FISCAL YEAR 2023
EPA REGION 6 END-OF-YEAR EVALUATION RAILROAD COMMISSION OF TEXAS UNDERGROUND INJECTION CONTROL PROGRAM

Introduction

State Primacy programs are established under Sections 1422 and 1425 of the Safe Drinking Water Act (SDWA). Section 1422 requires primacy applicants to meet EPA's minimum requirements for UIC programs. Section 1425 requires primacy applicants to demonstrate their standards are effective in preventing endangerment of USDWs. Section 1425 programs are not required to meet EPA's minimum requirements.

Under 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) 2023 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.

FY2023 Grant Application/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.

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) must be updated annually, and the Quality Assurance Project Plan (QAPP) must be updated every three years (at the least). 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 RRC has maintained current quality documents as required and approved by EPA Region 6.

The grant workplan includes tasks detailing activities covering Monitoring and Assessment of Injection Facilities, Plan Review and Permit Processing, Administration and Program Development, Training and Technical Assistance, Enforcement and Surveillance, Public Participation, Data Management, and any Special Projects which may be funded. This report includes an evaluation of key program measures as reported annually to EPA by the RRC through EPA's Forms 7520 and an annual narrative required in the annual UIC grant workplan.

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.

The Railroad Commission's activities in administering the UIC program include not only Class II injection wells, but also hydrocarbon storage wells, Class III brine mining wells, and Class V geothermal and brine wells. The RRC is also began the pre-application process for obtaining primacy for Class VI carbon capture and sequestration activities.

At the end of FY2023, the Commission's inventory of UIC wells was 50,802. This is a decrease of approximately 2.6% from September 30, 2022, and approximately 5% from Fiscal Year 2021. See the table below for the current inventory of UIC wells by UIC class.

UIC Class	**Wells Permitted**	**% of Total**
IIR – Secondary Recovery / EOR	37,251	73%
IID - Disposal	12,823	25%
IIH – Liquid Hydrocarbon Storage	522	1%
III – Brine Mining	206	<1%
Total*	50,802	

* 434 wells in the Total are Gas Storage from base of 50,802

Permitting
All injection wells authorized by the RRC are authorized through RRC permits. There are no authorized-by-rule injection wells regulated by the RRC.

As reported by the RRC to EPA, in FY 2023, the Commission received 1240 applications for 1411 disposal and injection wells and issued 947 permits for 1090 wells. The Commission also resolved 139 applications through hearings conducted by the agency.

In FY 2023, the Commission received 18 applications for 18 brine-mining wells and issued 4 new permits for 4 wells and amended permits for 13 brine-mining wells. The Commission received 7

new applications and 10 expansion applications for underground hydrocarbon storage. The Commission amended permits for 99 underground hydrocarbon storage wells and issued permits for 13 new underground hydrocarbon storage wells. The Commission received no applications for salt cavern disposal wells in FY 2023. Additionally, the Commission issued no permits for caprock injection.

Well Completions

The RRC has made a concerted effort over the past few years to enable online reporting and filing of applications and compliance data. In FY 2023, the Commission's online system for filing and processing Completion Reports for Oil, Gas, and Injection wells (Forms W-2/G-1) tracked approximately 5,001 completion packets for injection/disposal wells, each of which was reviewed for permit compliance.

Mechanical Integrity Test (MIT)

In FY 2023, operators performed 17,762 MITs and the Commission reviewed 27,987 reports for MIT pressure tests of disposal and injection wells. The Commission's district inspectors witnessed approximately 40 percent of the 7,133 of the MITs performed by operators on permitted UIC wells. The Commission approved tubing-casing annulus credit (TCAM) in lieu of mechanical integrity testing for 5 wells. Each of these wells was inspected to verify credible wellhead monitoring.

In FY 2023, in lieu of pressure tests, the Commission received the reports of 4 radioactive tracer surveys and 6 temperature surveys. The Commission also received reports of 47 MITs for hydrocarbon storage wells (e.g., nitrogen-brine interface tests) and 59 MITs for brine-mining wells (e.g., static fluid pressure tests).

Annual Reports

The Commission processed 49,276 annual reporting forms for disposal/injection wells (Form H-10) and 845 annual reporting forms for hydrocarbon storage and brine mining wells (Form H-10H).

The Commission's online filing system for Form H-10s has increased the availability of information relating to injection and disposal volumes for public review, as well as enhancing internal agency reviews. The system helps to increase the number of annual compliance reviews.

Inspection

The Commission's district offices reported 35,544 routine inspections of injection, disposal, and storage wells in FY 2023. This represents approximately 71% of UIC wells that submitted an annual report for this fiscal year. The district offices continue to maintain a high level of activity in support of the UIC program and remain an important part of program operation.

Enforcement

In FY 2023, the Commission took a total of 14,758 enforcement actions against operators of disposal and injection wells. Of these actions, 3,100 were notices of violation for failure to timely

file the annual reporting forms and 488 were notices of violation for failure to conduct a pressure test within the time required by the Commission. The Commission also issued seal orders for 82 disposal and injection wells, and severed pipeline connections on 842 wells/leases due to delinquent annual reporting forms and failure to conduct required MITs.

In FY 2023, the H-10 online system initiated the review of reports and issued 600 notice of violation letters, representing 1,912 violations for 1,130 wells. Of those violations, 550 notice of operating violations were for excessive pressure and volume or injecting out of zone. The Commission issued 18 seal/pipeline severance orders when operators failed to comply these notices of violation.

In FY 2023, the Commission issued 3,086 seal orders and pipeline severances for violations associated with the UIC program resulting in $699,000 lease reconnection fees. The Commission signed 5 consent agreements and administrative orders for enforcement actions associated with the UIC program. Enforcement actions resulted in penalties of $12,500 violations associated with the UIC program.

In FY 2023, the Commission initiated a delinquent operator project in which the injection and disposal permits of delinquent operators were reviewed. The Commission implemented procedures, contacted delinquent and inactive operators, and cancelled 968 permits. Additionally, the Commission enhanced the projects in which expired injection and disposal permits are reviewed monthly, issued letters to operators, and cancelled 478 permits.

Area-Specific Issues

In previous program evaluations EPA Region 6 has focused on various UIC program concerns which continue to warrant attention with this evaluation. These include apparent formation pressure increases in East Texas, the Fort Worth Basin, and other areas with pressure concerns associated with authorized Class II disposal including the Permian Basin. Increased seismic activity related to authorized Class II disposal, particularly in the Permian Basin of West Texas also has been a focus area. The review and amendment of aquifer exemptions in some producing basins has been an ongoing project where the RRC has cooperated with the EPA to document historical practices. EPA and the RRC have also discussed the increased interest in Class VI CO2 Geosequestration in the state and interest by operators in the transition of acid gas well projects for sequestration. These issues are discussed below.

East Texas Field

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 FY 2023, the Commission permitted no new wells and amended 7 non-commercial injection wells in the East Texas field. Commercial disposal wells in East Texas Field are subject to the AOR requirement and special permit conditions that include open-hole logs to verify formation tops, cement bond logs to confirm formation isolation, and radioactive tracer surveys to ensure confinement. Many logs and surveys are witnessed by district office staff. In FY 2023, the Commission permitted no new or amended commercial disposal wells in the East Texas field.

Fort Worth Basin
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 FY 2023, the Commission received no 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 FY 2023, the Commission received applications for no new wells to inject into the Ellenburger. The Commission permitted no new wells for injection into the Viola, Simpson, and Ellenburger Formations in the Barnett Shale trend area. No permit applications remained pending as of the end of FY 2023. In FY 2023, the Commission also amended permits for no new wells permitted to inject into the Ellenburger.

Panhandle
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.

Harrison, Panola, and Shelby Counties
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 2018, 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. 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 FY 2023, the Commission received the results of bottomhole pressure tests for 10 wells in Harrison, Panola, and Shelby counties. In FY 2023, the Commission issued
11 new permits and 4 amended permits with a special condition to measure bottomhole pressure. In FY 2023, the Commission denied 2 applications for a new permit based on the results of previous formation pressure mapping.

The RRC continues to coordinate and cooperate with the State of Louisiana and EPA in evaluating issues as they arise.

Seismicity

The Commission's Statewide Rules 9 and 46 were amended in 2014 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. The RRC developed a standard operating guideline (SOG) document in 2019 titled "Permitting Salt Water 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 increased disposal well permit application review confidence and productivity in seismically active areas.

During FY 2022, the Commission Seismologist and UIC staff produced an additional SOG, titled "Response Plan to Seismic Events in Texas". The SOG provided UIC staff with a consistent system for responding to seismic events; thereby, clarifying procedures and steps already taken on an ad hoc basis. The SOG introduced the following terms: 1) Seismic Event of Significance (SES), 2) Seismic Investigation Region (SIR), and 3) Seismic Response Area (SRA). The SOG provided UIC staff with guidance on gathering additional data from operators of both saltwater disposal wells and completion stimulation wells in SIRs and in other areas, and guidance on implementation of response actions that can include both voluntary and non-voluntary curtailments and limits on existing permit conditions. EPA is pleased the RRC has continued to refine their approach to seismicity response, particularly in the Permian Basin.

For FY 2023, the Commission initiated a seismicity review for 275 disposal well applications. Of those applications, 77 applications remain pending. The Commission issued 8 permits without special conditions and 119 permits with special conditions to mitigate risk of seismic activity. The applicants withdrew or the Commission returned 61 applications. UIC staff transmitted 27 applications to Docket Services for hearing.

During FY 2023, Commission staff took several actions to adjust previously established SRAs. Further voluntary and non-voluntary curtailments were made in response to unacceptable increases in seismicity. Some voluntary curtailments of shallow injection were ended and eased back to original permit conditions in certain areas based on the conclusion that shallow injection is less of a seismic hazard than deep injection in those areas. EPA recognizes the efforts by the RRC to increase contributions to the seismic array system through both voluntary actions agreed to by operators or conditions imposed by the agency to monitor seismic activity.

The RRC makes publicly available the actions in the various SRAs and copies of the Operator Led Response Plans (OLRPs) on the Commission's website. https://www.rrc.texas.gov/oil-and-gas/applications-and-permits/injection-storage-permits/oil-and-gas-waste-disposal/injection-disposal-permit-procedures/seismicity-review/seismicity-response/. The established SRA are discussed below.

Midland-Odessa (Gardendale) SRA
During FY 2023, the magnitude and frequency of earthquakes declined since deep disposal prohibition in December 2021, with the December 2022 M5.2 Range Hill event being a significant departure. The SRA was enlarged after the December 2022 M5.2 Range Hill event, and deep disposal in this SRA ended in December 2022. Deep disposal had continued in the SRA up to that point by two operators of four wells because the results of the show-cause hearings held in April and May of 2022 were not concluded. Following the M5.2 Range Hill event, the two operators withdrew the show-cause hearings and agreed to end deep disposal at the four wells. A new operator group was formed to manage seismicity, and a new OLRP was approved in May 2023, focusing on the Range Hill part of the SRA. An amended OLRP was approved in August 2023, and the Commission's staff ended the request for voluntary curtailments of shallow well injection volume.

Northern-Culberson Reeves (NCR) SRA
During FY 2023, the magnitude and frequency of M2 and M3 earthquakes continued with no significant change. There has been a decline of M3.5 and greater events, recently. A departure from that decline trend occurred with the M5.4 Coalson event on November 16, 2022. The SRA was enlarged after the November 2022 M5.4 Coalson event. An amendment to the OLRP was approved in December 2022. Deep disposal volumes have had significant reductions. In the amended OLRP, the schedule of deep well volume curtailments was accelerated by three months, and the level of curtailment was lowered. As of June 30, 2023, 19 of the 23 deep wells in the OLRP are limited to 7,500 barrels per day (bpd), 2 wells are limited to 10,000 bpd, and 2 wells are not participating in the OLRP. Operators agreed to cancel all existing deep well permits in the SRA for wells not drilled. The shallow well portion of the OLRP was not amended and, shallow well response actions and curtailments continue unchanged. Commission staff increased the frequency of technical meetings and data sharing with New Mexico UIC staff in January 2022. The Commission continues meeting with New Mexico staff to discuss seismic data and seismicity management.

Stanton SRA
During FY 2023, the magnitude and frequency of earthquakes was stable but recurrent. Voluntary curtailments of deep well injection volumes are in place based on the OLRP. In August 2023, the Commission's staff ended the voluntary curtailments of shallow well injection volume.

Other Notes on Seismicity and SRAs
During FY 2023, each SRA operator group provided detailed periodic updates to Commission staff, quarterly. A new Operator group formed to manage seismicity in the Knott SIR which is northeast of the Stanton SRA. Another Operator group is watching the seismic activity in the Camp Springs area on the Scurry-Fisher County line. The Stanton OLRP group is managing the uptick in seismicity just outside the Stanton SRA boundary to the west and UIC staff began an internal review of the shallow injection permitting.

EPA commends the RRC on working with operators to reduce the intensity of earthquakes in west Texas, utilizing operator led groups to manage seismicity, while using their authorities to impose

monitoring conditions and prohibiting deep disposal when necessary.

USDW / Aquifer Exemption Review

In November 2017, the Commission produced a report, “State of Texas Aquifer Exemption Project”, and statewide digital maps of aquifer exemptions from oil and gas fields as they were at the time the Commission received UIC primary enforcement authority, April 23, 1982. The Commission also reviewed its UIC inventory to determine if any wells were permitted to inject into aquifers with Total Dissolved Solids (TDS) of 10,000 ppm or less, which would be an Underground Source of Drinking Water (USDW) if not granted an aquifer exemption. Commission staff continues to review UIC permits in Texas to ensure protection of USDWs. If Commission staff discovers a UIC permit that could threaten USDWs, staff determines whether an aquifer exemption should be pursued or if the permit should be modified or terminated. The Texas Water Development Board (TWDB) also reviews aquifer resources in Texas for water quality and may be required to review oil, gas, and injection wells to perform their duties. TWDB staff notifies Commission staff of any UIC permit that could threaten a potential water resource.

In FY 2023, the Commission staff reviewed 29 wells and notified operators that their permits may be injecting into aquifers with TDS ≤ 10,000 ppm. Following review, the Commission amended UIC permits for two wells. Operators for seven wells provided information that showed the wells were not injecting into aquifers with TDS ≤ 10,000 ppm or that the aquifers were exempted. Reviews for 18 wells remain pending as the RRC is cooperating with operators to acquire additional data to refine their understanding of the reservoirs.

In FY 2023, the Commission notified EPA of possible actions for the expansion of existing aquifer exemptions for enhanced oil recovery projects in producing basins and is in the process of issuing 2 new aquifer exemptions. EPA staff has worked with the RRC to gather the necessary documentation to process these amendments, and appreciates the work being done by state ground water advisory units to continue to evaluate injection activities with respect to drinking water aquifers, terminating injection in cases where there could be a threat to water resources. EPA encourages the state to continue working closely with EPA staff on evaluation of aquifer exemptions.

Special Project Grants

The Commission continued to improve the efficiency of its Underground Injection Control (UIC) program through an information technology project that improves the organization, accessibility and transparency of injection, disposal, and storage well data. The Commission contracts with a digital imaging provider (Neubus) for these services and with this project, the Commission expanded public and industry access to UIC permit and monitoring information.

In FY 2023, the Commission enhanced the configuration of the UIC number field in the "Mechanical Integrity Tests - Form H-5, Brine Mining & Storage Cavern MIT/SONAR Surveys" in the Neubus profile. The Commission modified and enhanced the page sort order of the Disposal, Injection wells, Brine mining wells and Storage Cavern wells in the Neubus profiles. The sort order was modified such that new uploads into existing records are appended to the top. In addition, the Commission added “TIFF” file format upload capability to Neubus profiles.

IT Infrastructure and Data
The Commission continues its Mainframe Transformation Project, including projects awarded to the Groundwater Protection Council (GWPC) since FY 2020. The Commission deployed Release 1 in February 2022, subsequent modifications to that system and new functions have been added in FY 2023. In FY 2024, the Commission will build new systems for surface disposal facilities, gas storage permits and reporting.

In FY 2023, the Commission required all Form H-10s to be filed online. This new requirement decreased program cost and increased annual report review efficiency. EPA encourages the RRC to continue the trend of digitization of historical records, online reporting of compliance data, and continue enhancing the ability of the public to access and analyze the existing data.

External Participation
The Railroad Commission continues to actively participate in activities concerning UIC and other groundwater protection issues that involve activities external to the Commission, including the Texas Groundwater Protection Committee (TGPC), the Interstate Oil and Gas Compact Commission (IOGCC), and the Groundwater Protection Council (GWPC). EPA recognizes the commitment and efforts of the RRC to further staff continuing education. UIC staff continues to assist Texas Water Development Board (TWDB) staff on their evaluation of Texas aquifers for brackish water production in areas of injection and evaluation of potential water availability.

Commission staff attended the following meetings during FY 2023:
- October 2022 - IOGCC Annual Conference in Baltimore, Maryland
- February 2023 - Permian Basin Water in Energy Conference in Midland, Texas
- March 2023- Produced Water Conference in Midland, Texas
- May 2023 - Oilfield Water Market Booth Participation in Dallas-Fort Worth, Texas
- September 2023 - GWPC's Annual Forum in Tampa, Florida

Class V-Geothermal and Brine Mining Injection Wells
The 88th Legislature assigned or clarified jurisdiction over the following UIC Class V activities: closed-loop geothermal injection wells, brine-mining injection wells used to return brine after the extraction of halogens, including lithium, or other elements and hydrogen storage (whether sourced from oil and gas or not). RRC has primacy for geothermal wells. The Commission will issue rules for Class V brine extraction injection wells and then must apply to EPA for primacy prior to implementation.

Class VI-Carbon Capture and Sequestration Activities
In July 2022, RRC received its first permit application for a geologic storage facility to store anthropogenic carbon dioxide (UIC Class VI) and in July 2023, RRC received its second application. Both permit applications have received initial review and letters detailing issues and deficiencies have been sent to the operators. RRC submitted a pre-application for primary enforcement authority for the UIC program ("primacy") to EPA and made changes to its rules to ensure that the Commission's rules meet the minimum standards required by EPA for primacy. EPA appreciates the RRC staff efforts and cooperation to complete its primacy application, maintaining close

communication with the Region and Headquarters in working to address all outstanding issues to enable a complete application. EPA recognizes RRC efforts to add staff to assist in review of Class VI applications and any future administration of Class VI primacy.

Summary

The Railroad Commission continues to confront significant challenges in the program as well as increasing workloads. There has been increasing public interest in Class VI wells, primacy application status, and RRC activity which may not directly involve the underground injection program such as orphaned or purging oil and gas wells. EPA continues to maintain a heightened awareness of areas where there remain vulnerabilities of underground sources of drinking water (USDWs), particularly in areas of continuing seismicity in portions of West Texas as well as areas receiving interest in carbon sequestration. The RRC is commended for establishing response areas in relation to seismicity requiring additional monitoring, reduced injection volumes, and increased information sharing. EPA also appreciates cooperation of state staff in the several proposed sequestration applications which will require both a federal and a state permit.

EPA continues to have concerns for any operator proposal for the use of Class II H2S wells for Class VI CO2 geologic storage. EPA appreciates the engagement of the RRC staff to share information with the Region and Headquarters and evaluate and understand these proposals in relation to the federal rules and guidance. The RRC should continue to evaluate all such proposals to ensure that the permitted activity remains consistent with normal Class II operations for acid gas disposal and continue to coordinate with EPA Region 6 when there are questions regarding a specific operator proposal for such projects which may be more appropriate for a Class VI permit.

EPA encourages the Railroad Commission to continue to work with other state agencies such as the Bureau of Economic Geology and Texas Water Development Board as well as engaging operators to address areas of public concern regarding abandoned wells, leaking wells, and citizen complaints. While some of the emergent issues may not be injection related, the RRC should continue to assess the possible contribution of injection activity when evaluating the conceptual models around problem areas. EPA would like to continue to work with the RRC in understanding these issues and concerns, thus providing EPA and the public with transparent information. The Commission is to be congratulated on their efforts effectively implementing such a large national program and wisely using their available resources.