UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1201 ELM STREET, SUITE 500
DALLAS, TEXAS 75270

February 9, 2021

Robyn Strickland, Director
Oil and Gas Conservation Division
Oklahoma Corporation Commission
P.O. Box 52000-2000
Oklahoma City, OK 73152-2000
Robyn Strickland <Robyn.Strickland@occ.ok.gov>

Dear Ms. Strickland:

Enclosed is our evaluation of the Oklahoma Corporation Commission (OCC's) Class II Underground Injection Control (UIC) program performance during state fiscal year 2020 (FY20). By e-mail on January 7, 2021, we invited OCC comments on the draft evaluation and there were no suggested changes.

EPA commends OCC on its creation of the Permian restricted area to help improve protection of Underground Sources of Drinking Water (USDWs). EPA is concerned that stricter controls on the production side of oil and gas activities may be required to fully resolve the site problem.

We thank you and your staff for your efforts in the implementation of this challenging program. We consider our open dialogue a key component of effective communication between our agencies. If you have any questions on the evaluation report or the revision requests, you may contact Troy Hill, my Deputy Director at (214) 665-6647, or your staff may call Jim Brown or Ken Johnson of my staff at (214) 665-7150.

Sincerely,

Charles Maguire

Charles Maguire
Director
Water Division

Enclosure

cc: Patricia Downey, OCC UIC Manager, w/encl. (Patricia.Downey@occ.ok.gov)
Charles Lord, OCC Manager Induced Seismicity Manager, w/encl. (Charles.Lord@occ.ok.gov)
Matt Skinner, OCC Public Information Officer, w/encl. (matt.skinner@occ.ok.gov)

EPA Region 6
End-Of-Year (EOY) Review

Oklahoma Corporation Commission (OCC)
Underground Injection Control (UIC) Program

State Fiscal Year 2020 (SFY2020)
July 1, 2019, through June 30, 2020

INTRODUCTION

EPA has approved the Oklahoma Corporation Commission (OCC) as the primary enforcement agency for the State's Class II Underground Injection Control program. Simultaneously, the Oklahoma Department of Environmental Quality (ODEQ) implements the applicable State UIC program for all other injection wells except Class VI in Oklahoma. EPA retains primary authority for all Class VI, and Class I, III, IV and V on certain Indian Lands, and Class II on some Indian Lands not under the authority of OCC. This annual review considers the approved State UIC program administered by OCC, including the UIC grant work plan and other program activities, between July 1, 2019, and June 30, 2020.

EPA is in the process of creating a new methodology for internal and oversight reviews across all programs. This process is currently in the draft development and approval stage and is described in this paragraph and the subsequent following two paragraphs but is not yet final. The first part of the process defines an 'Annual Check-In' between EPA and the permitting authority to discuss and agree on planned oversight topics for the next year. The basis of the check-in meeting would be the upcoming fiscal year's agreed Workplan, with a focus on the items to be reported to EPA and items on which we will be concentrating our oversight.

Plans also include using existing 7520 reporting data and inventory numbers. HQ may utilize prebuilt Qlik graphs[1] (part of the same online reporting system) to conduct national comparisons among various delegated permitting programs. It is not sure whether this is for internal reporting or the primacy agency report, but we wanted to let you know of the discussions.

An 'Annual Check-In' virtual meeting was held on December 15th. Currently, no changes in oversight from the approved 2021 Workplan are planned. Details of our annual meeting are covered in Appendix A.

EPA representatives solicited comments on EPA's annual end-of-year (EOY) draft evaluation report with OCC via e-mail on December 2, 2020, and an updated version on January 7th. We received a response that it looked good and they had no comments. Appendix B contains OCC's annual narrative required in the UIC grant work plan.

OCC's Induced Seismicity Department continues to effectively manage induced seismicity, as demonstrated by the continued decrease in the number and severity of events. OCC is highly

[1] https://uicdata.epa.gov/apex/uicinv/

commended for its diligence and actions related to addressing seismicity in the state. The EPA would also like to acknowledge the OCC's staff cooperation and willingness to share information.

This report consists of six main sections: Introduction, Grant Work Plan, Program Revisions, Special Issues, UIC Oversight Issues, Induced Seismicity, and Summary and Recommendations.

GRANT WORK PLAN

STATE FISCAL YEAR UIC GRANT

OCC's applications for SFY2020 was for a total of $437,225 in Federal funds. EPA approved and awarded $252,000 as of the Federal 2020 allotment for the State of Oklahoma's UIC program administered by the OCC under G-006224-20. Also, EPA awarded OCC $33,618 in UIC Special Project funds in SFY2020. Altogether, this brings the total awarded to $285,618. Work plan Deliverables: OCC submitted all required State program updates and other deliverables required during SFY2020.

As shown in Figure 1, the UIC grant allocation has gradually decreased over the last ten years, while inventory has increased. Additionally, on more than one occasion, federal funding has been late due to federal budget issues.

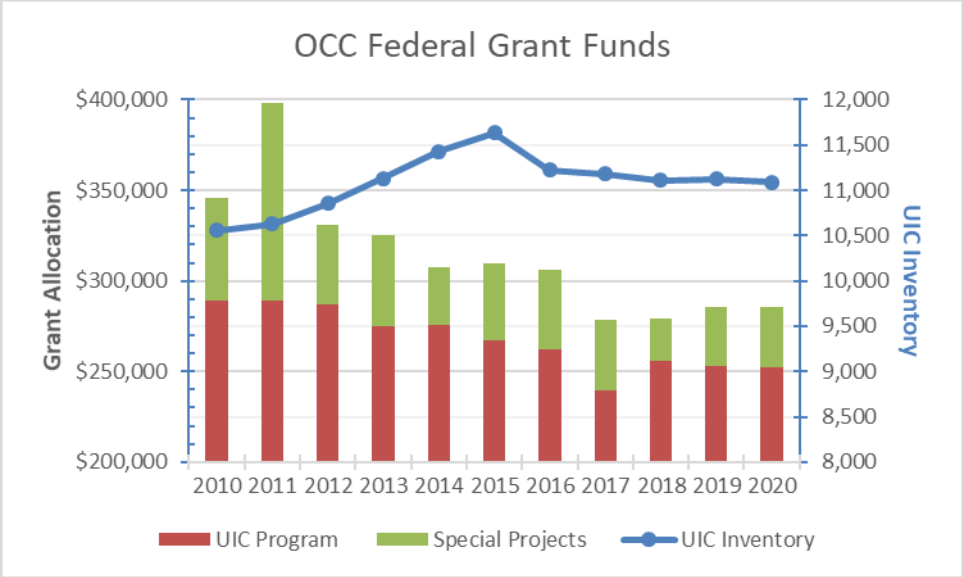

Figure 1: UIC Grant Funding

SPECIAL PROJECTS

EPA commends OCC on its continuing commitment to improving its information resource database through the Special Projects initiative to georeferenced archival aerial photos. The OCC Narrative in Appendix A describes the status of OCC's special projects for the year. Close to an additional 10,000 archived images across the state have been georeferenced using part-time help funded through special projects. This georeferenced effort increases the easily usable historic images to 34% of those collected scanned under the earlier project phase.

MULTIPURPOSE GRANT

OCC UIC received a special Multipurpose grant (MPG) for the Brown Dolomite project, not connected to the regular OCC UIC FY2020 grant; the grant # was #AA-01F693-01. The grant was for $65,273 in Federal Funds; no state matching funds were required or included. Appendix C contains the narrative describing the grant.

PROGRAM REVISIONS

CLASS II DRAFT SECTION 1425 PROGRAM REVISION

OCC submitted updates for the Safe Drinking Water Act Section 1425 program to EPA on September 26, 2011. This submittal is pending EPA review but will need to be updated for all the program changes since submittal.

CLASS V DRAFT SECTION 1422 PROGRAM REVISION

In a draft joint program submission with ODEQ dated June 30, 2000, OCC sought UIC Primacy authority for certain Class V activities: Reinjection of spent brine into the same formation following halogen removal; and aquifer remediation wells associated with leaking petroleum storage tanks. In 2002, at EPA's request, both Agencies submitted regulatory crosswalks that compare applicable State rules and regulations with the corresponding Federal regulations at 40 CFR 144 through 148. This primacy request remains unresolved as discussed in the following two paragraphs.

After numerous discussions and communications, the last being a letter from Mr. Tim Baker transmitted to Larry Wright in a letter dated August 5, 2005, OCC's proposed regulations for Class V wells under "jurisdiction" of OCC Oil and Gas Division "in response to Region 6 comments received in April 2002." Those proposed regulations cite applicable Federal UIC regulations regarding applications for a "Class V underground injection well (a brine mining underground injection well)." The wells in question are spent brine return wells following halogen removal [Class V, by rule at 146.5(e)(14)], not Class III brine mining wells. Also, the rulemaking does not address the Class V aquifer remediation wells associated with AST and UST cleanup operations under the OCC Fuels Division authority, referring only to "brine mining" wells, which are currently under ODEQ jurisdiction. Mr. Baker's transmittal letter indicates that the proposed regulations are in response to EPA's "April 2002" comments. Other issues regarding EPA's crosswalk comments remain to be addressed and resolved.

This topic remained on hold during the seismicity crisis and has yet to conclude. A resolution of this longstanding authority issue by a joint OCC and ODEQ 1422 final Class V revision package is crucial. EPA requests OCC's Oil & Gas Conservation Division Director work with ODEQ's management to finalize this portion of the 1422 Program Revision process.

CONSIDERATION OF CLASS VI SECTION 1422 PROGRAM REVISIONS

With economic incentives becoming more available, proposed plans for Class VI wells have significantly increased with petitions across the US in various development stages. EPA Region VI anticipates numerous submissions that will be handled by direct implementation until the respective states request and receive primacy for the program. UIC Class VI falls under the Safe Drinking Water Act Section 1422, not 1425, and must be equivalent in stringency to federal rules.

If either OCC or ODEQ plans to issue any UIC Class VI permits, as permitted in their state rules, they will have to request primacy from EPA. This course of action will be a major program revision for both agencies and be time-consuming.

SPECIAL ISSUES

OCC has kept EPA apprised of Permian age (geological age) injection activities, notably in the Brown Dolomite from near the panhandle to central Oklahoma. The Permian area denotes west and central Oklahoma, where Permian age sediments outcrop at the surface.

As reported in last year's review, the EPA held a teleconference on September 5th, 2019, connecting the OCC staff with counterparts at the Texas Railroad Commission to discuss the situation. OCC shut in four saltwater disposal wells near a saltwater purge occurring at the Blaine-Kingfisher County border. Additional problems with saltwater coming to the surface have occurred further away. OCC UIC has limited injection volumes into Pennsylvanian age zones and stopped approving new disposal into Permian age zones within the Permian restricted area. On December 6, 2019, OCC Chairman Hiett requested EPA staff assistance to advise and assist in this critical matter. EPA has been analyzing voluminous data that OCC has acquired on the case and maintains close communication with OCC and ODEQ during our ongoing support period.

Most of the actions and meetings related to the Blaine-Kingfisher saltwater purge were held in FY 2021 and will be discussed in next year's review. However, a few observations may be helpful. As with the seismicity issue, the in-depth look at this issue requires a practical application of several diverse specialized skill sets to complement your existing staffs' abilities. Ideally, these would be with at least two staff dedicated to the special project and working with the operational and UIC staff to ensure the best results.

As an analogy, to build a tall building, either a civil or geological engineer certifies that the formation used for the foundation is sufficient to prevent the building from tilting or collapsing. Someone with specialized petroleum engineering or rock mechanics can certify or calculate that a particular formation will not fracture during the cementing run at a casing shoe, thereby maintaining the unit's confinement. Additionally, they can specify critical parameters necessary to get interpretable test results. Within the petroleum engineering training additional specialization is common. Both production and reservoir experience are necessary components to solving this issue.

As with the seismicity issue, this problem has generated an enormous amount of data. While EPA understands a project to create a separate dashboard is at least in the discussion, reformatting the data into useful information to act upon is critical. Data engineering with visualization may be a highly beneficial option. However, this is heavily time intensive as the data has to be cleaned up, reworked, and analyzed with numerous scenarios run. The benefits could include 3D graphics to clarify the problem and spatial statistical analysis.

EPA UIC OVERSIGHT ISSUES

EPA has expressed concerns with some aspects of the OCC permit process over the years. These concerns primarily focus on OCC's area of review process, financial surety requirements, permit stipulation tracking, and gaps in permit coverage.

PERMIT TIMELINESS AND EFFECTIVENESS

The new proposed draft EPA permitting oversight procedure under discussion includes a focus on permit timeliness and effectiveness that does not directly translate to a UIC oversight program as systematic reviews of State issued permits are not typical.

INSPECTIONS AND MECHANICAL INTEGRITY TESTS (MIT)

OCC continues to conduct and witness (Appendix B) annual mechanical integrity tests for well over 20% of the inventoried injection wells. This practice results in OCC's success at exceeding the minimum five-year MIT requirement for all wells in the inventory. EPA commends OCC for its MIT program accomplishments, for witnessing most of the MITs and improved tracking of RATs beginning in SFY2018. Figure 2 shows various MIT and field metrics, including the number of MIT's witnessed and the number of site inspections.

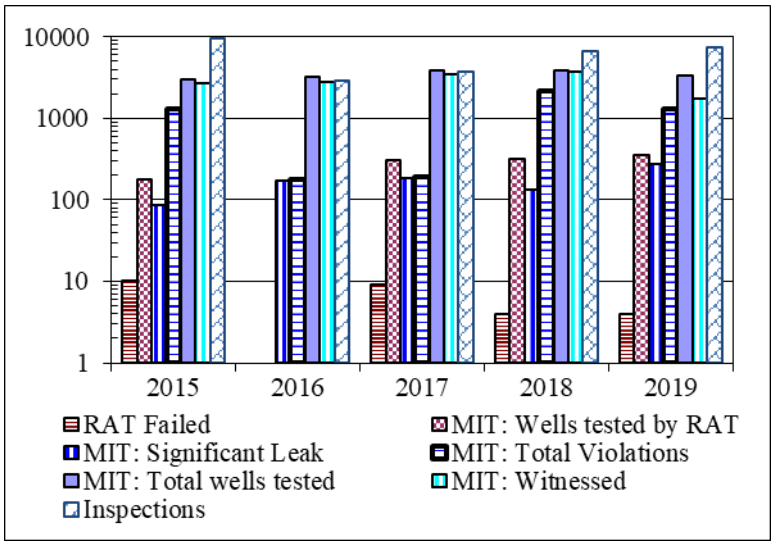

Figure 2: Mechanical Integrity

ENFORCEMENT ACTIONS

Figure 3 provides a summary of OCC enforcement actions. The absence of Monitoring and Reporting entries for years 2015 and 2017 represents either a failure of RBDMS to provide the required information or erratic tracking that EPA did not catch at the time.

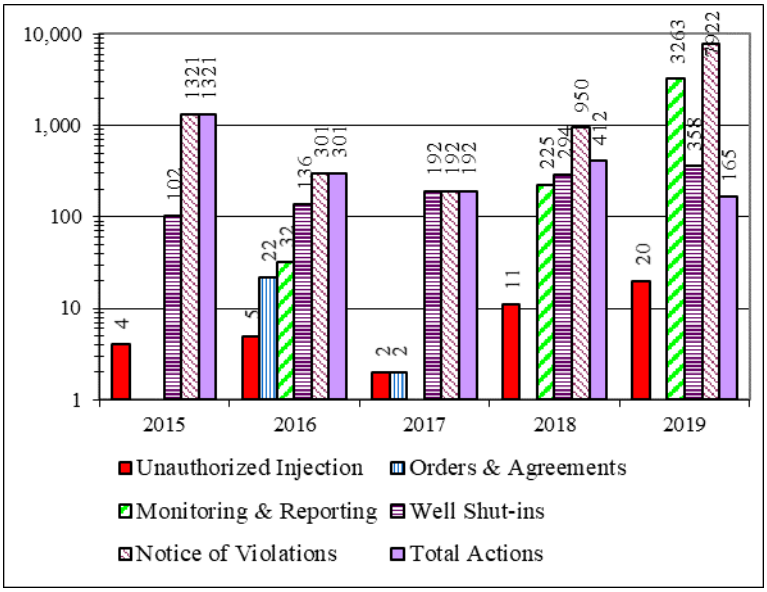

Figure 3: Enforcement Actions

INDUCED SEISMICITY

Currently, OCC's Induced Seismicity (IS) Department deals with ongoing issues with completion generated events in the Scoop and Stack play and a series of events near Quinton, Oklahoma, where a shallower injection zone may be in communication with the Arbuckle.

SUMMARY AND RECOMMENDATIONS

EPA commends OCC for continuing to clean up known data issues in RBDMS. EPA commends OCC on its creation of a Permian restricted area, in central and west Oklahoma, to help improve the protection of Underground Sources of Drinking Water (USDWs). EPA is concerned that stricter controls on the production side of oil and gas activities may be necessary before there is any improvement. OCC Pollution Abatement initiated the appropriate response actions and has held both

internal and joint EPA-OCC meetings on the topic. Within the existing framework of regulations, they have done very well.

While the technical analysis of the available purge related data continues, it seems likely that the cause will be from a combination of issues. Issues may include local geology, allowed historic production practices, (both construction and cementing), and allowed injection into formations that appear to be, in hindsight, inappropriate whether through lack of reliable containment or by adding pressure to an already over-pressurized system. If analysis supports those conclusions, OCC will be facing a difficult decision on whether rule changes or restrictions will help manage or reduce the likelihood of another purge.

APPENDIX A: ANNUAL CHECK-IN

The Annual Check-in was held virtually on: December 15, 2020
In attendance:

EPA	**OCC**
Nancy Dorsey	Patricia Downey
Ian Ussery	Charles Lord
Ken Johnson	Robyn Strickland
Arnold Bierschenk	Mike McGinnis
Michael Vaughan	Jeffery Myers

The draft End of Year and findings were discussed, along with draft new procedures for oversight and tracking that EPA is currently developing.

Next year's area of oversight, which is actually the current year, covers the approved Workplan along with areas already under discussion: the purge issue mentioned earlier, along with technical discussions on formation fracture pressure derivation used to decide on allowable injection/disposal pressures; and use of Hall Plot analysis.

In addition, it was agreed to hold a meeting to go through the 7520 definitions. There is a national push for more consistency in how to enter the data. Region 6 started the process of working through the definitions with another state's UIC agency.

APPENDIX B: YEAR-END NARRATIVE

Oklahoma Corporation Commission
Underground Injection Control
Class II Wells
Year-End Narrative
Workplan 2020
7/1/2019-6/30/2020

Oklahoma Corporation Commission (OCC) implemented a successful Program in FY 2020 meeting or exceeding most of the established targets as determined in Workplan 2020. The attached "Annual Report Card", depicts a summary of Activities.

OCC currently has an inventory of approximately 11,086 active UIC wells.

Total UIC applications and orders submitted were 426 for the year: 86 Disposals, 124 Injectors, 0 Annular, 2 SI, 51 Commercial Disposals, and 139 Exceptions to the rules, and 24 Emergency Orders. There were 341 UIC approved orders/permits this year: 72 Disposals, 107 Injectors, 0 Annular, 2 SI, 43 Commercial Disposals, and 84 Exceptions to the rules, 9 Interim Orders, and 24 Emergency Orders. Total number of dismissals was 82.

UIC inspections for 2020 were 8,744, which is lower than the 10,000 target. The OCC normally exceeds this workplan goal; however, the agency's efforts were hindered on two fronts. The first of these was the reduced ability to undertake field duties due to the effects COVID-19 pandemic. Lastly, the agency has undergone a procedural change that combines the efforts of UIC inspections and the performance of MITs into one event rather than two. This in its nature has and will reduce the overall total number of annual UIC inspections. This new procedure will be reflected in future workplans through a lower target goal. MIT's numbered 3,447 this year.

UIC staff continues to place an emphasis on the timely filing of 1012A forms (Annual Fluid Injection Reports) by operators in Oklahoma. Due to the efforts of UIC staff and a special project temp, 1012A filing compliance is 94% with all received reports processed into RBDMS. UIC continues to under-take the necessary due diligence to obtain any missing 1012A reports.

In FY 2020, UIC still required and processed the 1012D form. This is used for daily reporting of injection volume in seismically sensitivity areas of the state. The UIC Program continues to work closely with the Seismicity Team Members as UIC applications are processed, reviewed, approved and monitored for compliance.

In the area of GIS, UIC continues to sustain the OCC's aerial photo library. We are current on all aerial photos from the NAIP. At this time, we have county wide aerial photos for the years 1995, 2003 - 2006, 2008 - 2010, and 2013 - 2019 in all 77 counties. These maps with well data are provided to our field inspectors, as the information is updated by our GIS specialist. All of this data is available to the EPA.

In addition to the aerial photos from NAIP, the OCC maintains an archival GIS library that contains 121,234 historical aerials of the state. This project has been aided by EPA through Special Project grants. The continued georeferencing of these photos produces historic time frames that can be used by UIC and the OCC in investigations. The aerial maps provide a more precise determination of well locations and a detailed record of past surface pollution. This project was still in progress in FY2020, as of 7/07/2020 there are 41,604 georeferenced aerials.

The Brown Dolomite Project was funded through a multipurpose grant related to the UIC grant. This project has its own workplan but was implemented under the UIC QAPP. The purpose of this grant was to help fund a new FTE position for an expert to address an issue occurring with wells completed in the Brown Dolomite in central and western portions of the state. OCC hired an expert to fill the po-sition. The new employee continues to work with OCC staff and operators to reduce and eliminate the purge issue from the Brown-Dolomite formation.

ANNUAL REPORT CARD

UIC Program Activities
Workplan 2020
(7-1-19 through 6-30-20)

Activity	Goals	Accomplishment
Inspections (On-site)	10,000	8,744
MITs (total)	2,300	3,447
MITs (Witnessed)	2,300	2,770
Permits/Orders (Total Issued)	NA	341
Technical Reviews	NA	264
Operatorship Transfers	NA	346*
Technical Conferences	NA	50

*Number represents total 1073i forms processed per well, both approved and rejected

APPENDIX C: BROWN DOLOMITE WORKPLAN

Brown Dolomite Project

Agency: Oklahoma Corporation Commission

Issue: The issue that the state is experiencing encompasses the Permian geologic period formation(s) (i.e. Brown Dolomite) and is extending from far western to central portions of the state. There are several instances of water purging to the surface on the outside of the casing of producing wellbores completed in the Brown Dolomite formation. The Oil and Gas Conservation Division (Division) followed normal procedures in requiring the reduction of Class II well pressure and volumes in the area(s) of concern. The issue persists and continues to spread. The Division needs to determine if this is the result of possible overpressure, increased injection and disposal volumes, other factors, or a combination of factors. The Division considers this to be, in our opinion, of the highest priority. The Division needs a determination of cause and a solution to this issue, therefore; we have contracted with a consultant to assist in the technical expertise of this growing problem.

Solution: The Division is requesting this multipurpose grant funding in order to continue obtaining the needed expertise in addressing the above issue. The consultant will review the information from the area(s) of concern as it relates to oil and gas activity. There will be no environmental sampling activities for lab analysis involved with this grant. The consultant will supply the division with expert opinion on how to address this emerging issue. The consultant will also provide the Division with expert witness services in court proceedings relating to compliance and enforcement based upon the consultant's statements of expertise.

Budget: <u>Federal</u>

The agency has been awarded $65,273.00 in federal funds. These funds will be used entirely to cover the contractual cost for the consulting and expert witness services.

<u>State</u>

The Division will cover the administrative costs related to procurement of the services and for grant compliance.

Outcome: The Division will obtain expertise input on how to address with this rising issue in the state.