

State of Kansas Class II UIC Program Peer Review

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Executive Summary

On February 8, 1984, the U.S. Environmental Protection Agency (USEPA) granted primary enforcement authority (primacy) to Kansas for the Class II Underground Injection Control (UIC) program under Section 1425 of the Safe Drinking Water Act (SDWA). This authority covers all lands of the state except those that are designated as Indian lands where the authority remains with USEPA Region 7. At the time of this review, there were no Class II UIC wells on Indian lands and Kansas regulated a total of 4,954 Class IID (disposal) wells, and 11,160 Class IIR (enhanced oil recovery) wells for a total of 16,114 Class II UIC wells. The Class II UIC program is managed by the Kansas Corporation Commission, Conservation Division (hereafter division) under K. A. R. (Kansas Administrative Regulations) 82-3-400 et seq. The division has approximately 73 employees. With respect to UIC activities this includes 100% of the time of two geologists and two lead research analysts, and 60% of the time of a geologist and a senior administrative assistant. A manager also devotes 75% of their time to UIC work. Including field inspection staff and district UIC Managers, the division devotes a total of approximately 16 FTEs to UIC activities.

The UIC program is managed through the Wichita central office of the division. Field activities of the division are managed through district offices located in Dodge City, Wichita, Chanute, and Hays.

Federal grant funding provides only a small percentage of the funds needed to implement the UIC program. However, the division is currently able to run a Class II UIC program which meets the measures established by the USEPA because it receives its predominant funding from fees generated from industry. Activities such as strategic planning and goal setting and updating program and data systems would benefit from additional staffing and funding.

The division works with the Kansas Geological Survey (KGS) and the Kansas Department of Health and Environment (KDHE) on several issues governing UIC related activities. The division and KGS coordinate activities using the Kansas Online Automated Reporting system (KOLAR). The division also consults with the KDHE regarding seismic activity and accessing KDHE water well data. The division works with the KGS, primarily on developing and updating fresh or usable water maps and identifying seismic activity.

Permit applications for injection wells must include an application form with the required fee and supporting documents. The same construction requirements must be

met for both new wells and conversions of existing wells. Presently, approximately 40% of applications are for new wells and 60% are for well conversions. Permit applications are reviewed for technical and administrative sufficiency by division professional and managerial staff.

The inspection staff manage day to day inspection duties from their homes but coordinate their activities with the district office to which they are assigned, with UIC coordinators, and with the central office in Wichita to determine the schedule and frequency of inspections for each well. Every January and June the division district offices provide each Class II operator with a list of Mechanical Integrity Tests (MITs) required for the upcoming six months. Based on the generated list of required MITs for each district office, the field inspector and the District Manager use a shared MS Outlook calendar to track and schedule MITs.

The following is a list of some of the identified strengths of the division's UIC program and the review team's critical suggestions for program improvement:

Identified Strengths:

- 1) The division's ability to utilize flex time, approve overtime and shift inspectors from within a district to cover critical operations such as MITs, well construction and well plugging is commendable.
- 2) The Class II program staff is dedicated, knowledgeable, experienced, and demonstrates a high degree of technical competency.
- 3) To the extent resources allow, the permitting and field witnessing programs have focused on the most critical programmatic elements such as casing installation and cementing and mechanical integrity testing of wells.
- 4) Through an ongoing review process, the division has promulgated updates to the rules and regulations which have enhanced the UIC program.
- 5) To supplement its UIC program, the division has actively prioritized, decentralization to the district office level, and accelerated its abandoned well plugging efforts.

Critical Review Suggestions:

- 1) The review team strongly suggests the division consider reviewing with the KCC Advisory Committee the current financial assurance program. This may include:

- a. Modifying the current licensing system to establish full time individual and blanket bonds that are maintained through the lifecycle of the well; and
 - b. Evaluating the cost of Class II well plugging and abandonment and setting bonding amounts consistent with these costs; and
 - c. Surveying the bonding requirements in other states as a means of assisting the division in establishing a financial assurance system that is consistent (where appropriate) with other states' primacy programs.
- 2) The review team suggests continued emphasis be placed on updating KOLAR and the Risk Based Data Management System (RBDMS) to fully incorporate all UIC activities including field inspections, permitting, well testing and reporting.
 - 3) The review team suggests the division consider requiring new or newly converted Class II wells have a Cement Bond Log (CBL) and where possible a CBL and Variable Density Log (VDL) run to assure proper cementing bonding on both the casing and the formation.
 - 4) The division should continue to work with the KGS and the KDHE on a plan for the division to acquire and use all seismic data held by KGS and KDHE regardless of its source to assure proper seismic monitoring relative to potential induced seismicity. This may need to include a means of assuring that privately owned seismic data can be confidentially held by the division. A Memorandum of Agreement (MOA) involving the three agencies might be a possible mechanism to achieve this goal.

Introduction to Underground Injection

This section provides a general description of underground injection and how it is regulated by the USEPA and state agencies throughout the United States. As such, it is not specific to the State of Kansas. The comprehensive review of the Kansas program begins with the Executive Summary of this report.

Underground injection is the placement of fluids, including but not limited to waste by-products, into the subsurface through a wellbore. Underground injection is not a new practice. The Chinese injected freshwater into the subsurface for salt extraction as early as A.D. 300. The first documented use of injection to dispose oilfield produced water (brine) was in Texas during the 1930s, over eighty years ago. Beginning in the 1930s, the oil and gas industry also began to inject produced water into pressure-depleted oil reservoirs to enhance recovery of crude oil resources. During the 1970s and 80s, oil refineries and chemical industries began to inject liquid wastes in deep disposal wells. Today, underground injection is used to remove more than 50% of the liquid hazardous waste, and more than 98% of saltwater produced by onshore oil and gas operations from the surface environment.

Some waste is an unavoidable by-product of a myriad of resource development and manufacturing processes that create thousands of products that we use in our daily lives including steel, plastics, pharmaceuticals, fuels, and natural gas. Underground injection is an important waste management practice internationally and in the United States. Some renewable energy sources, such as geothermal, also rely on underground injection. Municipalities need underground injection to replenish aquifers (aquifer storage and recovery), to combat saline water encroachment in coastal areas, to dispose of residual waste streams generated by treatment and desalination of water for public use, and to dispose of treated sewage. While industries continue to develop ways to reduce waste volumes and recycle, generated wastes must be disposed in a safe manner. Various types of injection wells have unique associated benefits and risks. To dispose of fluids safely, injection wells must be properly constructed; located in an appropriate geologic setting; and operated, maintained, and monitored in accordance with standards that are protective of our groundwater resources.

Liquid wastes can be managed in a variety of ways other than underground injection including:

- treatment and release into surface waters, such as rivers, through a National Pollutant Discharge Elimination System (NPDES) permit issued pursuant to the federal Clean Water Act;
- biological treatment;
- incineration;
- storage in evaporation pits;
- discharge into percolation pits; and
- beneficial re-use (e.g., irrigation, livestock watering, ice, or dust control)

Each of these practices has its limitations and associated environmental risks. For many waste streams, including produced water generated during oil and gas exploration practices, the volumes are too great to rely solely on these alternative waste management practices. Furthermore, injecting highly saline fluids back into deep subsurface reservoirs that contain equally saline water is a common-sense waste management practice that poses fewer environmental or public health risks than these alternatives.

Underground injection plays a crucial role in disposing residual wastes, especially those that would pose the greatest risks to society if managed by any other method, such as discharge to surface waters. In other words, if underground injection is restricted or eliminated, the result will be more, not less risk of environmental harm.

In 1974, Congress passed the Safe Drinking Water Act (SDWA), which required the U.S. Environmental Protection Agency (USEPA) to develop minimum federal requirements for injection practices. Regulations adopted pursuant to the SDWA are now administered by USEPA along with state and tribal partners that collectively constitute the UIC Program. The purpose of the UIC Program is to protect public health by preventing contamination of underground sources of drinking water (USDWs).

A USDW is defined as an “aquifer or its portion which supplies any public water system or contains a sufficient quantity of groundwater to supply a public water system, and either currently supplies a public water system, or contains less than 10,000 milligrams per liter of total dissolved solids and is not an exempted aquifer.” Most groundwater used for public drinking water today contains less than 500 milligrams per liter of Total Dissolved Solids (TDS), and most water that is treated for drinking water contains less than 3,000 milligrams per liter TDS. Therefore, the UIC Program ensures that water resources that could be treated and used as drinking water in the future are protected today.

After passage of the Safe Drinking Water Act (1974), USEPA worked with a twelve-member state workgroup to develop the UIC Program regulations (1976-1977). From the onset of regulation development, regulatory officials sought to apply lessons learned from decades of injection experience. Prior to enactment of the federal regulations, USEPA and state officials examined best practices and problems associated with injection well operations that predated passage of the SDWA.

While developing the UIC Program regulatory framework, USEPA and state officials recognized six pathways through which injected fluids could potentially migrate into USDWs. Officials sought to develop regulatory standards that mitigate and effectively address the following pathways:

- migration of fluids through a faulty injection well casing;
- migration of fluids through the annulus located between the casing and wellbore;
- migration of fluids from an injection zone through the confining strata;
- vertical migration of fluids through improperly abandoned and improperly completed wells that penetrate the injection zone;
- lateral migration of fluids from within an injection zone into a protected portion of that stratum; and
- direct injection of fluids into or above an USDW¹

The USEPA has defined six classes of injection wells that are permitted and regulated under the SDWA, which are summarized in the following table.

U.S.EPA Classification	Injection Well Description
CLASS I	Wells used to inject waste beneath the lowermost USDW
CLASS II	Wells used to dispose of fluids associated with the production of oil and natural gas
CLASS III	Wells used to inject fluids for the extraction of minerals
CLASS IV	Wells used to dispose of hazardous or radioactive wastes into or above a USDW
CLASS V	Wells not included in the other classes generally used to inject non-hazardous waste
CLASS VI	Wells used to geologically sequester carbon dioxide to reduce greenhouse gas emissions

Table 1 Injection well classification chart Source: after USEPA

¹ Osbourne, P., 2001, Technical Program Overview: *Underground Injection Control Regulations*, Office of Water 4606, EPA 816-R-02-025.

The USEPA is charged with enforcement of the SDWA and exercises that authority directly or through formal agreements with state and tribal partners, under their oversight. The USEPA has given primary enforcement authority (primacy) over underground injection wells to those state agencies or tribes that have shown they are able to implement a UIC Program that is effective in protecting groundwater resources. These requirements are in Sections 1422 and 1425 of the SDWA, and the Federal Register (40 Code of Federal Regulations Sections 144 through 147). The states that USEPA has determined have regulations, laws, and resources in place that meet the federal requirements and are authorized to run the UIC Program, are referred to as Primacy states. Primacy states manage their programs subject to periodic audits and program reviews conducted by USEPA. In states that have not received primary responsibility for the UIC Program, USEPA remains the responsible regulatory agency. These states are referred to as Direct Implementation (DI) states, because USEPA directly implements the federal UIC regulations in these states. Some states share responsibility with the USEPA, with authority over some well classes residing at the state level, and other well classes being regulated by USEPA.

The Class II UIC Program

Class II injection wells are used primarily to inject fluids that are associated with oil and gas exploration and production (E&P) activities including drilling, stimulation (hydraulic fracturing), and production operations. Since the inception of oil and gas exploration and development (1860), the oil and gas industry has been generating and managing produced water. Produced water is the water extracted from the subsurface during oil and gas E&P activities. Produced water occurs naturally within underground formations and is brought to surface along with oil and gas through a cased wellbore.

Produced water is generated during several oil and gas E&P activities including:

- drilling through saline water zones that naturally occur in the subsurface and overlie the target oil and gas reservoir(s);
- stimulation of oil or gas reservoirs by hydraulic fracturing during the flow back and swabbing process; and
- workover operations, and
- during day-to-day production operations

Long before hydraulic fracturing operations started in the 1940's, the oil and gas industry generated large volumes of produced water that was capable of harming the environment if not properly managed.

Produced water characteristics and physical properties vary considerably depending on the geographic location of the field, the geological formation with which the produced water has been in contact for thousands of years, and the type of hydrocarbon product being produced. Produced water properties and volumes can even vary throughout the lifetime of an oil and gas well or reservoir. Produced waters can be highly saline, with salt concentrations exceeding 200,000 milligrams per liter of chloride (more than ten times as salty as sea water) or may be pure enough for agricultural or irrigation purposes. In addition, produced water commonly contains many organic and inorganic compounds that can lead to toxicity. Some of these are naturally occurring dissolved or emulsified hydrocarbons derived from associated crude oil while others are related to chemicals that have been added for well-control or reservoir stimulation purposes. These fluid wastes are specifically excluded from hazardous waste classification under the Resource Conservation and Recovery Act (RCRA).²

The 1980 amendments to the RCRA required USEPA to conduct a study of the environmental and potential human health impacts associated with E&P wastes and their associated waste management practices. USEPA completed its two-year study in 1987. Based on the findings in the Report to Congress, and on oral and written comments received during public hearings in the spring of 1988, on June 30, 1988, USEPA decided not to recommend federal regulation of E&P wastes as hazardous wastes under Subtitle C of RCRA (USEPA 1988). This determination is commonly referred to as the “RCRA exemption”. Although produced water is exempt from one section of RCRA, it is subject to requirements in RCRA Subtitle D and the Safe Drinking Water Act.

Approximately 20.5 billion barrels of produced water are generated by federal and state onshore operations in 2012. Generally, the volume of produced water from oil wells does not remain constant over time. The water-to-oil ratio can increase over the life of a conventional oil well. For such wells, water makes up a small percentage of produced fluids when the well is new. Over time, the percentage of water increases and the percentage of crude oil declines. On average, more than seven barrels of water are produced for each barrel (bbl.) of oil. For crude oil wells nearing the end of their productive lives, water can comprise as much as 98% of the fluid brought to the surface.

Shale gas wells generate most of their produced water after hydraulic fracturing

² Veil, J.A., M.G. Puder, D. Elock, R.J. Redusik, 2004, A White Paper describing Produced Water from Production of Crude Oil, Natural Gas, and Coal Bed Methane, prepared by Argonne National Laboratory, prepared for the U.S. Department of Energy, 79 pp.

operations are completed and pumping pressure is relieved from well. During the flow back process, water-based fracturing fluid mixed with natural formation (connate) water begins to flow back to surface.

Produced water is separated from crude oil or natural gas at the surface facility associated with producing oil and gas wells. It is delivered to Class II injection well facilities by pipeline or truck. Once delivered to the storage facility at the injection well, any remaining crude oil is skimmed, the water may be filtered to remove solids such as sand or silt, and the water may undergo other types of treatment prior to injection. Today there are approximately 168,000 Class II injection wells operating in 31 states. There are three types of Class II injection wells:

- Hydrocarbon storage wells;
- Enhanced oil recovery wells; and,
- Produced water disposal wells.

Hydrocarbon storage wells are used to pump crude oil and other hydrocarbons that are liquid at standard temperature and pressure underground for temporary storage, prior to recovery, processing, and use. Enhanced oil recovery (EOR) wells are used to prolong the productive life of oil wells within a specific oil field. Secondary recovery is an EOR process commonly referred to as water-flooding. Salty water produced with oil is separated from the oil at surface and re-injected in the oil-producing formation to drive oil to proximal, pumping oil wells completed in the same reservoir. This saline wastewater by-product is referred to as “produced water” or “saltwater” because salts (sodium, calcium, magnesium, potassium chlorides) are the predominant dissolved constituents in produced water. Produced water disposal wells are sometimes referred to as “saltwater disposal wells” because they inject fluids into deep saline reservoirs for disposal purposes. Nationally, approximately 60% of all saltwater produced with onshore oil production wells is re-injected at Class II EOR wells, while 40% is injected for disposal.

USEPA has awarded primacy for the Class II Program to 43 states and territories, and two tribes. Primacy for Class II programs may be awarded under Sections 1422 or 1425 of the Safe Drinking Water Act. Most states with Class II programs have applied under Section 1425, as it provides regulatory flexibility to address the specific conditions present in an individual state.³ Some states have instead chosen to apply under Section 1422, where the regulations are more prescriptive, which allows a state to obtain

³ Safe Drinking Water Act, Section 1425, Amended 1996, <https://www.gpo.gov/fdsys/pkg/CPRT-106SPRT67528/pdf/CPRT-106SPRT67528.pdf>

primacy for most UIC well classes through a single primacy application process. At present only one state (North Dakota) has obtained primacy for the Class VI program. The following map shows the distribution of Class II Primacy states and Direct Implementation states.⁴

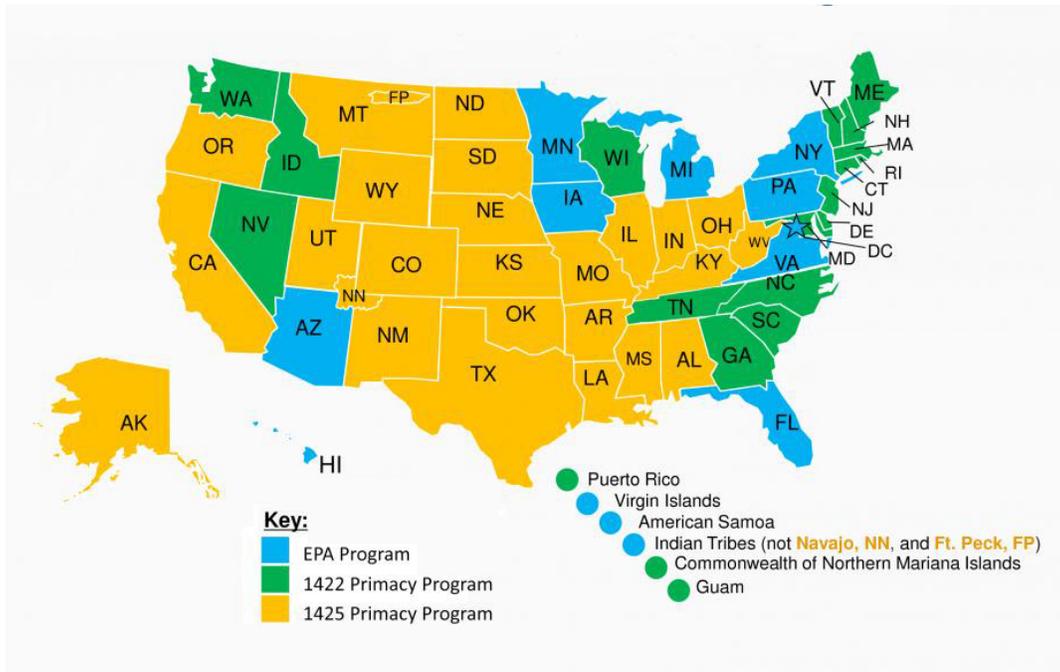


Figure 1: Map of Class II primacy program status

Class II injection well regulations establish standards that address the six potential pathways in the following manner:

- Prior to issuance of a permit, geologists evaluate the suitability of a proposed site for injection. As part of the permit review process, geologists determine the depth of the deepest USDW, evaluate the adequacy of the proposed injection zone, and examine the thickness and nature of confining strata on a site-specific basis.
- Permit writers establish the depth of surface casing necessary to extend through and isolate all USDWs.
- In addition to cemented surface casing, Class II injection wells must be constructed with multiple layers of protection (cemented, steel casing strings) between USDWs and the injected waste stream. Most Class II injection wells have three-to-six layers of protection between the injected fluid and the

⁴ Note: Figure 1 still shows Idaho as a primacy state even though primacy was returned to USEPA on July 30, 2018

protected groundwater. Therefore, injected fluids can only enter USDWs because of faulty casing when there are multiple, concurrent failures of cemented, steel casing strings.

- Regulators establish injection pressure limits designed to confine injected fluids in the authorized injection zone.
- The mechanical integrity of casing and injection tubing is tested prior to commencement of injection operations and monitored on a regular, scheduled basis thereafter. Mechanical integrity tests must be conducted at least every five years, and more frequent tests may be required by regulation or permit condition. In addition to testing the integrity of the casing, operators must run tests to demonstrate that no significant fluid movement into a USDW through vertical channels adjacent to the injection well bore is occurring.
- All known wellbores that penetrate the proposed injection zone are evaluated within an “Area of Review” (AOR) surrounding the proposed injection well. Wellbores that pose potential avenues for fluid migration by their construction or plugging status must be mitigated before injection can be authorized.
- Injection owners must monitor their operations and submit reports regarding injection pressures and fluid volumes.

Produced water is injected into depleted oil and gas reservoirs or deep reservoirs that are naturally saline. These saline reservoirs contain water with similar chemistry to the injected produced water. Typically, produced water is injected into porous and permeable sandstone or dolomite formations that are overlain by “confining strata”. Confining units consist of rock types that typically have low permeability, such as shale, halite (salt), anhydrite, and some limestone formations. When confining units overlie oil and gas reservoirs, they are also referred to as “cap rocks” because the strata have effectively sealed oil, natural gas and even CO₂ in the underlying reservoir for millions of years with no, or minimal, leakage. The effectiveness of confining units has been further validated through extensive stratigraphic tests, and decades of successful experience at gas storage and injection operations.

Constructing a wellbore and maintaining mechanical integrity throughout injection operations is a key principal of injection well regulations. An injection well is said to have “mechanical integrity” if:

- 1) there are no significant leaks in the casing, including injection tubing (the string of steel pipe through which fluids are actually injected), and
- 2) there is no significant fluid movement behind casing (either behind cement or in un-cemented annular spaces) into a USDW

Class II regulations require operators to construct a well in a manner that allows mechanical integrity to be tested and monitored.

Injection well operators are required to verify that each Class II well has mechanical integrity before commencement of injection is approved; at least every five years thereafter; and every time down hole equipment, such as injection tubing or packer, is removed for servicing or repair. These standards are enforced to protect USDWs and ensure that fluids are injected into the authorized injection zone.

The Peer Review Process

The Groundwater Protection Council (GWPC) conducts the Class II UIC Peer Review process under the joint GWPC and Interstate Oil and Gas Compact Commission (IOGCC) “States First Initiative”. The purpose of this process is to assess the effectiveness of Class II UIC programs that have been delegated to states under Sections 1422 or 1425 of the Safe Drinking Water Act (SDWA) and to offer suggestions designed to strengthen the program.

The review team consists of the following persons:

- Two to three volunteer state Class II UIC program persons from primacy programs of states that reside outside of the USEPA Region of the state being reviewed
- A GWPC staff member
- A facilitator hired by the GWPC
- A federal observer from the USEPA Region in which the state being reviewed resides

The review process and desired timing is as follows:

- 1) Initial contact with states to solicit volunteers for review (GWPC)
- 2) Coordination of timing for the review with the state program (GWPC)
- 3) Recruiting of review team members at least 60 days prior to the in-state interview (GWPC)
- 4) Distribution of the questionnaire to the state program to be reviewed at least 60 days prior to the in-state interview (GWPC)
- 5) Notification to state program of review team members at least 30 days prior to in-state review (GWPC)
- 6) Submission of the completed questionnaire to the GWPC at least 30 days prior to the in-state interview
- 7) Review of the completed questionnaire and development of follow-up questions no later than two weeks prior to the in-state interview (Review team)

- 8) In-state interview of up to 1 ½ days (Review team and state program staff)
- 9) Prepare draft report within 60 days following in-state interview (Non-observer team members, facilitator and GWPC representative) *NOTE: Due to the need to interpose an expedited review of another state the Kansas review draft preparation was expected to take between 120-180 days.*
- 10) Initial review of draft report by team within 30 days following draft completion
- 11) Submission of draft report to state program within 30 days following team review (GWPC)
- 12) Review and comment submission by the state to GWPC within 30 days of receipt of draft
- 13) Revision of draft within 30 days following receipt of state program input (Non-observer team members, facilitator and GWPC representative)
- 14) Approval of the final report within 15 days of revision completion (GWPC Executive Director)
- 15) Printing of copies of the final report per state request within 10 days following approval by GWPC Executive Director (GWPC)
- 16) Posting of the final report on the GWPC website within 10 days following approval by GWPC Executive Director (GWPC)
- 17) Distribution of 25 copies of the printed report to the state program (GWPC)

The general protocol for a review includes the following:

- Review team members agree to maintain confidentiality and may not discuss the review findings or draft report with persons who are not members of the team until the final report is published
- Observers are entitled to submit questions to the review team as part of the in-state interview but are not permitted to participate in drafting of the report
- Observers may submit comments on the draft report at their discretion
- Preparation and approval of the draft report will be accomplished using a consensus approach
- Minority reports, other than those that may be published by the reviewed state, are not allowed
- Comments in the report will not be attributed to any individual team member
- The GWPC is solely responsible for the content of the final report
- The report is the intellectual property of the GWPC and any distribution of or quotation from the report may only be done with the express permission of the GWPC

Kansas Class II UIC Program Peer Review

Review Details:

The in-state interview of the Kansas Class II UIC program staff was held in Wichita, Kansas on September 25-26, 2019.

Team members:

Michael K. (Kenny) Brown, UIC Manager, Ohio Department of Natural Resources, Division of Oil and Gas Resources Management

Patricia Downey, UIC Manager, Oklahoma Corporation Commission, Division of Oil and Gas

Mike Nickolaus, P.G. Special Projects Director, Ground Water Protection Council

John Taylor, USEPA UIC Program Manager (Retired)

Mark Layne, Ph.D., Technical Director, Ground Water Protection Council

Observers:

Adam Peltz, Environmental Defense Fund

Kurt Hildebrandt, USEPA Region 7

Ben Misner, USEPA Region 7

Brent Campbell, USEPA Region 7

Program Overview

The division oversees a diverse Class II Program. Class II activities are distributed statewide necessitating staff in four district offices. The division regulates saltwater disposal (Class IID) wells and enhanced oil recovery (Class IIR) wells. The following is an overview of the division's UIC program.

Administration, Staffing and Funding

The division funds the UIC program using both USEPA and state funds. In FY 20, the Class II portion of the most recent USEPA UIC grant was \$311,300 of which the division provided a 25% state match of \$103,767. The overall division budget for FY 2020 is \$8.65 million and covers approximately 73 employees. There are no state general funds used in support of the UIC program. The division's predominate source of funding is

supplied via the industry through mills (1 mill = 1/10 of a cent) levied against production and UIC application specific fees. Most of this funding is generated through levies of 144 Mil/bbl. fee on oil produced and 20.5 Mil/MCF fee on natural gas produced. The division also receives about \$55,000 per year in application fees.

In the central office, approximately 5.95 Full Time Equivalent (FTEs) are devoted to UIC activities, including staff which conduct most technical functions such as permit application reviews and general program administration. This includes 100% of the time of two geologists and two lead research analysts, 60% of the time of a geologist and a senior administrative assistant, and 75% of a manager's time. Currently there are 17 inspectors assigned to the Western Districts. Districts 1 and 4 in Western Kansas have 8 and 9 inspectors respectively who devote about 30% of their time to the UIC program. Districts 2 and 3 in Eastern Kansas have 8 and 10 inspectors respectively who devote about 50% of their time to the UIC program. Each of the districts also has a UIC Manager who devotes 100% of their time to UIC activities. In total the division devotes approximately 18 FTEs to UIC activities.

Data Management Systems

RBDMS and Oracle are used to manage the overall well database, including specific tables for UIC wells. Operators file annual injection reports online via KOLAR. This Information populates RBDMS and generates a PDF form. Current programming for KOLAR includes MIT test forms to be filed electronically from the field. Future programming is planned to incorporate the UIC permitting process. Inspection reports are housed at the district level within network folders and partially transcribed into RBDMS; which provides a digital record of the inspection form. The inspection forms are accessible to the inspectors and district and central office staff so they can verify operator compliance.

Permit Application Flow and Review Process

To obtain a Class II UIC permit for a new well in Kansas, an operator must first submit an application to drill to the division in accordance with the provisions of K.A.R. 82-3-103 through 110. While these regulations set certain technical requirements that must be met in order to receive a permit to drill, a significant amount of additional information is required to receive a UIC permit in accordance with K.A.R. 82-3-400 et seq. For conversions of existing wells to UIC use, an application to drill is not needed unless the well is deepened or plugged back.

When an operator is ready to apply for a UIC permit, an application is submitted by mail to the UIC/Production Department of the division. During the past three years, an average of 356 UIC permits per year have been issued by division, and the rate of permit applications submitted has been relatively stable. Approximately 90% of the applications submitted received permits, with the remainder split fairly evenly between application denials and withdrawals. A UIC permit, which provides the operator with authorization to inject, is issued after all regulatory and technical requirements have been satisfied, a well completion report has been provided, and Parts 1 and 2 of mechanical integrity have been demonstrated.

Administrative Aspects of Permit Application Review

As part of the application for a UIC permit, operators are required to provide notice of a pending application. A copy of the application is sent to all operators and unleased mineral owners within ½-mile of the subject acreage along with the landowner on whose land the well is located. As previously noted, this Notice of Application is required by K.A.R. 82-3-402 and also requires notice to the general public via a county newspaper; whose publication of the notice is checked by administrative and legal staff to assure it meets the notification requirements. The notice must run once in the newspaper and a second time if a hearing is required. The public notice period has been 30 days since 2008 when it was increased from 15 days through a rule change to K.A.R. 82-3-135(e). This change in the comment period has not been consistently reflected in all operator notices, and as a result, the division has initiated a program to remind operators of this requirement.

When public comments are received by the division, they are filed with the application and considered by the geologist as part of their application review. If the comment is a protest of the application, it is sent to the legal department to be assigned a docket number and pre-hearing officer. The pre-hearing officer contacts the parties and establishes a procedural schedule.

While operators are required to file bonds on wells for the first three years of operation, if the operator does not have a specific violation history during the first three years, they are allowed to withdraw their bond after the third year and file an annual \$100 licensing fee instead. The division has defined a specific violation history as five or more violations or \$3,000 in monetary violations during a running three-year period.

Technical Aspects of Permit Application Review

The technical aspects of the UIC permit review process include identifying the depth of the deepest fresh or usable water, evaluating well construction, reviewing the operating parameters, and assessing induced seismicity considerations.

The first priority is ensuring that fresh or usable water is protected. To accomplish this, it is necessary to determine the base of the fresh or usable water at the location of the proposed well. The KGS maintains detailed fresh or usable water maps which utilize numerous data points per county. Water well data, which is maintained by the KDHE, is also used to verify map data. Water well data is fairly complete but older records are not considered to be as reliable.

The minimum depth of surface casing ranges from 20 to over 1000' depending upon the location and construction requirements (Alt I or Alt II) of the well in question and is decided on an individual well basis in accordance with surface casing depths established for the county where the proposed well is located. For example, in Eastern Kansas the surface casing has to be set through the unconsolidated material and the long string cemented top to bottom for Alternate II completions.

Dual completion production and disposal wells have been allowed in Kansas in accordance with K.A.R. 82-3-401(b) and (c) of the division rules and regulations. The number is currently unknown except in Southwestern Kansas where there are 18 dual completion wells. The division has not permitted any new dual completion wells for many years and the number of existing wells is likely decreasing as they become unproductive.

With regard to maximum surface injection pressure (MSIP), various approaches are used to determine the MSIP depending on the area of the state. For example, in Western Kansas the MSIP is determined by calculating the parting pressure of the injection formation using a specific gravity of 1.05. In Eastern Kansas where depths are less than 1,000 feet, the Mid-Continent Carbonate fracture gradient of .75 pounds per square inch (psi)/foot is used. In addition, the division uses an 80% of fracture gradient safety factor in setting the MSIP. Alternate approaches such as an Instantaneous Shut-in Pressure (ISIP) or Step Rate testing are seldom utilized but could be allowed if requested by an operator.

In accordance with K.A.R.82-3-403, a fixed radius minimum of a ¼ -mile AOR is required for all disposal wells and enhanced recovery project wells. In addition, operators are required to submit information on wells that penetrate the disposal horizon within a ½-

mile of the proposed well. The division allows use of the Zone of Endangering Influence (ZEI) calculation as a method to define the AOR only if it leads to expansion of the ¼-mile fixed radius. No calculation resulting in an AOR of less than the ¼-mile can be used. Before a permit is issued the division requires corrective action (i.e. plugging) for any wells in the AOR determined to be potential conduits.

Periodic File Review Process

The division utilizes a routine schedule for performing file reviews on all UIC wells. Wells are generally selected for review at the time of the MIT, which is scheduled on a 5-year recurring basis. Non-routine file reviews can also be conducted at times other than at scheduled MITs based upon the specific circumstances of a well or operator which may include compliance history.

MIT Procedures and Exceptions

For Part 1 MITs, which demonstrate casing, tubing and packer integrity, there are a variety of tests which are approved based on how the well is constructed. For wells equipped with a tubing and packer, a standard annulus pressure test (SAPT) shall be run at least once every five years. An SAPT shall be performed to at least 300 psi with no more than a 10% drop over a thirty-minute test. For wells without tubing, constructed using the Alternative II casing and cementing procedure, MITs shall be performed at least every five years by using one of a number of different methods established by K.A.R. 82-3-407 (b). One MIT method for Alternative II packerless completions requires running a retrievable plug to a depth of no more than 50 feet above the uppermost perforations or open hole of the injection zone and applying a fluid pressure of 300 psi for 30 minutes with no drop in pressure. The division has also approved the use of a fluid depression test for Alternative II casing and cementing construction with no tubing and packer installed.

For Part 2 MIT determinations which demonstrate cement integrity, the division requires each Class II well to be constructed to prevent migration of fluids up the casing/wellbore annulus into fresh or usable water. To determine this requirement, the division reviews cementing records, field inspections and inspector observations, and, if run or required, a CBL to determine that each well has passed a Part 2 MIT prior to injection operations commencing.

Well Construction Practices

The division has construction practices for new and converted Class II injection wells that protect fresh or usable water by prescribing surface casing to be set at least 50 feet below the base of the lowest known fresh or usable water. Fresh or usable water is roughly equivalent to a USDW and is defined by K.A.R. 82-3-101(78) as meaning water containing not more than 10,000 milligrams of total dissolved solids per liter.

For Class II wells the division requires a production casing run through the injection interval and cemented. Depending on the location of the proposed injection well, the amount of cement required on the production casing will vary. If the well is required to have an Alternative II casing and cementing program, the production casing will have a continuous sleeve of cement from the casing shoe to surface. If the proposed well is not required to use the Alternative II casing and cementing program, the production casing shall be cemented with a minimum of 100 feet. Regardless, isolation of corrosive zones with cement is not required, though it is commonly practiced.

Wells permitted after December 8th, 1982, that require positive pressure to inject must inject through tubing and packer, except as specified in K.A.R. 82-3-406. The packer must be set immediately above the uppermost perforations or open-hole interval into a cemented section of the production casing. The division has a policy that the packer should not be set greater than 50 feet above the uppermost perforations or open-hole interval. The annulus between the tubing and production casing is required to have corrosion inhibiting fluid or hydrocarbon fluid.

Conduct and Management of Field Operations

Inspections are conducted by inspectors who are assigned to one of the four division district offices. The Inspection staff manage day-to-day inspection duties from their homes but coordinate their activities with the district office, UIC coordinators, and the central office in Wichita to determine the schedule and frequency of inspections for each well within each district. Every January and June the division district offices provide each Class II operator with a list in of MITs required for the upcoming six months. From the generated list of required MITs for each district office, the field inspector and the District Manager use a shared MS Outlook calendar to track and schedule when MITs are due for a particular lease. Districts 1 and 4 in Western Kansas have 7 inspectors who devote about 30% of their time to the UIC program. Districts 2

and 3 in Eastern Kansas have 8 inspectors who devote 50% of their time to the UIC program.

Division inspectors perform an inspection on Class II injection wells using a fillable pdf inspection form. While each district may have different variations on the inspection form, each record similar information regardless of the form used. The variations between forms are due to the wide variety of well types and configurations found in different areas in the state.

If a priority job is scheduled and the assigned field inspector cannot make it to the job, an adjacent district field inspector can be contacted to witness operations that are not within their assigned area or district.

Compliance and Enforcement Processes

Once field noncompliance is determined, the district staff will generate a Notice of Violation (NOV) letter. The letter will state the violation and a specific timeframe for the operator to follow to achieve compliance. A division field inspector will perform a follow-up inspection to determine if the violation has been corrected. If the violation is still not resolved, the division district staff makes a penalty recommendation. The penalty recommendation is sent to the central office in Wichita for consideration. Standard penalties for violations are listed in the rules and regulations, however if the district believes higher penalties are needed based on the severity or frequency of the violations, the district office can recommend additional penalties. Additional penalties must be approved by the Commission.

The division has a number of different compliance tools which ensure each Class II well is operating in compliance with statutes, rules, and regulations. If the operator fails to bring the well back into compliance within the time frames set forth by the inspector or district staff, the division has a complete enforcement toolbox. These tools include requiring the well be shut in, financial penalties, and increasing enforcement actions if the operator still refuses to comply with the NOV letter and Commission order.

Emergency and Citizen Complaint Response Procedures and Processes

The division may receive a complaint or notice of an emergency (“complaints”) via many avenues including phone calls, in writing, by email, or through the division website. Any district office, the Wichita central office, or the main agency office in Topeka may receive a complaint. Based on the type of complaint received, the appropriate district office or the Wichita central office receives notice of the complaint. If the notice or complaint involves a serious spill or imminent risk of environmental degradation, the division is capable of producing an immediate response around the clock regardless of the day or time of day. If the complaint requires a field inspector follow-up, the appropriate district office is assigned to investigate the complaint, regardless of which office received it. K.S.A 55-162(d) requires the division to investigate complaints within 72 hours of receipt of the complaint excluding holiday and weekends. However, the division has a policy to meet or call the complainant within 24 hours of the complaint. Based on the nature of the complaint, inspectors make the complaint a priority over routine activities and investigate as soon as possible. The operator is notified of the complaint when remedial action of the well or well site is required.

Program Changes since Primacy

Since primacy was approved, division has generally run the program without numerous regulatory and programmatic changes. However, some significant regulatory changes were noted by the review team including:

- 1) **K.A.R. 82-3-407. Mechanical integrity requirements; penalty** May 1, 1987:
Describes the manner to conduct mechanical integrity tests for wells drilled or converted to injection or disposal before December 8, 1982.
 - (1) Wells in areas with saltwater bearing zones shall be pressure tested as specified in paragraphs (b)(1) and (2) at a max test pressure of 300 psi.
 - (2) Wells in areas without saltwater bearing zones shall be pressure tested as specified in paragraphs (b)(1) and (2) at a max test pressure of 100 psi.
 - (3) Method of pressure testing known as fluid depression may be conducted for well with tubing and no packer.
- 2) **K.A.R. 82-3-401. Application for injection well; content.** April 5, 2002: Applications for simultaneous injection wells. Requires that the applications demonstrate the injection will not adversely affect offsetting production or endanger fresh or usable groundwater, that injection pressure is limited to less than the local injection formation fracture gradient, that the injection well is continuously cemented across

the injection and producing intervals, and the well demonstrated mechanical integrity as specified in K.A.R. 82-3-407

- 3) **K.A.R. 82-3-402. Notice of application;** October 24, 2008 Adoption of a 30-day public comment period for permit applications. Prior to that time, the comment period had been 15 days.

Part I: General Administrative Overview

Statutory Authorities and Regulatory Jurisdictions

Overall responsibility for Kansas' Oil and Gas program, including the injection of produced fluids for disposal or enhanced recovery (UIC Class II wells), has been delegated by the state legislature to the Kansas Corporation Commission, Conservation Division (division). The Commission consists of three members appointed by the Governor to overlapping four-year terms. No more than two members may be of the same political party. The Office of the Commission includes the Executive Director of the Commission and the General Counsel. To carry out its multi-faceted mission, the Commission is financed by assessments, registration fees, operating charges, federal funds, and other sources. The Commission has five main divisions: Administration, Conservation, Utilities, Transportation, and Energy.

The UIC program is managed through the division's central office which is located in Wichita. Field activities of the division are managed through district offices located in Dodge City, Wichita, Chanute, and Hays. The division's mission is to protect correlative rights and environmental resources with effective regulatory oversight of oil and natural gas exploration and production activities, and intrastate gas storage.

The division has authority to adopt rules and regulations and make orders as necessary to administer operations for and relating to the production of oil and gas, including Class II UIC wells. This includes the ability to issue enforceable orders, which may include penalties, to achieve compliance when violations occur. Legislative authority for the UIC program is found at K.S.A. (Kansas Statutes Annotated) 55-900 *et seq.* and 55-1000 *et seq.* K.S.A. 55-901(b) directs the Corporation Commission to promulgate rules and regulations to carry out the provisions of K.S.A. 55-900 *et seq.*

The specific regulations governing the UIC program are found at K. A. R. 82-3-400 *et seq.* Other regulations may also impact the UIC program, such as the Drilling and Construction regulations which are found at K.A.R. 82-3-103 through 110. The

regulations provide broad authority in a number of important areas, such as the ability to enter onto properties where wells requiring corrective action exist. The division has prepared a comprehensive guide listing all relevant statutes, regulations, and orders, which govern their operations, including the UIC program. This guide is conveniently available to oil and gas operators, Commission staff, and the public.

Many of the terms which are used throughout the UIC program are defined in Kansas statutes and regulations. Specifically, K.S.A. 55-150 defines a number of terms including fresh water, usable water and well. Implementing regulations have then been developed at K.A.R. 82-3-101 for terms such as enhanced recovery, freshwater, injection, disposal well, injection well, enhanced recovery injection well, and usable water. The term “underground sources of drinking water” is not used in Kansas statutes and regulations, instead “usable water”, which has a definition similar to the Federal definition of a “USDW” is used in its place.

The USEPA granted Kansas primary enforcement authority (primacy) for permitting and regulating UIC Class II injection under Section 1425 of the Safe Drinking Water Act (SDWA) on February 8, 1984. This authority covers all lands of the state except those that are designated as Indian lands where the authority remains with USEPA Region 7. At the time of this review, there were no Class II UIC wells on Indian lands and the division regulated a total of 4,954 Class IID wells, and 11,160 Class IIR wells for a total of 16,114 Class II UIC wells.

Administration, Staffing and Funding

The division funds the UIC program using both USEPA and state funds. The Class II portion of the FY 20 USEPA UIC grant was \$311,300 of which the division provided a 25% state match of \$103,767. The overall division budget for FY 2020 is \$8.65 million and covers approximately 73 employees. There are no state general funds used in support of the UIC program. The division’s predominant source of funding is supplied via the industry through mills (1 mill = 1/10 of a cent) levied against production and UIC application-specific fees. Most of this funding is generated through levies of 144 Mil/bbl. fee on oil produced and 20.5 Mil/MCF fee on natural gas produced. The division also receives about \$55,000 per year in UIC application fees.

Within the Central Office, 5.95 FTEs are currently devoted to UIC activities, which include most technical functions such as permit application reviews and general program administration. This includes 100% of the time of two geologists and two lead

research analysts, and 60% of the time of a geologist and a senior administrative assistant. A manager also devotes 75% of their time to UIC work.

All district staff perform some level of UIC work as part of their regular duties. Each of the four districts has an assigned UIC program manager, who devotes 100% of their time to UIC activities. Currently there are 17 inspectors including a newly hired field inspector assigned to the Western Districts. The inspectors devote a percentage of their time for UIC duties and cross over to other inspector coverage areas to perform priority inspections on an as-needed basis. Districts 1 and 4 in Western Kansas have 8 and 9 inspectors respectively who devote about 30% of their time to the UIC program. Districts 2 and 3 in Eastern Kansas have 8 and 10 inspectors respectively who devote 50% of their time to the UIC program. UIC duties include well inspections, witnessing of key functions such as casing and cementing and MITs, and the initiation of compliance and enforcement actions.

The team considers staffing to be adequate. In fact, in those areas where activities may require additional staff hours, this is handled using state flex time or overtime allowances or shifting of staff within a district.

Funding levels available to USEPA for the UIC program have been essentially unchanged for the past 25 years; as a result, states have had to assume increasingly greater amounts of the total cost of running the UIC program. The current USEPA grant amount mostly covers the salaries of the seven UIC employees in the central office. If funding were limited to the USEPA grant and 25% state match, the division would be limited to office related UIC functions such as permitting. All of the inspections, witnessed MITs, and compliance follow-up work would not occur or would occur at a very limited rate. While this level of funding is not adequate, the division is currently able to run a full UIC program which meets the measures established by the USEPA grant due to the fees generated from industry. However, activities such as strategic planning and goal setting, and updates to program and data systems, could be enhanced with additional staff and funding.

Interagency Coordination

The division works closely with the KDHE and KGS on a number of issues, although there are no formal agreements, such as an MOA governing UIC related activities. Cooperation includes working with KGS on KOLAR, consultation regarding seismic activity, and access to KDHE water well data.

The division also works closely with the KGS, primarily on fresh or usable water maps and seismic activity. With the exception of an MOU for KOLAR programming and maintenance, there are no formal agreements between the agencies related to UIC work. Since 2015, the KGS has implemented a statewide monitoring system and publishes its data online. The KGS monitors trends statewide and notifies the division if it observes areas with unusual increases in seismicity so that staff can evaluate these events to determine if any mitigation action is needed. For seismic events in the vicinity of Class II wells, division staff coordinates with the KDHE and KGS. KGS analyzes the seismic data and KDHE provides any pertinent information regarding Class I wells in the vicinity of the seismic event.

While the maps and seismic data from KGS have been helpful, not all seismic information is shared as some comes from a consortium of Class I well operators, arranged by KGS. While the seismic data obtained by the consortium is technically public, it requires a significant annual subscription for access. The division indicated that resolving this issue is important to them and would help them determine the need for mitigation actions.

The division has always enjoyed a close relationship with the USEPA. In addition, the division has also been an active member of national organizations involved with groundwater protection and the oil and gas industry. These include the Ground Water Protection Council (GWPC) and the Interstate Oil and Gas Compact Commission (IOGCC). Through these organizations, the division has interacted with state agencies from across the country, USEPA Headquarters and Region 7 and other Regional offices, environmental organizations, and industry groups. This has led to a productive exchange of experiences and approaches, which has been helpful to the division in building and updating their UIC program.

Program Changes since Primacy

Since primacy was approved, the division has run the Kansas Class II UIC program with relatively few regulatory and programmatic changes. One of the more significant regulatory changes was made to **K.A.R. 82-3-402. Notice of application; objection** with the adoption on October 24, 2008 of a 30-day public comment period for permit applications. Prior to that time, the comment period had been 15 days. Other significant regulatory changes which have occurred since primacy was approved include:

- 1) **K.A.R. 82-3-407. Mechanical integrity requirements; penalty** May 1, 1987: Describes the manner to conduct mechanical integrity tests for wells drilled or converted to injection or disposal before December 8, 1982 as follows:
 - (1) Wells in areas with saltwater bearing zones shall be pressure tested as specified in paragraphs (b)(1) and (2) at a max test pressure of 300 psi.
 - (2) Wells in areas without saltwater bearing zones shall be pressure tested as specified in paragraphs (b)(1) and (2) at a max test pressure of 100 psi.
 - (3) Method of pressure testing known as fluid depression may be conducted for well with tubing and no packer.
- 2) **K.A.R. 82-3-401. Application for injection well; content.** May 1, 1988: A new factor for the Commission to consider when issuing an order approving injection or disposal; the construction of all oil and gas wells within a ¼ mile radius of the proposed injection or disposal well to ensure fluids introduced into the proposed injection or disposal zone will be confined to that zone.
- 3) **K.A.R. 82-3-400. Injection allowed only by permit; penalty.** April 23, 1990: Created penalty amounts for failing to obtain Commission approval before beginning injection or disposal operations. \$1,000 for the first violation, \$5,000 for the second violation, and \$10,000 for the third violation.
- 4) **K.A.R. 82-3-401. Application for injection well; content.** April 23, 1990: Part of the information to be included in the application to the division was changed to an electric log run to the surface or a log showing lithology or porosity of geological formations encountered in the injection or disposal. If such a log is unavailable than an electric log from a well located within a one-mile radius of the subject well. New paragraph included that failure to obtain Commission approval of any amendment, other than those in subsection c, before resuming injection or disposal operation shall be punishable by a \$500 penalty.
- 5) **K.A.R. 82-3-401. Application for injection well; content.** April 5, 2002: Applications for simultaneous injection wells. Requires that the applications demonstrate the injection will not adversely affect offsetting production or endanger fresh or usable groundwater, that injection pressure is limited to less than the local injection formation fracture gradient, that the injection well is continuously cemented across the injection and producing intervals, and the well demonstrated mechanical integrity as specified in K.A.R. 82-3-407

In terms of implementing the UIC program, the most significant changes have been in the development of data management systems. RBDMS and Oracle are used to manage the overall well database, including specific tables for UIC wells. Operators file annual injection reports online via KOLAR. This Information is used to populate RBDMS and

generate a PDF form. Current programming for KOLAR has enabled MIT test forms to be filed electronically from the field. Future programming is planned to incorporate the UIC permitting process.

Efforts have also been initiated by the division to provide more expansive outreach to operators and the general public. This includes holding informal discussions with operators and citizens and holding pre-hearing conferences as part of formal proceedings. To further advance this effort, development of plain language guides which would outline processes and procedures to be followed is being considered.

Identified Strengths

- 1) The division's ability to utilize flex time, approve overtime and shift inspectors from within a district to cover critical operations such as MITs, well construction and well plugging is commendable.
- 2) The Class II program staff is knowledgeable and experienced and demonstrates a high degree of technical competency. They have benefitted from the many years of relevant experience provided by division management.
- 3) Field staffing levels are generally appropriate and adequate.
- 4) The District Office structure has been designed to focus on the geologic and petrologic conditions present in the various diverse areas of the state.
- 5) The fee- based system utilized by the division has provided a consistent source of funding for the UIC program.
- 6) The public outreach efforts of the division are laudable and should be continued.

Review Suggestions

- 1) The division should consider conducting an audit of their UIC regulations through a working group formed from their Oil and Gas Advisory Committee to assure they meet technical and groundwater protection requirements consistent with current norms. As part of this process, the division may want to consider evaluating the UIC regulations against the Model Regulatory Framework (MRF) developed by the Environmental Defense Fund as an initial step.
- 2) The division should continue to work with the KGS on a plan for the division to acquire and use all seismic data held by KGS regardless of its source to assure proper seismic monitoring relative to potential induced seismicity. This may need to include a means of assuring that privately owned seismic data can be confidentially held by the division. An MOA involving the agencies might be a possible mechanism to achieve this goal.

- 3) The division should consider developing a Standard Operating Procedure (SOP) for data management that assures consistency between districts and the central office. This could include the retirement of individual district data systems and protocols, such as the use of the MS Outlook calendar to schedule MITs.
- 4) The review team suggests that continued emphasis be placed on updating KOLAR and RBDMS to fully incorporate all UIC activities including field inspections, permitting, well testing and reporting.
- 5) While current sources of funding have been sufficient to run a fully successful UIC program, the division should consider seeking additional funding sources to enable the agency to place more emphasis on strategic planning and goal setting, and updates to program and data systems.
- 6) In order to provide greater transparency and avoid unnecessary confusion, the division should consider developing plain language guides for operators and citizens on important program areas such as permitting, public notices, and complaints and protests.
- 7) The KCC should continue to place an emphasis on evaluation of environmentally sensitive sites.

Part II Permitting/ Compliance Review

Permit Application Flow and Review Process

To obtain a Class II UIC permit for a new well in Kansas, an operator must first submit an application to drill to the division in accordance with the provisions of K.A.R. 82-3-103 through 110. While these regulations set certain technical requirements that must be met in order to receive a permit to drill, a significant amount of additional information is required to receive a UIC permit in accordance with K.A.R. 82-3-400 *et seq.* For conversions of existing wells to UIC use, an application to drill would not be needed unless the well is deepened or plugged back.

When an operator is ready to apply for a UIC permit, an application is submitted by mail to the UIC/Production Department of the division. During the past three years, an average of 356 UIC permits per year have been issued by the division, and the rate of permit applications submitted has been relatively stable. Approximately 90% of the applications submitted received permits, with the remainder split fairly evenly between application denials and withdrawals. A UIC permit, which authorizes the operator to begin injection, is issued after all regulatory and technical requirements have been

satisfied, a well completion report has been provided, and Parts 1 and 2 of mechanical integrity have been demonstrated.

An operator also has the option of choosing to seek “design approval” in accordance with K.A.R. 82-3-403(g). This approach allows an operator to obtain approval of the design of the well before it is actually constructed, which is advantageous because operators have only one year to actually drill the well after a drilling permit is issued. Under this option, an operator essentially submits a complete UIC permit application meeting all regulatory requirements including fresh or usable water protection. Upon completion of the well, the applicant submits a copy of the well completion report, on the form furnished by the Commission, to the division. The application for the injection of fluid into the proposed well for injection purposes is then approved, provided there are no significant differences between approved and actual well construction and the mechanical integrity of the well has been tested according to K.A.R. 82-3-407.

The permit application submission must include the application form with the required fee and supporting documents as identified in K.A.R. 82-3-401. The same requirements must be met for both new wells and conversions of existing wells; approximately 40% of applications are for new wells and 60% for well conversions.

After being logged in, an application is forwarded to a Lead Research Analyst, who initially screens the application for completeness. This individual is required to have at least 4 to 5 years of oil and gas regulatory experience and additional on the job training.

When an application is considered complete in terms of the required documents, it is assigned to a geologist who reviews the application and evaluates how well it meets the factors to be considered as outlined in K.A.R. 82-3-403. Information required in an application includes:

- The name, location, surface elevation, total depth, and plug-back depth of each injection well;
- A plat showing the location of all oil and gas wells, including producing wells, abandoned wells, drilling wells and dry holes within a ½-mile radius of the injection well, and indicating producing formations and the subsea top of the producing formations;
- The name and address of each operator of a producing or drilling well within a ½-mile radius of the injection well;

- The name, description, and depth of each injection interval. The application shall indicate whether the injection is through perforations, an open hole, or both;
- The depths of the tops and bottoms of all casing and cement used or to be used in the injection or disposal well;
- The size of the casing and tubing and the depth of the tubing packer;
- An electric log run to the surface or a log showing lithology or porosity of geological formations encountered in the injection well, including an elevation reference. If such a log is unavailable, an electric log to surface or a log showing lithology or porosity of geological formations encountered in wells located within a one-mile radius of the subject well;
- A description of the fluid to be injected, the source of injected fluid, and the estimated maximum injection pressure and average daily rate of injection in barrels per day;
- An affidavit that notice has been provided in accordance with K.A.R. 82-3-402;
- Information showing that injection into the proposed zone will be contained within the zone and will not initiate fractures through the overlying strata that could enable the fluid or formation fluid to enter fresh or usable water strata. Fracture gradients shall be computed and furnished to the division by the applicant, if requested;
- The applicant's license number;
- Any other information that the division requires; and
- Payment of the application fee required by K.A.R. 82-3-412.

When the geologist begins their technical review of an application, K.A.R.82-3-403 requires consideration of the following:

- Maximum injection rate;
- MSIP, formation pressure, pressure at the formation face, or all of the above;
- The type of injection fluid and the rock characteristics of the injection zone and the overlying strata;
- The adequacy and thickness of the confining zone or zones between the injection interval and the base of the lowest fresh or usable water; and
- The construction of all oil and gas wells within a ¼ -mile radius of the proposed injection well, including all abandoned, plugged, producing, and other injection wells, to ensure that fluids introduced into the proposed injection zone will be confined to that zone. If deemed necessary by the division to ensure the protection of fresh or usable water, this radius may be determined pursuant to

40 C.F.R. 146.6(a)(2), as published July 1, 2000, which is hereby adopted by reference.

During the review process, the geologist also reviews the application to assure construction is proper and the area does not contain any possible routes of communication with fresh or usable water. Deficiencies identified by the geologist are communicated back to the operator by mail or email. The geologist may also talk to the operator on the telephone depending on what issues need to be addressed.

The Notice of Application required by K.A.R. 82-3-402; which must be given to applicable operators, landowners and mineral owners, and the general public via county newspaper, and its publication are also checked by administrative and legal staff to assure that they meet rule requirements. While there is no specific language which must be used in these notices, they must cover the criteria enumerated in the regulation. As part of the application review, the geologist utilizes a checklist which identifies the important criteria which must be satisfied before a permit can be issued. No other formal documents regarding permit application review, such as manuals or standard operating procedures, are currently available.

Application tracking is accomplished through monthly reports, containing the number of permits received, processed, and currently being reviewed. The geologists also have access to a query that shows all applications in their work queue, the date the application was received, and other information pertinent to the UIC application process. The geologist monitors their queue and periodically sends the operator reminders regarding the status of the application, information needs and other related information. Notice and publication are good for one year and the operator is sent a notice approximately 90 days before the application would expire. Operators are given the option to renew the application for one year by re-noticing and republishing. If that is not done the application renewal is denied and a notice sent to the operator. While permitting decisions can be challenged by operators, this has only occurred under very rare circumstances. When an application is denied, the application package is retained by the division.

UIC permits are issued for the life of the well. In the past some license revocations have resulted in withdrawal of injection authorization for individual wells. The system has changed, and revocations now apply to operators and rather than specific wells. When modifications to a permit are proposed, the same application review procedures are followed as for a new well. Major modifications are considered to be those which

increase important characteristics of the injection operation, such as those identified in the required public notice. This includes such items as MSIP, maximum injection rate, and injection formations. Minor modifications are those which decrease criteria, or which make small adjustments to items like liner or packer placement. Major modifications require a new public notice, while minor modifications do not.

Area permits are issued by the division, with all wells held to the same standards as an individual well permit. The division does not issue commercial disposal permits because Kansas regulations do not contain such provisions. However, the division requires operators to specify the source of injection fluid including the leases from which it comes. This allows an operator to dispose of fluids from other operators in their Class II well. Under this scenario the permit requirements would be the same as if the only fluid being disposed of in the well came from a single lease. No additional requirements are contained in such permits.

With regard to potential assistance with the application review, the KGS has consulted on seismic questions in the past. In addition, while site visits have been conducted in situations where an application has been contested and in areas of the state that contain sensitive groundwater zones, routine site visits are not usually conducted but might assist the division in identifying other environmentally sensitive areas prior to well permitting.

At present, only protested applications have been posted to the division website. As the RBDMS and KOLAR systems are further developed, increased transparency via posting on the division website may become possible. Manual records continue to be available in the state files and must be kept “until no longer useful” according to state law. As such, they should remain available for the foreseeable future.

Administrative Aspects of Permit Application Review

As part of the application for a UIC permit, operators are required to provide notice of a pending application. A copy of the application is sent to all operators and unleased mineral owners within ½-mile of the subject acreage along with the landowner on whose land the well is located. As previously noted, this Notice of Application is required by K.A.R. 82-3-402 which also requires notice to the general public via a county newspaper, whose publication of the notice is checked by administrative and legal staff to assure it meets the notification requirements.

While there is no specific language or format required in these notices, they must cover the criteria enumerated in the regulation. While the division has not chosen to develop a regulation specifying the items which must be included in a notice, they have developed a SOP for use in reviewing the public notice. This SOP includes items such as the operator's name and address, the proposed pressure, the proposed rate, the name of formation to be used for injection, the approximate depth of the proposed well, and the well location. If a notice is found to have major deficiencies, the division does require a new notice.

The notice must run once in the newspaper and a second time if a hearing is required. The public notice period has been 30 days since 2008 when it was increased from 15 days through a rule change to K.A.R. 82-3-135(e). This change in the comment period has not been consistently reflected in all operator notices, and as a result, the division has initiated a program to remind operators of this requirement.

When public comments are received by the division, they are filed with the application and considered by the geologist as part of their application review. If the comment is a protest of the application, it is sent to the legal department to be assigned a docket number and pre-hearing officer.

Protests to applications must meet 2-part criteria showing that the well must pose a recognizable injury and that the protestant has a causal connection to the well. K.A.R. 82-3-135b(a) establishes the general requirements which state that "The protest shall include a clear and concise statement of the direct and substantial interest of the protester in the proceeding, including specific allegations as to the manner in which the grant of the application will cause waste, violate correlative rights, or pollute the water resources of the state of Kansas." The Commission has issued a Precedential Order using Kansas' two-part standing test to interpret the substantial interest portion of the regulation. Operators may file a motion to dismiss the protest if the 2-part criteria are not met.

Public hearings are formal evidentiary hearings before the Commission, at which pre-filed testimony is utilized. This testimony is also available on the division website. The hearing is transcribed by a court reporter and is available upon request. At the hearing, comments are handled through direct testimony and cross examination. Public hearings are normally held in the courtroom of the central office in Wichita, although they may also be held in Topeka. Hearings are rarely held outside of these offices and would require a highly unusual specific reason.

The division holds informal discussions with operators and citizens as needed. Public concerns regarding permit applications can be addressed during informal pre-hearing conferences held as part of the formal proceedings. If the case is docketed, the results of the public hearings are made available on the division website.

Financial responsibility for UIC wells in Kansas is handled in several different ways through K.A.R. 55-155(d), as follows:

d) In order to assure financial responsibility, each operator shall demonstrate annually compliance with one of the following provisions:

(1) The operator has obtained an individual performance bond or letter of credit, in an amount equal to \$.75 times the total aggregate depth of all wells (including active, inactive, injection or disposal) of the operator.

(2) The operator has obtained a blanket performance bond or letter of credit in an amount equal to the following, according to the number of wells (including active, inactive, injection or disposal) of the operator:

(A) Wells less than 2,000 feet in depth: 1 through 5 wells, \$7,500; 6 through 25 wells, \$15,000; and over 25 wells, \$30,000.

(B) Wells 2,000 or more feet in depth: 1 through 5 wells, \$15,000; 6 through 25 wells, \$30,000; and over 25 wells, \$45,000.

(3) The operator: (A) Has an acceptable record of compliance, as demonstrated during the preceding 36 months, with Commission rules and regulations regarding safety and pollution or with Commission orders issued pursuant to such rules and regulations; (B) has no outstanding undisputed orders issued by the Commission or unpaid fines, penalties or costs assessed by the Commission and has no officer or director that has been or is associated substantially with another operator that has any such outstanding orders or unpaid fines, penalties or costs; and (C) pays a nonrefundable fee of \$100 per year.

Thus, while operators are required to file bonds on wells for the first three years of licensure, if the operator does not have a specific violation history during the first three years, they are allowed to withdraw their bond after the third year and file an annual \$100 licensing fee instead. The division has defined a specific violation history as five or more violations or \$3,000 in monetary violations during a running three-year period.

The \$100 per year licensing fee is clearly not sufficient to cover well plugging needs on either currently permitted or abandoned wells. The division has been able to plug slightly more than 200 wells per year with available funds. Unfortunately, there are over 5,000 abandoned oil and gas wells, many of which are orphaned, in Kansas. While many

of these wells date back several years, they still need to be addressed, which would require enhanced funding sources.

Technical Aspects of Permit Application Review

The technical aspects of the UIC permit review process include identifying the depth of the deepest fresh or usable water, evaluating well construction, reviewing the operating parameters, evaluating the Area of Review (AOR), and assessing induced seismicity considerations.

The first priority is ensuring that fresh or usable waters are protected. To accomplish this, it is necessary to determine the base of fresh or usable water at the location of proposed well. The KGS maintains detailed groundwater maps which utilize numerous data points per county. While the maps have not recently been formally updated by the KGS, the division adds extra data points as available. These additional data points are obtained by utilizing available electric logs located as near as possible to the proposed well. This combined information allows for a better correlation of groundwater data.

Water well data, which is maintained by the KDHE, is also used to verify map data. This data is fairly complete but older records are not considered to be as reliable.

Regardless, this data is not solely used to establish depth to fresh or usable water. Drillers' logs are also submitted with well completion reports and these are checked to see if additional fresh or usable water information exists. Additional sampling at water wells in proximity to the proposed UIC wells is not normally required.

Approval of the casing and cementing plan may occur in stages or at one time. If an applicant first seeks a drilling permit, the surface casing is approved at that time, with the remainder of the casing and cementing approved as part of the subsequent UIC permit application. Accordingly, the intent-to-drill includes well construction information but may not include information specific to the construction of a UIC well such as tubing and packer. However, if an operator seeks "design approval" along with the intent-to-drill, they essentially submit a complete UIC permit application meeting all regulatory requirements including casing and cementing, and tubing and packer designed to protect fresh or usable water.

The production department maintains the fresh or usable water records to approve the intents-to-drill in the state. If the injection well is a new well the application first goes through that department to get the casing string requirements. The geologist reviewing

the UIC application also checks the casing requirements and if they have any question on fresh or usable water depths, consults with the production department or with other agencies, as necessary.

The minimum depth of surface casing ranges from 20 to over 1000' depending upon the location and construction requirements (Alt I or Alt II) of the well in question and is decided on an individual well basis in accordance with surface casing depths established for the county where the proposed well is located. For example, in Eastern Kansas the surface casing has to be set through the unconsolidated material and the long string cemented top to bottom on Alternate II construction.

In the event a proposed well conversion would not meet current construction requirements the division may require more frequent MITs, but this would be done only in unique circumstances.

Dual completion production and disposal wells have been allowed in Kansas in accordance with 82-3-401(b) and (c) of the division rules and regulations. The number of dual completion wells is currently unknown except in Southwestern Kansas where there are 18 of these wells. The division has not permitted any new dual completion wells for many years and there are no known problems with those which currently exist, although well integrity cannot be as easily established through MITs as with conventional wells. Because the division is no longer permitting this type of well the number of existing wells is likely decreasing as they become unproductive.

With regard to MSIP, various approaches are used to determine the MSIP depending on the area of the state. For example, in Western Kansas the MSIP is determined by calculating the parting pressure of the injection formation using a specific gravity of 1.05. In Eastern Kansas where depths are less than 1,000 feet, the Mid-Continent Carbonate fracture gradient of .75 psi/foot is used. In addition, the division uses an 80% of fracture gradient safety factor in setting the MSIP. Alternate approaches for establishing the MSIP such as an Instantaneous Shut-in Pressure (ISIP) or results of a Step Rate test are seldom utilized but could be allowed if requested by an operator.

As part of the permit application, the division does not require an analysis of the produced waters that will be injected at the proposed well. Follow-up sampling during well operation is also not usually conducted. The formation water injected in Kansas comes from the same or very similar zones and thus there is not generally a big difference in salinity between the formations. As a result, NORM resulting from precipitation is not known to be an issue. The operator is required to disclose which

leases are the source of the brine that will be injected for each Class II well, and these are included as a permit condition. Sampling could be required if there is a complaint or as the result of an on-site review by the division inspector.

Area of Review (AOR) Considerations and Procedures

In accordance with K.A.R.82-3-403, a fixed radius minimum of a ¼ -mile AOR is required for all Class II wells. In addition, operators are required to submit information on wells that penetrate the disposal horizon within a ½-mile radius of the proposed well. The division allows use of the ZEI calculation only as a method to define the AOR if it leads to expansion of the ¼-mile fixed radius. No calculation resulting in an AOR of less than ¼-mile may be used.

Before a permit can be issued the division requires corrective action (i.e. plugging or reconstruction) for any wells in the AOR which are determined to be potential conduits. The division has the authority to provide access to wells in an AOR even if they are on another lease or property for the purpose of completing corrective action. If the well records are not adequate to establish the location of potential problem wells, district staff are assigned to try and locate the well.

Plugging plans are developed by each division district. In accordance with K.A.R. 82-3-114, wells must be plugged with “50 feet of cement above and below any fresh or useable water horizons.” District staff have the flexibility to add additional plugging requirements due to specific conditions at an individual well.

Induced Seismicity Considerations

There are approximately 200 large volume wells located in seismically active areas and 500 wells in low level seismic areas in Kansas. In its evaluation of the permit application in areas with potential seismicity concerns the division considers various criteria including:

- the frequency and magnitude of the reported seismic events;
- proximity to other Arbuckle disposal wells, including other classes of Arbuckle wells;
- any geophysical logs which have been run; and
- static fluid levels.

Permits do not currently require bottom hole pressure testing for disposal wells, even in seismically sensitive areas.

Each new permit now contains language allowing the division to order operators to reduce or cease injection operations if staff observes an increase in seismic activity near a Class II well. Staff researches the Arbuckle disposal wells within a 15-mile radius of an event and reviews injection trends. Staff also reviews spud call records to determine if there is any potential for a completion induced seismic event. If a seismicity concern arose on a permit issued prior to the addition of this permit condition and voluntary action by the operator was not obtained, the division would need to go to a Commission hearing and demonstrate likely harm so that an order could be issued requiring the reduction or cessation of injection.

Prior to 2015, seismic monitoring capabilities in the state were limited. Consequently, there is a limited record of seismic activity outside of historical reports. In addition, there was only one potential link to Class II operations in any of the recorded historical events in an area with a significant Class II well presence.

Since 2015, the KGS has implemented a statewide monitoring system and publishes its data online. The KGS monitors trends statewide and notifies the division if it observes areas with unusual increases in seismicity so that staff can evaluate the occurrence to determine if any regulatory action is necessary. Since KGS began gathering this data, the numbers of seismic events with magnitude 2.0 or greater has declined every year since 2016 with annual totals numbered at 650, 583, 441 and 406.

Although an analysis of the possible relationship between agency actions and the reduction of seismic events has not been conducted, the decline in seismic events does appear to parallel actions taken by the division to reduce the volume of injection activity in areas such as Harper and Sumner Counties in south central Kansas, where there appeared to be a correlation between Class II injection and seismic events. On March 29, 2015, the Commission issued an “Order Reducing Saltwater Injection Rates (Initial Order)”. In this initial order, the Commission found the increased volumes injected into large volume Arbuckle wells in areas of Harper and Sumner Counties posed a public safety threat and that immediate damage could result if no action were taken.

As opposed to the normal division requirement for monthly monitoring and annual reporting, the Initial Order established volume reductions, testing requirements, and reporting of daily volumes on a monthly basis for large volume Arbuckle injection wells. Since 2015, several additional related orders have been issued, and the division has now moved to make these orders permanent. The actions taken by the Commission were taken pursuant to authorities found at K.S.A. 2014 Supp. 77-536(a), K.S.A. 55-162(b),

and K.S.A.77-415(b)(2)(A) which provide authority to establish binding precedents to address immediate danger to public health, safety or welfare.

To date, 70 operations have received orders to reduce volumes and none have been ordered to cease injection. The Commission ordered operators of 23 Class II wells to verify the true vertical depth (TVD) of their wells in the March 29, 2015 Initial Order. Approximately 12 of the wells tested had penetrated the surface of the Pre-Cambrian basement. However, all of the wells had sediment plugs above the base of the Arbuckle. Although the division technical staff believed these sediment plugs effectively prevented communication with basement rock operators were still required to place cement plugs on top of the sediment.

Currently there are between 2,000-2,500 Arbuckle perforated and open hole disposal wells in the state. When permitting Arbuckle wells, no additional permit stipulations are required. However, drilling through the Arbuckle into the basement is restricted informally and on a voluntary basis unless there is a division order. When there is sufficient cause, the division may require an operator to prove TVD and plug back out of the Arbuckle.

At the time of this review, the KGS maintained a network of 12 monitoring stations throughout Kansas. The information from this network is shared with division. There is also a private network maintained at 20 Class I wells, data from which is available to KGS, but which is not shared with the division. Obtaining access to this information would strengthen the division's seismic analysis efforts and is a priority objective for the agency. While the division does have the ability to include seismic monitoring requirements in permits as needed, to date this has not been required.

During the review, the team discussed with the division the Oklahoma Corporation Commission (OCC) Oil and Gas Division's utilization of the Well and Seismic Monitoring application (OWSM) developed by the GWPC for seismic evaluation. The team noted that the OCC had also developed an induced seismicity "traffic light" system. This system was first put in place in 2013 in response to the concerns over the possibility of earthquake activity being caused by oil and gas wastewater disposal wells, especially in the Arbuckle. The system requires additional permitting requirements in areas of high seismicity events and enhanced monitoring of Arbuckle wells and increased frequency of MITs depending upon volumes injected. The division in consultation with KGS currently focuses on seismic clusters, similar to Oklahoma, and indicated an interest in

assessing whether the OWSM application and elements of the “traffic light” system could prove useful in Kansas.

Aquifer Exemptions

Kansas has no exempt aquifers, and there is no provision proposed to allow aquifer exemptions. No interest in exemptions has been expressed by operators and the division has discouraged the practice in order to maximize protection of ground water resources.

Periodic File Review Process

The division utilizes a routine schedule for performing file reviews on all UIC wells. Wells are generally selected for review at the time of the MIT, which is scheduled on a 5-year recurring basis. Non-routine file reviews can also be conducted at times other than at scheduled MITs based upon the specific circumstances of a well or operator which may include compliance history.

As part of the file review, the division central office staff review the paper files using standard forms to make sure everything is still in compliance. However, a new AOR check is not done at this time. District staff only become involved if an issue requiring their attention is found during the review. If a change to well construction is found, the operator is required to file an amendment to the permit. If there is an increase in rate or pressure needed, a new public notice would also be required in addition to an amendment.

Identified Strengths

- 1) The UIC application review process is well conceived and designed to provide a good technical and administrative judgment of any proposed Class II well. Reviews include a thorough technical review of well construction and operating specifications.
- 2) The ability of the agency to hold a permit application based on the operator’s responses, without the restriction of an artificial or arbitrary deadline, is a positive aspect of the program.
- 3) Converted wells are held to the same standards as new wells.
- 4) The permitting checklist helps guide the technical reviews of permit applications to assure that all regulatory criteria are met.

- 5) The division's use of 80% of test pressure as a safety factor for determining MSIP is more restrictive than the average of 90% used elsewhere and is highly protective of usable water.
- 6) The division's policy of evaluating potential induced seismicity out to a radius of 15 miles from a proposed well is commendable
- 7) The fact that operations are limited to defined injectate sources through permit conditions is a positive attribute of the program.
- 8) The division does not issue permits for Class II UIC wells where a well in the AOR that needs corrective action has not been addressed.
- 9) The ability of the division to enter onto properties where wells requiring corrective action exist provides a valuable tool the division can use to assure wells are properly constructed or plugged where such wells may impede the issuance of a Class II permit.
- 10) The division's use of the ZEI calculation to only to expand AORs is commendable and enhances the protection of usable water.
- 11) The division's requirement for operators to collect information out to a ½ mile radius of a proposed Class II UIC well although only a ¼ mile AOR evaluation is required is commendable and provides additional data that can be used to evaluate usable water protection measures.
- 12) The division's interest in acquiring a tool like the OCC OWSM application developed by the GWPC for seismic evaluation and evaluating the OCC "traffic light" system are positive steps that could assist the division in the management of induced seismicity.
- 13) The ability of the division to apply injection restrictions as a permit condition on Class II wells is a useful tool for ensuring the proper management of potential induced seismicity.
- 14) The ability of the division staff to discuss pending permit applications informally with both operators and commenters, thus resolving many issues prior to the need for formal proceedings is a positive attribute of the program.

Review Suggestions

- 1) The review team strongly suggests the division consider reviewing with the KCC Advisory Committee the current financial assurance program. This should include:
 - a) Modifying the current licensing system to establish full time individual and blanket bonds that are maintained through the lifecycle of the well;

- b) Evaluating the cost of Class II well plugging and abandonment and setting bonding amounts consistent with these costs; and
 - c) Surveying the bonding requirements in other states as a means of assisting the division in establishing a financial assurance system that is consistent (where appropriate) with other states' primacy programs.
- 2) To improve transparency, the division should evaluate the information placed on-line regarding permits and, where appropriate, increase it.
 - 3) The division should consider Implementing bottom hole pressure (BHP) testing of disposal wells in seismically active areas where specific well conditions or seismic activity warrant.
 - 4) The division should consider conducting AOR evaluations on all wells at the time file reviews are conducted to assure that wells which were not present, missed or physically changed from the initial AOR check conducted during a permit application review are captured.
 - 5) The division should consider expanded use of on-site visits prior to permit issuance, as this may help identify potential problems which can be readily fixed prior to wells being drilled.
 - 6) The division should consider development of SOPs or manuals to guide the permit application review process. Such documents could be especially useful in maintain institutional knowledge when key managers or staff retire, and in training new staff.
 - 7) In those circumstances where a well to be drilled will be utilized as a UIC well from the outset of its existence, the division should consider making "design approval" for UIC applications a requirement rather than voluntary prior to drilling a well. This might help simplify procedures and avoid wells being completed which do not meet UIC criteria and are thus unable to receive a UIC permit.
 - 8) The division should consider phasing out any permitting of dual completion wells that are used for both production and injection because tests for mechanical integrity of these wells has not been shown to be an accurate means of evaluating well integrity.
 - 9) The division should consider requiring the submission of water quality tests of injectate during permitting and on a random periodic basis afterwards as a quality control measure.
 - 10) In instances where fresh water wells exist within ½-mile of a UIC well under permitting review, the division should consider requiring baseline water quality testing of usable water zones in random wells in the AOR to assure a basis for

Kansas Class II injection wells are shallower and the fresh or usable groundwater is near the ground surface. For this reason, Appendix B – Eastern Surface Casing was adopted in Commission Docket 133, 897-C(C-20,079) and incorporated within K.A.R. 82-3-106 (b). Within the Appendix B there are three areas as shown on Figure 1.

Areas 1 and 2 are required to use only Alternative II rules, where Areas 3 can use Alternate I or Alternate II rules, depending on the depth of fresh or usable water. Alternate I rules are established in Table 1 of the Commission Docket 34,780-C(C-1825) for each county. Alternative I rules have the surface casing set to at least 50 feet below the base of all fresh or usable water zones. Alternative II Rules establish 20 to 40 feet of surface casing and cementing production casing from casing seat to surface. These depths are again set by county. Within eastern Kansas 65 to 70% of the wells are constructed using the Alternative II procedure. To confirm the quality of the cement on the production string the division reviews all casing cementing records supplied by the company, as also has the authority to require a CBL.

In Western Kansas, the usable water includes the Lower Cretaceous Dakota/ Cheyenne Formation which can be greater than 1000 feet in depth, and the High Plains Aquifer (Ogallala). The division uses county specific surface casing depths using Table 1 from Commission Docket 34,780-C. Depending on the proposed disposal zone, the operator may be required to use the Alternative II rules which require the production casing to be cemented to at least 20 to 50 feet below the Dakota Formation and cemented to the surface.

When the Class II well is constructed, the production string is required to be run through the injection interval and cemented. Depending on the location of the proposed Class II injection well, the required amount of cement on the production casing will vary. If the well is required to have an Alternative II casing and cementing program, the production casing will have a continuous sleeve of cement from the casing shoe to surface. If the proposed Class II well is not required to use the Alternative II casing and cementing program, the production casing shall be cemented with a minimum of 100 feet. While the isolation of corrosive zones is not covered by regulation it is covered by KCC practice.

Cement placed in the annular space around the casing is required to set to a minimum compressive strength of three hundred (300) pounds per square inch, and the operator is required to wait for a minimum of eight hours prior to commencing further operations. Cement used to fill the annular space around the casing is required to be a

Portland cement blend and must be maintained at surface level for surface casing. If cement does not circulate, the operator is required to make direct contact with the district office immediately prior to performing a remedial cement operation in order to sufficiently prevent fluid migration. There is also a requirement for the surface casing to be centralized if the surface casing is more than 300 feet deep.

The division evaluates the quality and effectiveness of the casing cement jobs by comparing company submitted cement tickets with cement calculations when casing is not cemented to surface. If at any time the division determines that the well was not cemented to the cementing standards set forth by the regulations, a CBL or additional test is required to ensure the Class II well meets the current standards. Division districts have mud scales available to inspectors who routinely evaluate the cement during cementing operations by weighing the cement. If the cement is not a proper weight, the inspector has the authority to require the cement to be pumped out or drilled out.

Wells permitted after December 8, 1982, that require positive pressure to inject must inject through tubing and packer, except as specified in K.A.R. 82-3-406. The packer must be set immediately above the uppermost perforations or open-hole interval into a cemented section of the production casing. The division has a policy that the packer may not be set greater than 50 feet above the uppermost perforations or open-hole interval. The annulus between the tubing and production casing is required to have corrosion inhibiting fluid or hydrocarbon fluid.

The division can permit a Class II injection well without tubing and packer or packerless completions. However, there are additional requirements for both types of alternate completions within the K.A.R. 82-3-406. Within Kansas there are approximately five to six thousand injection wells that are completed without tubing and packer. For Class II wells that have packerless completions, the injection pressure cannot exceed zero psi. The majority of packerless completions are in Eastern Kansas, where the Alternative II casing and cementing program is used, which requires the production casing cement to be circulated to the surface. Most of these wells are shallow Class II enhanced recovery wells (Class IIE) constructed with 2-7/8-inch production casing, which limits the use of tubing and packer.

At the time Kansas was granted primacy for the UIC Class II program, existing UIC wells were allowed to be grandfathered into the Class II program if they met the requirements of the current rules and regulations. Currently there are approximately 15% of pre-primacy Class II wells which are still operational. There are no current plans

to require the pre-primacy Class II wells to be phased out because they still met the current well construction requirements and are subject to the periodic MIT testing requirements.

Well Construction Notifications

The District offices receives pre-spud calls and plugging instructions prior to permitted activities. As time allows, division inspectors witness surface casing and production casing installations and cementing operations. Within Eastern Kansas about 50% of the casing cementing operations are witnessed by division inspectors. However, within Western Kansas a great number of cementing operations occur during non-business hours. Regardless, the division has processes to assure that critical operations are witnessed.

In the event that cement does not return to the surface on the surface casing string, the district office must be notified by the operator immediately and the district office must grant approval prior to any corrective action taken. The district offices are also notified prior to running an MIT based on the 5-year cycle. When the division field inspector is on location for a scheduled MIT, it is typical for them to perform additional inspections on additional wells within the lease.

MIT Procedures and Exceptions

Each Class II injection well must be completed, operated, and maintained in a manner that will prevent pollution of fresh or usable water, prevent damage to oil and gas sources and confine injection fluids to the injection zone. This is confirmed by determining if the well maintains mechanical integrity. A Class II injection well is considered to have mechanical integrity if there are no significant leaks in the tubing, casing, or packer (Part 1 MIT) and no fluid movement into fresh or usable water (Part 2 MIT). Part 1 mechanical integrity can be determined through a pressure test depending on how the well was completed. Prior to beginning injection operations, the proposed well is required to demonstrate that both Part 1 and Part 2 MITs have been successfully completed. If an operator fails to demonstrate both Part 1 and Part 2 MITs prior to beginning injection operations, the division will require the well to be shut-in until the test is successful and the operator is issued a one thousand dollar fine.

For Part 1 MIT there are a variety of tests which are approved based on how the well is constructed. For wells equipped with a tubing and packer, a standard annulus pressure test (SAPT) shall be run at least once every five years. SAPTs shall be performed to at

least 300 psi with no more than a 10% drop over a thirty-minute test. For wells without tubing, which is constructed using Alternative II casing and cementing procedure, mechanical integrity shall be performed at least every five years by using one of a number of different methods established by K.A.R. 82-3-407 (b). One MIT method for packerless completions requires running a retrievable plug to a depth of no more than 50 feet above the uppermost perforations or open hole of the injection zone and applying a fluid pressure of 300 psi for 30 minutes with no drop in pressure.

The division has approved the use of a fluid depression test for Alternative II casing and cementing construction with no tubing and packer installed. The fluid depression test involves shutting in the well for a period of at least 24 hours then pushing the fluid down to a minimum of fifty feet above the top perforation or open hole by applying gas pressure on the fluid column using the following equation of $0.433 \text{ psi/foot}(\text{depth})$ or 100 psi, whichever is greater. The well is considered to have passed the test if the fluid level does not rise while constant pressure is maintained for one hour with readings taken every 20 minutes. The division may also approve the use of a radioactive tracer survey, and temperature logs if the conditions are appropriate, however, this has seldom occurred.

For Part 2 MIT determination, the division requires each Class II well to be constructed to prevent migration of fluids up the casing/ wellbore annulus into fresh or usable water. To determine this requirement, the division reviews cementing records, field inspections and inspector observations, and when required, a CBL to determine that each well has passed a Part 2 MIT prior to injection operations commencing.

According to K.A.R. 82-3-407 (c) for any well which fails to demonstrate mechanical integrity through one of the tests listed above, the operator must demonstrate mechanical integrity for the Class II well within 90 days of the MIT failure. The operator must repair the well, plug the well or show that the current operations will not pose a threat to usable water resource or endanger correlative rights. If the operator fails to demonstrate mechanical integrity, the division will require the well be shut in and will impose a one thousand dollar fine.

If the operator wishes to place the Class II injection well in temporary abandonment status, the operator must show that an MIT has occurred within the last five years or perform an MIT. The operator must also perform an MIT every five years to ensure the well maintains mechanical integrity.

Identified Strengths

- 1) The division policy of requiring wells with failed mechanical integrity tests to return to compliance within 90 days is more restrictive than the average return to compliance requirements of 180 days.
- 2) The division requirement for setting of a packer within 50 feet above the uppermost perforations and within cemented casing in Class II wells is relatively stringent and assures injection is conducted through tubing set within a reasonable distance above the injection zone.
- 3) The division has well construction standards for each district to ensure that the deepest usable water is protected.

Review Suggestions

- 1) The division should consider revising the current cementing standards to include a requirement that cements meet the standards established by the American Petroleum Institute (API) in spec 10A/ISO 10426-1:2009 Specifications for Cements and Materials for Well Cementing.
- 2) The division should consider regulating the isolation of all corrosive zones with cement to protect groundwater.
- 3) The division should consider requiring that new or newly converted Class II wells have a CBL and where available a CBL and Variable Density Log (VDL) run to assure proper cementing bonding on both the casing and the formation.

Part IV: Inspection Processes

Conduct and Management of Inspections

Inspections are conducted by inspectors who are assigned to one of the four division district offices. The inspection staff manage day-to-day inspection duties from their homes but coordinate their activities with the district office, UIC coordinators, and the central office in Wichita to determine the schedule and frequency of inspections for each well within each district. The division district offices provide each Class II operator a list of required MITs for the following six months starting in January and then again in June. From the generated list of required MITs for the district office, the field inspector and the District Manager use a shared MS Outlook calendar to track and schedule when MITs are due for a particular lease. The Outlook calendar provides a tracking

mechanism for compliance with the five-year MIT requirement set forth by division rules and regulations at K.A.R. 82-3-407.

There are 11,160 Class IIR and 4,954 Class II D wells in Kansas. Currently there are 17 inspectors assigned to the Western Districts. The inspectors devote a percentage of their time for UIC duties and cross over to other districts to cover priority inspections on an as-needed basis. Districts 1 and 4 in Western Kansas have 8 and 9 inspectors respectively who devote about 30% of their time to the UIC program. Districts 2 and 3 in Central and Eastern Kansas have 8 and 10 inspectors respectively who devote 50% of their time to the UIC program. The difference between the time devoted to the UIC program between the Western and Eastern Districts is due to the large number of shallow Class IIR wells in the Eastern region. If a priority job is scheduled and the assigned field inspector cannot make it to the job, an adjacent district field inspector can be contacted to witness operations that are not within their assigned area. Each district also has a UIC Manager who devotes 100% of their time overseeing UIC activities within the district.

The division inspectors perform an inspection on Class II injection wells using a fillable pdf inspection form. While each division district may have different variations on the inspection form, each district records similar information regardless of the form used. The variations between forms are due to the wide variety of well types and configurations found in different areas in the state. As a result, districts have created their inspection forms to meet the needs of the district. The inspection reports are housed at the district level within network folders and transcribed into RBDMS, which provides a digital record of the inspection form. The inspection forms are accessible to the inspectors and district and central office staff so they can determine that each operator is maintaining compliance. The operator's historical compliance history is also maintained in files within the district.

Each division field inspector goes through a series of training sessions conducted by Commission staff and external organizations to ensure each has the appropriate skills for the job. Once a field inspector is hired, the inspector receives internal training sessions to ensure they understand the division's rules and regulations and procedures. The new field inspector will ride along with more senior inspectors on a number of different types of operations to ensure they understand what is important to review when performing each type of inspection. In addition to internal training, the division has four inspectors who have gone through the TOP Courses for Regulators and Policy Makes (TOPCORP) training, and three additional inspectors who were enrolled in the

program at the time of this review. In addition to division and TOPCORP training, there are a number of different training seminars provided by operators and service companies that each inspector is encouraged to attend. Additionally, some staff from all districts have attended a bond log interpretation class and a well cementing class. When appropriate, the division will provide refresher training and additional training about proposed new technology. Overall, the division provides a detailed internal training for new and senior inspectors and provides external training when available and appropriate.

Routine/Periodic Inspection Processes

Each Class II Disposal and Enhanced Recovery well is inspected at least one time every five years in accordance with the five-year MIT schedule. However, a greater frequency of inspections may occur for a given Class II well based on a number of factors. These include the age of the well, how the well was constructed, any reported repairs or failures, any reported values which warrant field verifications, and if the well is in a flood prone area. Division inspectors also perform routine unannounced inspections for a given lease. Based on K.S.A. 55-182, the division field inspector may enter a lease to perform an inspection or witness an operation on a well. This also provides the division field inspector the right to enter the lease to ensure compliance is occurring for a given operator. This is essential to ensure the operator is operating the Class II well under the division rules and regulations and below the MSIP.

The division field inspector witnesses and records pressures when the Class II well is equipped with gauges. To accomplish this the division field inspector shuts the valve to ensure the gauge returns to a zero pressure and the gauge is still operating appropriately. The inspector then opens the valve to the gauge and records the pressure. The division requires a gauge to be replaced when it is determined the gauge has stopped operating accurately. Spot checks on measurements taken from the operator's gauges (when installed) and gauges calibrated and maintained by the division provide a cross check on the accuracy of the pressure gauge on each Class II well. The division determines whether or not a Class II well is operating below the MSIP through a review of reporting or an inspection. In the event a well is exceeding the MSIP, the division has the authority to require an operator install pressure gauges to allow injection pressures to be monitored and recorded. The District Supervising Geologist has the authority to impose stricter requirements on an as needed basis based on field conditions and operator compliance issues.

Witnessing of MITs

The operator will coordinate the MIT schedule with the field inspector and the district office. The operator is required to notify the district office and the inspector at least 48 hours in advance of a scheduled five-year MIT. However, the MIT will be accepted by the division even if a field inspector cannot be present. The division witnesses about 76% of the MITs conducted throughout the state. In western Kansas, the percentage of MITs witnessed is nearly 100% while in eastern Kansas, the percentage is closer to 60%. This disparity between areas of the state is due to the number of Class II wells in eastern Kansas relative to the number of inspectors.

Compliance and Enforcement Processes

When the division determines through an inspection or file review that a Class II well is in noncompliance, there is a comprehensive enforcement process to bring the well back into compliance. The first part of the process is the District staff will generate a Notice of Violation (NOV) letter. The letter will state the violation and a specific timeframe for the operator to follow to achieve compliance. A division field inspector will perform a follow-up inspection to determine if the violation has been corrected within the specified timeframe. If the violation is not resolved, the division district staff may make a penalty recommendation. The recommendation is sent to the central office in Wichita for consideration. Standard penalties for violations are listed in the regulations; however, if the district feels that additional penalties are due based on the severity or frequency of the violations, the district office could recommend additional penalties. The additional penalties must be approved by the Commission. Once the central office receives the penalty recommendation, the legal staff will draft an order to be signed by the Commission. Once approved, the order is sent to the operator and is appealable within 30 days of receipt. If the operator wishes to appeal the order, a hearing is held before the Commission. After the hearing, the Commission can approve the final order, however, the operator can invoke a reconsideration petition within 15 days after the final order has been approved by the Commission. If the Commission denies the reconsideration petition, the operator can file for judicial review.

The division has a number of different compliance tools which ensure each Class II well is operating in compliance with statutes and rules and regulations. As described above, if the operator fails to bring the well back into compliance within the time frames set forth by the inspector or district staff, the division has a complete enforcement toolbox. This includes requiring the well be shut-in, financial penalties, and increasing

enforcement actions if the operator still refuses to comply with the NOV letter and Commission order.

Emergency and Citizen Complaint Response Procedures and Processes

The division may receive a complaint or notice of an emergency (“complaints”) through phone calls, in writing, email, or through the division website. Any district office, the central office in Wichita, or the main agency office in Topeka may receive a complaint. Based on the type of complaint received, the appropriate district office or the central office receives notice of the complaint. If the notice or complaint involves a serious spill or imminent risk of environmental degradation, the division is capable of providing an immediate around the clock response regardless of the day or time of day. If the complaint requires a field inspector follow-up, then the appropriate district office is assigned the complaint to investigate even if they did not directly receive the complaint. There is no centralized tracking database for complaints received by the division, however the district offices track each individual complaint from notification until completion. Each District Supervising Geologist and assigned inspector tracks the complaint, performs follow up inspections when appropriate, and communicates with the operator to ensure the complaint can be closed within an appropriate time.

K.S.A 55-162(d) requires the division to investigate complaints within 72 hours of receipt of the complaint excluding holidays and weekends. However, the division has a policy to meet or call the complainant within 24 hours of the complaint. Based on the nature of the complaint, the field inspector makes the complaint a priority over routine activities and investigates as soon as possible. The operator is notified of the complaint only when remedial action of the well or well site is required.

Reporting and Follow-up Procedures

The division policy is to retain each original inspection report that is performed for five years and to permanently retain each inspection report on microfilm which is transferred to the state’s historical archive. However, the inspectors have access to the electronic images of each previous inspection report for every Class II well. Also, details from inspection reports are entered into RBDMS, to which each inspector has access. When a violation has been determined, a NOV letter is either sent from the district office for field violations or from the central office for reporting violations. The district or central office staff tracks the NOV due date on an MS Outlook calendar to ensure the violation is resolved prior to the due date or refer the violation to the legal staff to draft a Commission order. Once an order is signed by the Commission, the legal staff tracks

the due date for resolution and will coordinate with the field staff to ensure compliance has been restored.

Each Class II operator is required to fill out a Form U3-C, the Annual Report on Pressure Monitoring, Fluid Injection and Enhanced Recovery for each Class II well they own. This report can be filed using the KOLAR system. The KOLAR system sends an electronic notification that the Form U3-C is coming due or is overdue. One of the successes of the KOLAR system is that 99% of the U3-C Forms were submitted last year.

Well completion reports or the ACO-1 Form, which includes casing information, cementing tickets, geophysical logs, geological reports are required to be submitted to the division within one hundred and twenty days after spudding the Class II well. If the operator fails to submit the ACO-1 Form, the division will not hold the form confidential. The operator can amend the ACO-1 Form if additional well construction operations occur on the well after one hundred and twenty days. The ACO-1 Form and amendments can be submitted using the KOLAR system.

Each Inspection report, Form U3-C, ACO-1, applications, geophysical logs, MIT reports and all other documents are either scanned, or created by KOLAR and retained by the division in electronic form and for a period of time in paper form. Historical records are transferred to the Kansas historical archive to be retained indefinitely. General information regarding each Class II well is transferred to the KGS for research or public inquiry.

Identified Strengths

- 1) The overall percentage of Mechanical Integrity Tests (MITs) witnessed by the division is commendable.
- 2) The fact that District Supervising Geologists can impose more stringent requirements on an as needed basis is commendable.
- 3) The state requirement of responding to complaints within 72 hours is commendable. Also, the practical application of a 24-hour response is better than the state requirement.
- 4) The injection reporting rate of over 99% is a positive program attribute.
- 5) The division does not limit the method of receiving complaints, which provides greater access to the public.
- 6) The division has a well-organized and consistent enforcement system with appropriate penalty mechanisms.

- 7) The system of inspection districts with defined areas coupled with the ability of inspectors to flexibly assist inspectors in neighboring areas is a positive attribute of the program.
- 8) The division has a commendable public and operator communications and outreach program. The division procedure for notifying operators about MITs coming due provides a practical and effective means of assuring compliance with periodic MIT requirements.

Review Suggestions

- 1) The division should consider tracking all complaints received whether resolved at the field level or above. Further the division should consider developing a standardized complaint response tracking system.
- 2) The division should consider purchasing pressure gauges for district field staff to verify the pressure reading on each Class II well to ensure mechanical integrity and maximum allowable injection pressure requirements are met during injection operations.

Part V: Data Management Systems

Introduction

An effective data management system is a high priority for the KCC as part of their efforts to modernize and integrate into an open information world. KCC's KOLAR system and RBDMS system provide the agency with tools to support the agency's core program needs. Regardless, there are still ongoing efforts to provide updates to meet the agency's current needs for data management and address stakeholder needs.

General Overview

The review team identified ongoing efforts to improve the tracking of electronic data in support of managing wells, compliance, field activities, and the additional day-to-day needs of a modern oil and gas agency. Part of those efforts include the development of online regulatory forms through KOLAR. KOLAR is an application submission and data collection tool being developed through a cooperative agreement with the KGS and funded by the KCC. The KCC also maintains a classic version of RBDMS, which was initially installed in the 1990s and has been upgraded a number of times since initial installation. One of those upgrades included the migration of the data from Microsoft

SQL Server to the State Supported Oracle database. This provided the KCC with state IT staff support for management of the database and integration with other State databases. Although the current KCC website provides some data access components for the regulated community and the public, upgrading the RBDMS installation and integration with a more modern website is seen as a goal of the KCC.

Current KOLAR Oil and Gas forms related to the UIC program identified as available for submission can be found at <https://kcc.ks.gov/oil-gas/kolar-faqs> and <https://kcc.ks.gov/oil-gas/oil-gas-forms>. These include:

- Intent-to-Drill (C-1)
- Well Completion Form (ACO-1)
- Application for Dual Completion (ACO-5)
- Exploration and Production Waste Transfer (CDP-5)
- Well Plugging Application (CP-1)
- Well Plugging Record (CP-4)
- Temporary Abandonment Application (CP-111)
- The Well Inventory Certification Process
- Transfer of Injection or Surface Pit Permit (T-1)
- Annual UIC Report U3-C
- MIT Form (Mechanical Integrity Test) (U-7)
- Annual Operator License Renewal Application

Future KOLAR forms of interest include:

- UIC Application (U-1)
- Notice of Injection Commencement or Termination (U-5)
- Notice to Modify Injection Permit (U-9)

For operators, submission of these forms in the KOLAR system is required. Data submission through KOLAR is integrated back to RBDMS for tracking and management. Expansion of additional KOLAR forms and a tighter integration with analysis and historical data management in RBDMS is seen as a general need for KCC.

Tighter integration of systems into a functioning whole lead to a consistent data management process across the entire commission. It should be noted that there are additional components available to operators in the KOLAR “Beta” system beyond the above data submission components. An Operator Management Module provides operators with additional information on their well inventory. It does tie back to RBDMS for data. This includes initial drilling information and UIC permit information along with pit and TA & plugging information. Notably specific due dates for requirements on the

well inventory is provided. The module also solicits feedback from the users for improvements.

Beyond KOLAR and RBDMS there are other aspects of data management ongoing at the KCC. These include:

- KCC Website: The current website, found at: <https://kcc.ks.gov/oil-gas>, provides some data but was identified by the KCC as needing modernization to include additional information about ongoing efforts and provide additional data to the public and regulated community.
- Protest & Docket System: Current applications are publicly available from KCC through the state's Protest and Docket system only if they are protested. However, applications are available when requested through a public records request.
- KGS Data Portal: Much of the historic production data and well records recorded in RBDMS, and now submitted through the KOLAR system, are available through the state's centralized Oracle database servers. Some of this data has been compiled and made available on the KGS's website located at: <http://www.kgs.ku.edu/PRS/petroIndex.html>

Additional general data management needs identified by the team include:

- Complaints: Because complaints may currently be reported in multiple locations, a centralized complaint tracking system would be beneficial.
- Inspections: Inspection tracking is performed differently in each district RBDMS is used to track and schedule inspections but not for the tracking of all information collected. Upgrading RBDMS to fulfill all data collection on inspections would be beneficial.
- Seismic: Tracking and analysis of seismic data in relation to injection volumes and requested permit applications should be enhanced in KCC's data management and well permitting system.
- Commission Wide Document Management System: The document management system purchased for the Commission should be integrated into the available online well searches to provide current and historic well file information to KCC's stakeholders.

While the existing components of the system identified above currently support an effective regulatory program and provide many tools that strengthen the UIC program, the identified upgrades would strengthen the program further. It is critical that KCC continue completion of the KOLAR system and the identified components that will be

used by the UIC Program in their day-to-day scheduling and management of the program.

The existing RBDMS and KOLAR components evaluated during this peer review included required modules for managing data on Operators, Financial Assurance, Wells (including Construction), Well Permitting, UIC Injection Monitoring, and UIC Permits. These modules provide a solid foundation for the support of the full regulatory program requirements. Additional needs were identified for generating letters, notices, and periodic reports such as USEPAs 7520s.

Identified Strengths

- 1) The KCC has a means to track and manage current UIC Program data. This data is currently being used to run an effective program.
- 2) The KCC has devoted substantial resources toward improving the oil & gas program through the development of KOLAR.
- 3) The ongoing use of RBDMS by KCC demonstrates a commitment to the regulatory programs managed and tracking of necessary electronic data needed.
- 4) The KOLAR operator module provides notifications regarding upcoming tests and form submission deadlines; which helps avoid non-compliance.

Review Suggestions

- 1) Although the KCC has an electronic data management system that meets the current needs of their program, it is aging, and future needs are envisioned. Modern database systems are important tools that allow state oil and gas regulators to do more work with existing staff, monitor compliance, and track enforcement actions. Building tools to manage day-to-day communications, repetitive tasks, track statistics of actions taken, and do an accounting of work performed, will allow KCC the ability to better focus on more critical regulatory program needs.
- 2) The review team suggests the KCC complete their current implementation plans for the KOLAR system and specifically for UIC Forms. The team also suggests the KCC continue its efforts to expand the KOLAR system for direct electronic data collection.
- 3) The review team suggests the KCC continue its plans to make the U-1 form publicly available through KOLAR for all applications.

- 4) The review team suggests the KCC evaluate the needs of their stakeholders relative to a modernization of their Website to provide the data needed to support industry, the public and research.
- 5) The review team suggests the KCC evaluate the need for a centralized Document Management System, an Integrated Field Activity System, seismic analysis tools, compliance reporting, and complaints tracking.

Permitting and File Review

The KCC is currently using their KOLAR and RBDMS systems, as well as other processes, for tracking well permit applications and file reviews. New well drilling permits are submitted through KOLAR, which generates PDF files that are circulated to staff for applications review and approval. Once approved these well permit records are migrated into RBDMS. UIC permit applications have not yet been developed in KOLAR so entry of this information into RBDMS is done manually by staff.

Reports are generated from the data management system for permit applications received and in process. This assures that applications are managed in a timely manner. The data used in the reports is readily accessible on demand by permitting staff to help manage their workload.

The KCC supplies some general well permitting information on their website to assist operators in the permit application process. Beyond the availability of Statutes, Regulations, Guidances, and Forms, they have added the required county-by-county surface casing depth requirements to protect USDWs. This can be found at: <https://kcc.ks.gov/oil-gas/minimum-surface-casing-requirements>. The website also includes information on induced seismicity and the actions the KCC has taken to mitigate induced seismicity in seismically sensitive areas. These can be found at: <https://kcc.ks.gov/oil-gas/induced-seismicity>.

Additional resources could be added to the website specific to the permitting needs of UIC wells to benefit the program. These include things like any additional known environmental restrictions that an application would need to take into account in their application, listing of areas considered urban, wellhead protection areas, source water areas, current UIC permits, and posting of UIC permit applications currently under consideration. A list of other available resources provided by KDHE and KGS, such as the online water well map, should also be considered for addition to KCC's website.

Currently, if a permit application is protested and put on a docket it will become available on the KCC's website. The KCC plans on making all permit applications publicly available through KOLAR.

The role of RBDMS at the KCC during the permit review is largely limited to storing event and permit information such as permit requirements/conditions, dates of approval/last review, permit modifications, notices of deficiency, injection monitoring, due dates, and inspections. RBDMS could be used to identify wells within AOR based upon distance to a subject well, which can be instrumental in an AOR file review. At present the information used when performing AORs at the KCC includes map searches and file reviews. One area that was identified as requiring some review was the current mechanism for tracking complaints that does rely on where the complaint was filed. If these complaints deal with a well or operator in the UIC program, having a centralized database available during file reviews would be beneficial.

Adding tracking of wells with seismic or directional considerations in the RBDMS data management tracking system associated directly to the UIC Permit should be considered. This includes tracking of directional data, construction of wells in the AOR, and tracking of required corrective actions, performed by well, prior to issuance of a permit. Storing this information will help future permit writers and file reviewers.

As part of the annual assessment of compliance and file review of UIC permits the submission of Annual Injection reports is required. The KCC stated they received about 99% of their Annual Injection reports electronically for calendar year 2019. This is a very high percentage and provides the agency with the ability to develop excellent metrics of program performance and operator compliance.

Identified Strengths

- 1) The storage of well and permit information in electronic format makes information readily available for the review process. This assists in the monitoring and management of the program and assessment of the programs' health over time.
- 2) The tracking of permit applications and their approval/ denial using the RBDMS and KOLAR systems supports personnel workload management and is a positive aspect of the program.

Review Suggestions

- 1) The review team suggests the KCC continue expanding the KOLAR system to include additional UIC form submissions. This should include the application for UIC Permits and Permit Modifications.
- 2) Because some information beneficial to the application process is currently supplied to applicants from the KCC website the review team suggests the KCC consider expanding use of the website to provide guidance which may result in higher quality applications, requiring less staff time to evaluate.
- 3) The review team suggests the KCC develop a tracking system for complaints that is usable by all offices. This will assist in managing the data required for operator and well reviews.
- 4) The review team suggests the KCC develop additional tracking of well construction and seismic conditions for AOR reviews on permit applications and file reviews where practical, applicable, and necessary. This could include additional information on individual wells in an AOR, required tracking of corrective actions performed by well, and potentially include water wells.

Well Construction

The KCC's RBDMS program collects and maintains well construction and related completion information on all regulated wells. This includes information on wellbores, casing, cement, geology, and well logs. Access to these and other available information when evaluating a well for conversion or review of proposed construction of new wells is critical to the success of the program. As work is performed by KCC on reviewing permits or assessing wells critical to the permitting process information discovered in paper or electronic documents representing well construction records should be entered into RBDMS. Well construction information on wells discovered in an AOR should also be captured in RBDMS. Tracking any corrective actions required on wells as part of the UIC permitting should be considered for addition to the system.

Having access to information on USDW depths and the geology of the area to be drilled is critical to determining if well construction will meet program needs and protect USDWs. Values for the depth of the lowermost USDW and other zones that may require additional cementing should be readily accessible in RBDMS. The water information is currently maintained on KCC's website and available for public access.

Identified Strengths

- 1) The KCC's RBDMS program contains well construction records and a geologic record of what zones are penetrated.
- 2) Proposed well construction and new completion reports are submitted along with any required logs and are readily available to the engineer when evaluating wells.
- 3) The availability of lowermost USDW data by county is used to evaluate well construction and is available to the public from KCC's website.

Review Suggestions

- 1) The review team suggests the KCC add a wellbore diagram tool to its RBDMS suite of products. This will assist in the visualization of well construction and identify potential deficiencies.
- 2) The review team suggests the KCC develop a geologic module in RBDMS to assist in the identification of problem zones that may be penetrated or may cause issues with existing well integrity in an AOR. Having RBDMS highlight those areas to the engineer when evaluating wells would be beneficial.

Inspections

Assuring the tracking and consistency of field inspections is critical to running an effective UIC program. Use of a comprehensive electronic field inspection tool can help to assure on-time inspections are being performed and are consistent across the state. Ideally a system will provide the inspector with the ability to enter data directly to the KCC's RBDMS system from the field. Currently the KCC's RBDMS system assists in the tracking of field inspections due and, for certain districts, the direct tracking of inspection data. Due to differences in workload and types of inspections required in each district, not all inspection data is tracked consistently. To meet the needs of the UIC program the development of a field inspections system that works for all districts and helps with standardize reports across the state should be considered.

The scheduling of workflow and workload for the field staff is currently managed through a standalone activity report tracking database and MS Outlook calendars. Additional tools could be integrated into an inspection system to assist in timely tracking of inspections due on a periodic/routine basis. A prioritization of inspections based on inspection histories and environmental parameters can be integrated into a new field inspection application. The necessary tracking of inspections could include the critical

notice for immediate inspection and the scheduling of routine periodic inspections. However, the current system of communications/notice from industry and calendar tracking used by the KCC for assuring critical notice of immediate inspections has proven effective. Regardless, the existing system can be more susceptible to mistakes on scheduling of individual inspections because it does not include central tracking.

When inspectors have cell phone connectivity in the field, they can review well and past inspection data. In addition, they can download well file data in PDF format if they know they are going to be in an area without connectivity. They can also use laptops, GPS, and smartphone technology to capture data in the field.

In addition to inspections the management of complaints is important. There are many ways complaints may be reported to the KCC including:

1. Reports to the KCC office in Topeka;
2. Reports to a district office or district staff; or
3. Reports to KCC's central office in Wichita.

Because of the multiple avenues for filing complaints, information regarding complaint response can become fragmented. Having a centralized system for entering the complaints that all districts can use as needed would be beneficial. RBDMS currently has an ability to track complaints that can be used in the central KCC office and district offices but does not address the tracking of complaints submitted to the KCC office in Topeka. KCC's website provides instructions on how to submit a complaint but no webform is provided for this purpose. This could be an addition to the modernization of the KCC's Website.

Field violations are addressed at the district level and typically tracked in an MS Outlook Calendar. This tracking of Notice of Violations (NOV) compliance should be enhanced. Resolution of an NOV is tracked in the central Wichita office and ultimately tracked both in RBDMS and by the Legal staff in a spreadsheet. This dual tracking provides a means to monitor actions being taken on operators to resolve an NOV and provides that information to field and district staff.

Submission of MITs to KOLAR has recently been completed and is available to both Industry and KCC staff. However, additional website posting could be provided to allow operators to provide the KCC with a notice of pending field activities which require witnessing by KCC staff. Data from submissions to KOLAR is integrated back into RBDMS and a PDF is generated for posting to a Document Management System. Additional field inspection activities and interactivity tracking is being planned for inclusion into KOLAR.

Identified Strengths

- 1) The KCC's current RBDMS system assists in tracking when routine and periodic inspections are due. This helps in the management of personnel and scheduling of inspection workflow.
- 2) The KCC has a procedure in place to track immediate and critical notice inspections that is currently functioning for their agency.
- 3) Inspectors can access the RBDMS and KOLAR document management system from the field to assist in performing required inspections. This provides inspectors with access to historic well inspection data.
- 4) Formal NOV tracking is centralized and tracked in RBDMS for reference, as needed, for future inspections and well reviews.

Review Suggestions

- 1) The review team suggests that field inspection systems be integrated with the central RBDMS well database and provide consistency in workflow, planning, inspection counts, and prioritization of inspections to be performed. The system should provide the KCC with flexibility to design inspections by district to meet the variability of needs across the state.
- 2) The review team suggests the KCC continue its efforts to capture MITs in KOLAR and to increase other KOLAR submissions relative to UIC needs.
- 3) The review team suggests that a field activity reporting and tracking system be put into place on KCC's website to provide operators with the ability to provide scheduled notice to the KCC of planned activities requiring an inspector. This will assist in coordination between industry and field personnel to accomplish these activities.
- 4) Because the tracking of NOVs in both RBMDS and a spreadsheet, with ultimate resolution performed by legal staff could lead to a confusion of data between the two data tracking systems: spreadsheet and RBDMS. Therefore, the review team suggests the tracking of final NOV resolution be automatically merged back into RBDMS in an automated process or the functions provided by the spreadsheet be integrated into RBDMS to assure consistency of data.
- 5) The review team suggests the KCC develop a centralized complaint tracking system accessible by all KCC personnel responsible for accepting, tracking, and addressing incoming complaints.
- 6) The review team suggests the KCC continue its efforts to implement a modern Commission wide Document Management System.



Ground Water Protection Council

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