Commission disagrees with the suggested wording change for §3.9(6)(A)(vi) and
§3.46(d)(1)(F); however, the Commission adopts language to clarify that the trigger for the Commission
to consider modification, suspension, or termination of a permit will be based on injection "likely to be or
determined to be contributing to seismic activity."

CrownQuest commented that generally, disposal wells should be treated differently based on their
proximity to population centers or the number of homes within the pressure front boundary.

The Commission disagrees with this comment; the Commission is concerned with the safety of
all Texans, including those who live in low population areas. The Commission made no changes in
response to this comment.

In a letter signed by the Honorable Judge Carlos Garcia, the Frio County Commissioners Court
commented that the capacity of disposal into disposal wells is "exceeding environmental boundaries" and
expressed concern that in the future, such disposal will result in well overflows or leaks. The
Commissioners Court requested that the Commission review the Frio County area, in which the
Commissioners Court stated are located wells permitted to dispose into shallow oil and gas producing
formations which contain brackish water. The Commissioners Court also expressed concern with public safety and spills on roads in the county as well as pipelines, fractionation facilities, and other ancillary facilities, and referenced Chapter 361 of the Texas Health and Safety Code, regarding development of solid waste plans to protect and promote water, health, and public safety.

The Commission finds that these comments are beyond the scope of this rulemaking or outside the Commission’s statutory authority. In determining whether to permit a disposal well, the Commission considers disposal capacity of an area, including the need for such disposal capacity and the existing pressure status of the interval into which the injection is proposed. The Commission also considers the presence of abandoned, unplugged or improperly plugged wells within the area of a proposed disposal well. The Commission does not permit injection into an underground source of drinking water as defined by the EPA and §3.30 of this title (relating to Memorandum of Understanding between the Railroad Commission of Texas (RRC) and the Texas Commission on Environmental Quality (TCEQ)). Section 3.30 defines an underground source of drinking water as "an aquifer or its portions which supplies drinking water for human consumption; or in which the groundwater contains fewer than 10,000 milligrams per liter total dissolved solids; and which is not an exempted aquifer." Such definition includes water defined as brackish. No disposal well in Frio County is permitted to inject into a USDW. The Commission made no changes in response to these comments.

DESCRIPTION OF RULE AS ADOPTED

As stated in the proposal preamble, the EPA estimates that there are 144,000 Class II injection wells in the United States. The Commission has permitted over 50,000 Class II injection wells in Texas since the 1930s. While few earthquakes have been documented over the past several decades relative to the large number of disposal wells in operation, seismic events have infrequently occurred in areas where there is coincident oil and gas activity. Therefore, the Commission adopts these rule amendments in order
to require additional information in support of a permit application regarding historical seismic events in
the vicinity of a proposed disposal well's location, as well as certain other information in the event the
well is to be located in an area where conditions exist that may increase the risk that fluids will not be
confined to the injection interval. The USGS maintains an online, accessible data base of seismic events
in the United States from 1973 to the present. Applicants for a disposal well permit under §3.9 or §3.46 as
amended will be required to access the USGS earthquake search tool at
http://earthquake.usgs.gov/earthquakes/search/ in order to retrieve data regarding the locations of
historical seismic events within a specified area around the proposed disposal well location. The
Commission also adopts these amendments to clarify that it has the authority to modify, suspend, or
terminate a permit for just cause after notice and opportunity for hearing if injection is likely to be or
determined to be contributing to seismic activity. Finally, the Commission adopts these rule amendments
to authorize more frequent monitoring and reporting by operators of disposal well injection pressures and
injection rates in the event certain conditions are present that may increase the risk that fluids will not be
confined to the injection interval.

The Commission adopts amendments to §3.9(3) to add new subparagraph (B), with changes
previously discussed, to state that the applicant shall include with the application for a disposal well
permit under this section a printed copy or screenshot showing the results of a survey of information from
the USGS indicating the locations of any historical seismic events within a circular area of 100 square
miles (a circle with a radius of 9.08 kilometers) centered around the proposed disposal well location.

The Commission adopts new §3.9(3)(C), with changes previously discussed, to state that the
Commission may require an applicant for a disposal well permit to provide the Commission with
additional information, such as logs, geologic cross-sections, pressure front boundary calculations, and/or
structure maps, to demonstrate that fluids will be confined if the well is to be located in an area where
conditions exist that may increase the risk that fluids will not be confined to the injection interval.
Conditions that may increase the risk that fluids will not be confined to the injection interval may include, but are not limited to, complex geology, proximity of the basement rock to the injection interval, transmissive faults, and/or a history of seismic events in the area as demonstrated by information available from the USGS required in §3.9(3)(B).

The Commission amends §3.9(6)(A)(vi), with changes previously discussed, to include injection that is likely to be or determined to be contributing to seismic activity to the list of reasons for which the Commission may modify, suspend, or terminate a permit for saltwater or other oil and gas waste disposal for just cause after notice and opportunity for hearing.

The Commission amends §3.9(11)(A) and §3.9(11)(B) to state that the Commission may require more frequent monitoring and monitoring reporting to the Commission of the injection pressure and injection rate in the event that conditions described in §3.9(3)(C) and §3.46(b)(1)(D) exist which may increase the risk that fluids will not be confined to the injection interval. The Commission also amends §3.9(11)(B) to correct a typographical error in the existing rule.

The Commission amends §3.46 to incorporate similar language for disposal wells that are permitted under §3.46. Under §3.46, the Commission regulates injection into productive formations for either enhanced recovery or for disposal. The new language relating to seismic activity would apply only to those wells permitted under §3.46 for disposal purposes.

The Commission amends §3.46(b)(1) to add new subparagraphs (C) and (D). New subparagraph (C), adopted with changes previously discussed, requires the applicant to include with the permit application for injection for the purpose of disposal under this section a printed copy or screenshot showing the results of a survey of information from the USGS indicating the locations of any historical seismic events within a circular area of 100 square miles (a circle with a radius of 9.08 kilometers) centered around the proposed disposal well location.

New §3.46(b)(1)(D), adopted with changes previously discussed, states that the Commission may
require an applicant for a disposal well permit under this section to provide the Commission with additional information such as logs, geologic cross-sections, pressure front boundary calculations, and/or structure maps, to demonstrate that fluids will be confined if the well is to be located in an area where conditions exist that may increase the risk that fluids will not be confined to the injection interval. Such conditions may include, but are not limited to, complex geology, proximity of the basement rock to the injection interval, transmissive faults, and/or a history of seismic events in the area as demonstrated by information available from the USGS required in §3.46(b)(1)(C).

The Commission amends §3.46(d)(1)(F), with changes previously discussed, to include injection that is likely to be or determined to be contributing to seismic activity to the list of reasons for which the Commission may modify, suspend, or terminate a permit for just cause after notice and opportunity for hearing.

The Commission amends §3.46(i)(1) and (2) to state that the Commission may require more frequent monitoring and monitoring reporting to the Commission of the injection pressure and injection rate.

RESTATEMENT OF STATUTORY AUTHORITY

The Commission adopts amendments to §3.9 and §3.46, pursuant to Texas Water Code, §26.131, which gives the Commission jurisdiction over pollution of surface or subsurface waters from oil and gas exploration, development, and production activities; Texas Water Code, Chapter 27, which authorizes the Commission to adopt and enforce rules relating to injection wells; Texas Natural Resources Code, §81.052, which authorizes the Commission to adopt all necessary rules for governing and regulating persons and their operations under the jurisdiction of the Commission under Texas Natural Resources Code, §81.051; Texas Natural Resources Code, §85.042(b), which provides the Commission with the authority to, when necessary, make and enforce rules either general in their nature or applicable to particular fields for the prevention of actual waste of oil or operations in the field dangerous to life or
property; Texas Natural Resources Code, §85.201, which authorizes the Commission to make and enforce rules for the conservation of oil and gas and prevention of waste of oil and gas; Texas Natural Resources Code, §85.202, which authorizes the Commission to adopt rules to prevent waste of oil and gas in drilling and producing operations; Texas Natural Resources Code, §91.101, which authorizes the Commission, in order to prevent pollution of surface water or subsurface water in the state, to adopt rules relating to the various oilfield operations, including activities associated with the drilling of injection water source wells which penetrate the base of usable quality water, and the discharge, storage, handling, transportation, reclamation, or disposal of oil and gas waste; and Texas Natural Resources Code, §91.602, which authorizes the Commission, in order to protect human health and the environment, to adopt and enforce rules relating to the generation, transportation, treatment, storage, and disposal of oil and gas hazardous waste.

Texas Water Code, §26.131, and Chapter 27; and Texas Natural Resources Code, §§81.052, 85.042(b), 85.201, 85.202, 91.101, and 91.602 are affected by the adopted amendments.

Statutory authority: Texas Water Code, §26.131, and Chapter 27; and Texas Natural Resources Code, §§81.052, 85.042(b), 85.201, 85.202, 91.101, and 91.602.


ADOPTED RULE LANGUAGE

[Note: Changes made to the published rule language are shown in bold type.]

§3.9. Disposal Wells.

Any person who disposes of saltwater or other oil and gas waste by injection into a porous formation not productive of oil, gas, or geothermal resources shall be responsible for complying with this section, Texas Water Code, Chapter 27, and Title 3 of the Natural Resources Code.

(1) - (2) (No change.)
(3) Application.

(A) The application to dispose of saltwater or other oil and gas waste by injection into a porous formation not productive of oil, gas, or geothermal resources shall be filed with the commission in Austin accompanied by the prescribed fee. On the same date, one copy shall be filed with the appropriate district office.

(B) The applicant for a disposal well permit under this section shall include with the permit application a printed copy or screenshot showing the results of a survey preview of information from the United States Geological Survey (USGS) regarding the locations of any historical seismic events within a circular area of 100 square miles (a circle with a radius of 9.08 kilometers) centered around [the estimated radius of the 10-year, five pounds per square inch (psf) pressure front boundary of the proposed disposal well location. [The pressure front is the zone of elevated pressure that is created by the injection of fluids into the subsurface.]

(C) The commission may require an applicant for a disposal well permit under this section to provide the commission with additional information such as logs, geologic cross-sections, pressure front boundary calculations, and/or structure maps, to demonstrate that fluids will be confined if the well is to be located in an area where conditions exist that may increase the risk that fluids will not be confined to the injection interval. Such conditions may include, but are not limited to, complex geology, proximity of the basement rock [baserock] to the injection interval, transmissive faults, and/or a history of seismic events in the area as demonstrated by information available from the USGS.

(4) - (5) (No change.)

(6) Subsequent commission action.

(A) A permit for saltwater or other oil and gas waste disposal may be modified, suspended, or terminated by the commission for just cause after notice and opportunity for hearing, if:

(i) a material change of conditions occurs in the operation or completion
of the disposal well, or there are material changes in the information originally furnished;

(ii) freshwater is likely to be polluted as a result of continued operation of the well;

(iii) there are substantial violations of the terms and provisions of the permit or of commission rules;

(iv) the applicant has misrepresented any material facts during the permit issuance process;

(v) injected fluids are escaping from the permitted disposal zone; [or]

(vi) injection is likely to be or [suspected of or shown] determined to be contributing to causing seismic activity; or

(vii) [(vii)] waste of oil, gas, or geothermal resources is occurring or is likely to occur as a result of the permitted operations.

(B) - (C) (No change.)

(7) - (10) (No change.)

(11) Monitoring and reporting.

(A) The operator shall monitor the injection pressure and injection rate of each disposal well on at least a monthly basis, or on a more frequent basis as required by the commission under conditions described in paragraph (3)(C) of this section.

(B) The results of the monitoring shall be reported annually to the commission on the prescribed form, or on a more frequent basis as required by the commission under conditions described in paragraph (3)(C) of this section [from].

(C) All monitoring records shall be retained by the operator for at least five years.

(D) The operator shall report to the appropriate District Office within 24 hours
any significant pressure changes or other monitoring data indicating the presence of leaks in the well.

(12) - (14) (No change.)

§3.46. Fluid Injection into Productive Reservoirs.

(a) (No change.)

(b) Filing of application.

(1) Application.

(A) An application to conduct fluid injection operations in a reservoir productive of oil, gas, or geothermal resources shall be filed in Austin on the form prescribed by the commission accompanied by the prescribed fee. On the same date, one copy shall be filed with the appropriate district office. The form shall be executed by a party having knowledge of the facts entered on the form.

(B) The applicant shall file the freshwater injection data form if fresh water is to be injected.

(C) The applicant for a disposal well permit under this section shall include with the permit application a printed copy or screenshot showing the results of a survey [review] of information from the United States Geological Survey (USGS) regarding the locations of any historical seismic events within a circular area of 100 square miles (a circle with a radius of 9.08 kilometers) centered around [the estimated radius of the 10-year, five pounds per square inch (psi) pressure front boundary of] the proposed disposal well location. [The pressure front is the zone of elevated pressure that is created by the injection of fluids into the subsurface.]

(D) The commission may require an applicant for a disposal well permit under this section to provide the commission with additional information such as logs, geologic cross-sections, pressure front boundary calculations, and/or structure maps, to demonstrate that fluids will be confined if the well is to be located in an area where conditions exist that may increase the risk that fluids will not
be confined to the injection interval. Such conditions may include, but are not limited to, complex
geology, proximity of the basement rock to the injection interval, transmissive faults, and/or
a history of seismic events in the area as demonstrated by information available from the USGS.

(2) (No change.)

(c) (No change.)

(d) Subsequent commission action.

(1) An injection well permit may be modified, suspended, or terminated by the
commission for just cause after notice and opportunity for hearing, if:

(A) a material change of conditions occurs in the operation or completion of the
injection well, or there are material changes in the information originally furnished;

(B) fresh water is likely to be polluted as a result of continued operation of the
well;

(C) there are substantial violations of the terms and provisions of the permit or of
commission rules;

(D) the applicant has misrepresented any material facts during the permit
issuance process;

(E) injected fluids are escaping from the permitted injection zone; [or]

(F) for a disposal well permit under this section, injection is likely to be or
[suspected of or shown] determined to be contributing to seismic activity; or

(G) [(F)] waste of oil, gas, or geothermal resources is occurring or is likely to

occur as a result of the permitted operations.

(2) - (3) (No change.)

(e) - (h) (No change.)

(i) Monitoring and reporting.
(1) The operator shall monitor the injection pressure and injection rate of each injection well on at least a monthly basis, or on a more frequent basis for a disposal well permitted under this section as required by the commission under conditions described in subsection (b)(1)(D) of this section.

(2) The results of the monitoring shall be reported annually, or on a more frequent basis for a disposal well permitted under this section as required by the commission under conditions described in subsection (b)(1)(D) of this section, to the commission on the prescribed form.

(3) All monitoring records shall be retained by the operator for at least five years.
(4) The operator shall report to the appropriate District Office within 24 hours any significant pressure changes or other monitoring data indicating the presence of leaks in the well.

(j) - (n) (No change.)

This agency hereby certifies that the rules as adopted have been reviewed by legal counsel and found to be a valid exercise of the agency's legal authority.

Issued in Austin, Texas, on October 28, 2014.

Filed with the Office of the Secretary of State on October 28, 2014.

Christi Craddick
Christi Craddick, Chairman

David Porter, Commissioner

Betsy Smithman, Commissioner

Secretary of the Commission

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