

**FISCAL
YEAR
2019**

**EPA REGION 6 END-OF-YEAR
EVALUATION RAILROAD COMMISSION
OF TEXAS UNDERGROUND INJECTION
CONTROL PROGRAM**

Introduction

Under Safe Drinking Water Act (SDWA) Section 1425 authority, EPA approved the Railroad Commission of Texas (RRC) Underground Injection Control (UIC) primacy enforcement responsibility for Class II oil and gas related injection wells in 1982. EPA later approved RRC's primacy UIC program for Class III brine mining wells and energy related Class V injection wells under SDWA Section 1422.

As part of the EPA/RRC primacy agreements, EPA Region 6 retains oversight responsibilities that includes an annual end-of-year evaluation. This annual oversight report summarizes RRC activities during State Fiscal Year (FY) 2016 in fulfillment of its primacy program and Federal UIC grant and workplan commitments. The Texas State Fiscal Year begins on September 1 and ends on August 31 each year.

FY2019 Grant Workplan

Pursuant to receiving federal financial assistance through SDWA Part C authorization, the RRC submits and EPA approves an annual grant application and associated workplan that outlines goals, expected milestones for key program activities, and estimated funding toward achieving those goals and milestones. The grant application for FY2019 was approved by Region 6 on 7/09/2018. And, the FY2019 workplan was approved by Region 6 on 6/12/2018.

FY2019 Grant Award and Allocation

The federal FY2019 grant allotment for the Texas Railroad Commission's (RRC) UIC program was \$631,720 in UIC programmatic funds; these funds are determined annually based on the annual well inventory numbers submitted by State UIC Primacy programs upon EPA request near the end of each calendar year. No UIC Special Project funds were awarded to the TX RRC in FY2019.

Grant Deliverables

Pursuant to EPA regulations and policies, environmental programs conducted on behalf of EPA will establish and implement effective quality systems. Correspondingly, the State program's Quality Management Plan (QMP) and Quality Assurance Project Plan (QAPP) must be validated annually. If both the QMP and QAPP are current and valid, EPA requires each state to certify annually that both plans are current by submitting updated signatory pages and organizational charts as applicable. The QMP [QTRAK #20-067] was approved by Region 6 on December 6th, 2019 and expires on December 6th, 2020. The UIC QAPP [QTRAK #20-070] was approved by Region 6 on December 16th, 2019 and expires on December 16th, 2020. Table 1 includes the workplan due dates and date of receipt for documents submitted by RRC as specified in the grant workplan.

Table 1. Grant deliverables in FY2019 UIC Workplan.

Grant Deliverable	Due Date	Date Received
Quarterly Reports (EPA Forms 7520)	4/30/2019 10/31/2019	Submitted on time
FY2019 Grant Application FY2019 Grant Workplan	The application/workplan were both due on 6/01/2018	Application received- 5/30/2018 Approved 7/09/2018 Workplan received- 5/30/2018 Approved 6/12/2018
Final Financial Status Report (FY19)	11/30/2019	11/22/2019
Annual UIC Program Report (FY19)	10/31/2019	10/03/2019
Update on Program, Regulatory or Statutory Changes	10/31/2019	10/03/2019
Annual QMP/QAPP Updates*	QMP- due 11/26/19 QAPP- due 11/29/19	Received- 12/03/2019 Approved- 12/06/2019 Expires- 12/06/2020 Received- 12/03/2019 Approved- 12/16/2019 Expires- 12/16/2020
UIC Well Inventory for FY19	1/01/2020	Submitted- 3/12/2020 Finalized 3/20/2020

* The Quality Management Plan (QMP) and Quality Assurance Project Plan (QAPP) are updated annually.

Inventory

The State UIC program annual inventory numbers are usually submitted during or near December each year. These values (along with values reported by other State and EPA UIC programs) are used by EPA to calculate the annual grant funds allocated to each State UIC program.

Since inception, the RRC UIC program remains the nation's largest Class II program by far based on the total number of Class II injection wells reported annually. Injection wells used in natural gas storage operations are also regulated by the RRC but are specifically excluded from regulation under the SDWA and not subject to EPA UIC oversight.

At the end of FY2019, the Commission's inventory of UIC wells was 55,313. The Commission processed 52,870 annual reporting forms (Form H-10) for disposal/injection wells and 816 annual reporting forms (Form H-10H) for hydrocarbon storage and brine mining wells.

Key Program Activities

This section includes an evaluation of key program measures as reported annually to EPA by the RRC through EPA's Forms 7520 and the annual narrative required in the annual UIC grant workplan.

Permitting

The previous Section 2 includes information on permitted wells regulated by the RRC. All injection wells authorized by the RRC are authorized through RRC permits. There are no authorized-by-rule injection wells regulated by the RRC.

In FY2019, the Commission received 2,230 applications for 2,425 disposal and injection wells and issued 1,437 permits for 1,603 wells. The Commission transmitted 212 applications to Docket Services for resolution through a hearing.

In FY2019, the Commission received 27 applications for 27 brine-mining wells and issued 14 new permits for 14 wells. The Commission received three new applications and five expansion applications for underground hydrocarbon storage. The Commission amended permits for 13 underground hydrocarbon storage wells and issued permits for six new underground hydrocarbon storage wells. The Commission issued one new permit for salt cavern disposal and amended no permits for salt cavern disposal wells in FY2019. Additionally, the Commission issued no new permits for caprock injection and amended three permits for disposal into caprock.

The East Texas Field is the only area in Texas for which operators have been granted an exception to the Area of Review (AOR) requirements of Statewide Rule 46. In FY2019, the Commission permitted one new and three amended noncommercial injection wells in the East Texas field. In FY2019, the Commission permitted two new commercial disposal wells and amended no commercial disposal well permits in the East Texas field.

Annual UIC Operator Reports

As part of their UIC surveillance, the RRC requires operators of injection wells to complete and submit

Form H-10 annually; Form H-10 includes specific well identification information and monthly measurements of injection pressures, injected volumes, and casing/tubing annulus pressures.

The Commission imposes additional permitting criteria and conditions for disposal wells in the Fort Worth Basin. The Commission expanded the AOR for these wells to an area of ½-mile radius. In addition, permit applicants for commercial disposal wells or for lease disposal wells proposing to inject over 5,000 barrels per day into formations above the Barnett Shale Formation in the Barnett Shale trend area are required to provide pressure influence information demonstrating that the injected fluids will be confined to the injection interval. In FY2019, the Commission received two applications for injection above the Ellenburger Formation. Permitted injection below the Barnett Shale Formation into the Ellenburger Formation, must be at least 250 feet below the top of the Ellenburger Formation, and is restricted to a maximum of 25,000 barrels per day. In FY2019, the Commission received no new permit applications for injection into the Ellenburger Formation in the Barnett Shale trend area.

Issues related to the Permian age formations in the panhandle are watched closely by the District Field office who makes permitting recommendations protecting areas of potential problems. The Commission imposes special conditions requiring bottomhole pressure (BHP) measurements for wells injecting into portions of the Brown Dolomite in the Texas Panhandle region. These wells are also subject to annual mechanical integrity testing. In addition, recently revised rules allow the Commission to require cement across critical zones which may be problematic. EPA held a teleconference on September 5th, connecting the staff at the Texas Railroad Commission and Oklahoma Corporation Commission counterparts to discuss the situation with those formations.

Class II Injection Well Inspections, Mechanical Integrity Testing, and Enforcement

Based on the reported values, more than half of the reported number of authorized injection wells in Texas are inspected annually and the RRC collects and reviews operator-submitted monitoring information from a large percentage of the Class II well inventory annually. Those numbers assure more than adequate inspection and monitoring surveillance actions.

One of the most important indicators of ground water protection in any UIC program is the mechanical integrity testing program, or MIT. A properly conducted MIT evaluates the condition of the well casing, tubing and packer to assure acceptable operating conditions. In most cases, an MIT is a pressure test of the casing/tubing annulus and the associated packer; a test failure may indicate a pathway for injected fluid to move out of the well into an underground source of drinking water. This procedure is required at least every five years for Class II wells; in some cases, more frequent testing is required depending on the completion and age of the well.

Based on the information provided by the RRC, EPA Region 6 believes the State UIC program compliance surveillance and enforcement program for Class II and III injection wells regulated by the RRC appears effective. A summary of focused oversight matters makes up the remainder of this evaluation.

Current Oversight Issues

In previous program evaluations EPA Region 6 has focused on three primary UIC program concerns:

Increased seismic activity related to authorized Class II disposal,

Apparent formation pressure increases in East Texas associated with authorized Class II disposal, and

Identification and delineation of aquifers exempted at Class II program primacy in 1982, and any aquifers exempted by the RRC since 1982 related to oil and gas operations.

Seismic Activity Related to Class II Disposal Injection

In previous reports, EPA expressed concern of the large number of earthquakes in North Texas. During 2016, the number of recorded seismic events in North Texas dramatically decreased. The RRC took actions to address this situation, including implementation of changes in permitting and operation requirements through amended RRC Rules 9 and 46. North Texas earthquakes have substantially diminished, however in the Permian Basin earthquake activity is an area of concern due to increased drilling and production.

Effective November of 2014, the Commission's Statewide Rules 9 and 46 were amended to require operators to provide information from the United States Geological Survey (USGS) regarding the locations of any historical seismic events within a circular area of 100 square miles centered around a proposed disposal well location. This requirement applies to all new disposal wells and similar amendment applications where pressure, volume, or interval changes are requested.

In addition, during FY2019, the Commission Seismologist and UIC staff produced a guidance document (SOG), titled "Permitting Saltwater Disposal Wells in Seismically-Active Areas of the Permian Basin". The SOG provided UIC staff with a consistent system for evaluating seismic hazard near a disposal well and appropriate permitting conditions. The SOG has increased disposal well permit application review confidence and decreased review time in seismically active areas. The Commission also increased UIC staff and modified staff organization to reduce its permitting backlog and increase overall performance and protection of groundwater resources.

These regulatory changes and new guidances to operators enhance RRC authority regarding seismicity related to Class II disposal, include new reporting and operational requirements for operators, and establish new permit application information to address seismic risk in problematic areas of the State.

For FY2019, the Commission initiated a seismicity review for 291 disposal well applications. Of those applications, 153 applications remain pending. UIC transmitted 56 applications to Docket Services for a hearing. The Commission issued 3 permits without special conditions and 65 permits with special conditions to mitigate risk of seismic activity. The applicant withdrew or the Commission returned 19 applications. An earthquake sequence near Timpson in Shelby County from September 4 to September 12, 2018, initiated an analysis by the Commission of the role of injection from two wells, and resulted in a response that included modification of one permit for lower volume and pressure, and cancellation of one permit.

EPA commends the RRC for implementing all the new seismicity procedures and permit actions discussed above.

East Texas Formation Pressure Increases Related to Class II Disposal

A large volume of produced brine in East Texas is injected underground into authorized Class II disposal wells. Many of those wells are permitted commercial facilities that receive exploration and production (E&P) oilfield wastes produced from East Texas and Northwest Louisiana. The volume of produced oilfield wastewater was largely due to increase brine production associated with the Haynesville Shale play. Injection of the increasing volumes of produced brine into Class II disposal wells in East Texas caused documented pressure increases in some geologic formations, primarily the late-Cretaceous Rodessa Formation. RRC records indicate that many production wells in East Texas lack cement between the well casing and Rodessa Formation; this cement void may provide a pathway for pressure transfer into another zone. Such transfer of pressure likely caused the observed high bradenhead pressures in some production wells in the area.

The Commission continues to study certain areas where formation pressures are elevated. The Commission continued its study of the effects of the increase in disposal well operations in the Rodessa and other formations in Harrison, Panola, and Shelby Counties of Texas related to the development of the Haynesville Shale. In January of FY2018, the Commission provided the Final Report for the East Texas Formation Pressure Project with EPA's funding assistance. The Joaquin area of northeast Shelby County was studied in detail in conjunction with staff from EPA and Louisiana Department of Natural Resources. A geologic boundary two miles south of Joaquin was identified between an area of elevated pressure and an area of lower pressure. This study is ongoing. The Commission continues to monitor the formation pressures in the Pergan-Marshall area in Harrison County. Annual bottomhole pressure testing three miles northwest of that area shows normal pressure, and the area 10-13 miles southeast shows elevated pressures.

In FY2019, the Commission received the results of bottomhole pressure tests from the operators of seven wells. In FY2019, the Commission issued 12 new permits and sent four application to hearing, all with a special condition to measure bottomhole pressure. In FY2019, the Commission denied six applications for new permits based on the results of previous formation pressure mapping. RRC has taken some positive steps toward evaluating and managing the East Texas pressure buildup situation. However, EPA continues to monitor the pressure situation and its potential impacts to USDWs.

Identification and Delineation of Aquifer Exemptions, Pre and Post-Primacy

EPA's FY2015 evaluation included the historical background of the RRC's approved UIC program related to Class II aquifer exemptions. RRC received additional UIC grant funds during FY2017 to query the RRC electronic databases for aquifers that may produce hydrocarbons from USDWs with the goal of identifying aquifers that existed at program primacy, therefore previously exempted from SDWA protection. RRC and Region 6 managers continued a dialogue on this matter through meetings in Austin and phone calls. RRC reported the effort is very resource intensive and staff continue to gather information in their records. RRC also requested additional funds from EPA to extend their initial database project (scanning of H-5s, MIT reports), which were granted in late 2016. RRC completed this effort in November 2017 and issued a report. EPA commends RRC for this resource intensive effort and found no significant issues regarding possible contamination of USDWs.

Special Projects

EPA has previously awarded special grant funds to the Commission, the results of which were realized in 2019. Funds were provided to add disposal formations and injected fluid types to the Commission's online Injection/Disposal query (online query), so that users of the online query can search injection/disposal well permits for those parameters. The Commission completed the first half of the Special Grant project in FY2018. The online query can now search by disposal formations. The Commission completed the second phase of the project to increase query functionality for injection fluid types, in FY2019. These new functions enhance the transparency of the Commission's UIC program by providing the public with a tool that aggregates UIC information by disposal formation and injected fluid type. The new functionality provides efficiency for UIC staff, enhancing their ability to protect groundwater resources. Future enhancements are anticipated.

The Commission and EPA headquarters have worked together to get Texas' mapped aquifer exemptions in the EPA's Interactive Aquifer Exemptions Map. The GIS dataset was delivered in FY2019. The Commission and EPA expect the data to be publicly available in FY2020. EPA commends the RRC for its valuable work using EPA special project funding and efforts to update EPA's Aquifer Exemption Map.

The Commission revised guidelines for performing step-rate tests. The revisions make clear that the purpose of

the step-rate test is to identify the fracture pressure and set out specific methods and deliverables to acquire the fracture pressure and clearly communicate the results of the test.

The Commission continues to make wise use of provided special funds to enhance data usability and visibility to the public.

Summary

The Railroad Commission continues to confront significant challenges in the program and has taken some innovative measures to address them. Emergent issues such as increasing West Texas seismicity and areas of significant pressure buildup have complicated management of the workplan commitments, but the Commission is to be congratulated on their efforts implementing such a large national program and wisely using their available resources. Despite some positive actions to manage the over-pressured injection formations in East Texas, EPA continues to have concern over the vulnerability for Underground Sources of Drinking Water in this area.