State of Utah
Class II UIC Program
Peer Review

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Conducted by the

GROUNDWATER PROTECTION COUNCIL

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Contents

Introduction

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 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 in order 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 percent of the liquid hazardous waste, and more than 98 percent of salt water produced by onshore oil and gas operations from the surface environment1.

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), 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 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 fluids safely, injection wells must be properly constructed, located in an appropriate geologic setting, 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: 1) 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, 2) biological treatment, 3) incineration, 4) storage in evaporation pits, 5) discharge into percolation pits, and 6) 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.

[1] Van Voorhees, R. F., Bryan Cave LLP, 2001, Removed from the *Environment, The Environmental Forum, The Policy Journal* of the Environmental Law Institute, Vol. 18, Number 2.

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 (U.S.EPA) to develop minimum federal requirements for injection practices. Regulations adopted pursuant to the SDWA are now administered by U.S.EPA 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."2 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), U.S.EPA worked with a twelve-member state workgroup to develop the UIC Program rules (1976-1977). From the onset of rule development, regulatory officials sought to apply lessons learned from decades of injection experience. Prior to enactment of the federal regulations, U.S.EPA and state officials examined best practices as well as problems associated with injection well operations that pre-dated passage of the SDWA.

While developing the UIC Program regulatory framework, U.S.EPA 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

[2] U.S. Environmental Protection Agency, 2002, Definition: *Underground Source of Drinking Water* (Section 146.3 of Part 146); U.S. Code of Federal Regulations, Title 40, Part 146, revised of July 1, 2002.

- Direct injection of fluids into or above an USDW[3].

The U.S.EPA 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

The U.S.EPA 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 U.S.EPA 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 U.S.EPA 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 U.S.EPA. In states that have not received primary responsibility for the UIC Program, U.S.EPA remains the responsible regulatory agency. These states are referred to as Direct Implementation (or DI) states, because U.S.EPA directly implements the federal UIC regulations in these states. Some states share responsibility with

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

the U.S.EPA, with authority over some well classes residing at the state level, and other well classes being regulated by U.S.EPA.

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 1) while drilling through saline water zones that naturally occur in the subsurface and overlie the target oil and gas reservoir(s), 2) after stimulation of oil or gas reservoirs by hydraulic fracturing during the flow back and swabbing process, 3) during work-over operations, and 4) 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).4

The 1980 amendments to the RCRA required U.S.EPA to conduct a study of the environmental and potential human health impacts associated with E&P wastes and their associated waste management practices. U.S.EPA 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, U.S.EPA decided not to recommend federal regulation of E&P wastes as hazardous wastes under Subtitle C of RCRA (U.S.EPA 1988). This determination is commonly referred to as the "RCRA exemption". Although produced water is exempt from one

[4] 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.

section of RCRA, it is subject to requirements in RCRA Subtitle D and the Safe Drinking Water Act.

Approximately 20.5 billion barrels (bbl.) 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 7 bbl. of water are produced for each barrel 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.

On the other hand, most shale gas wells generate most of their produced water after hydraulic fracturing 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. The majority of produced water recovered from typical shale gas operations is recovered during the first several months.5

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:

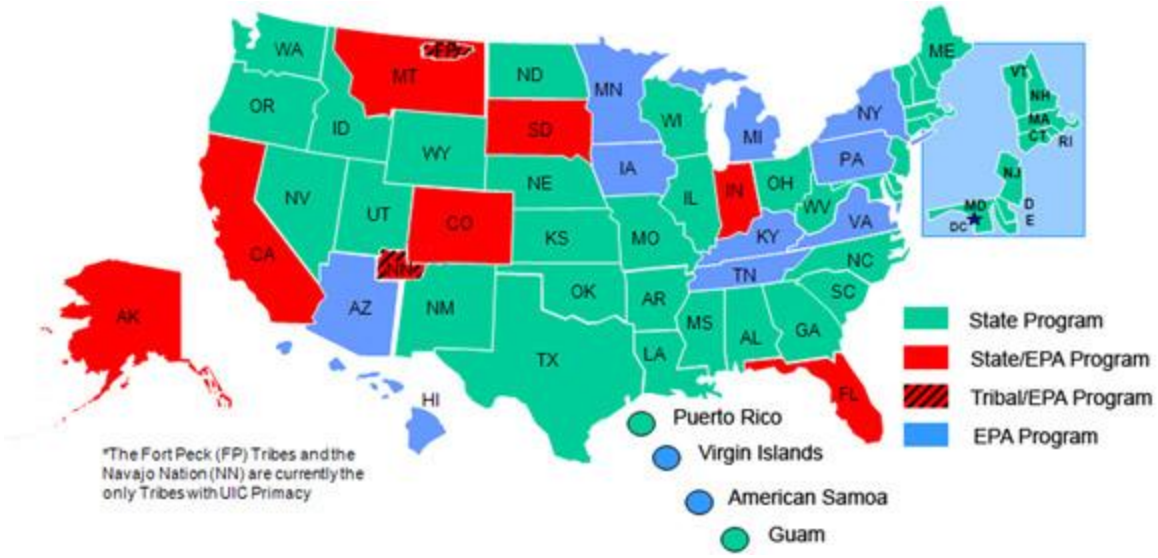
- Hydrocarbon storage wells;
- Enhanced oil recovery wells; and,
- Produced water disposal wells.

Hydrocarbon storage wells are used to pump crude oil and other liquid hydrocarbons beneath underground salt deposits 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 waste-water by-product is referred to as “produced water” or “salt water” because salts (sodium, calcium, magnesium, potassium chlorides) are the predominant dissolved constituents in produced water. Produced water disposal wells are sometimes

[5] Ground Water Protection Council and ALL Consulting, 2009, *Modern Shale Gas Development in the United States*, a Primer, prepared for the United States Department of Energy, 98 pp., Web 1, March, 2011.

referred to as “salt water disposal wells” because they inject fluids into deep saline reservoirs for disposal purposes. Nationally, approximately 60 percent of all salt water produced with onshore oil production wells is re-injected at Class II EOR wells, while 40 percent is injected for disposal.

As of 2012, U.S.EPA has awarded primacy for the Class II Program to 41 states and territories, and 2 tribes. The following map shows the distribution of Primacy states and Direct Implementation states.



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 protected groundwater. Therefore, injected fluids can only enter USDWs as a result 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 are 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 rule or permit condition.

- All known wellbores that penetrate the proposed injection zone are evaluated within an "Area of Review" surrounding the proposed injection well. Wellbores that pose potential avenues for fluid migration by virtue of 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 in 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 mechanical integrity can 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 Ground Water Protection Council (GWPC) conducts the Class II UIC Peer Review process under the joint GWPC and Interstate Oil and Gas Compact Commission (IOGCC) "StatesFirst" 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).

The review team consists of the following persons:

1. Two volunteer state Class II UIC program persons from primacy programs of states that reside outside of the EPA Region of the state being reviewed
2. A GWPC staff member
3. A facilitator hired by the GWPC
4. An federal observer from the EPA Region in which the state being reviewed resides

The review process and 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 30 days following in-state interview (Non-observer team members, facilitator and GWPC representative)
10. Submission of draft report to state program (GWPC)
11. Review and comment submission by the state to GWPC within 15 days of receipt of draft
12. Revision of draft within 30 days following receipt of state program input (Non-observer team members, facilitator and GWPC representative)
13. Approval of the final report within 15 days of revision completion (GWPC Executive Director)
14. Printing of 100 copies of the final report within 10 days following approval by GWPC Executive Director (GWPC)
15. Posting of the final report on the GWPC website within 10 days following approval by GWPC Executive Director (GWPC)
16. Distribution of 25 copies of the printed report to the state program (GWPC)

The general rules of a review include the following:

1. Review team members agree to operate under rules of 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
2. 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
3. Observers may submit comments on the draft report at their discretion

4. Preparation and approval of the draft report will be accomplished using a consensus approach
5. Minority reports, other than those that may be published by the reviewed state, are not allowed
6. Comments in the report will not be attributed to any individual team member
7. The GWPC is solely responsible for the content of the final report
8. 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

Utah Class II UIC Peer Review

Review Team

The following persons conducted the Utah Peer Review:

State team members:
Mona Nemecek, UIC Manager, Division of Oil and Gas, Indiana Department of Natural Resources
Charles Lord, Senior Hydrologist and Quality Assurance Manager, Division of Oil and Gas, Oklahoma Corporation Commission

GWPC staff and consultants:
Mike Nickolaus, Special Projects Director, GWPC
John Taylor, Former USEPA UIC Program Manager and GWPC Facilitator

Observer:
Bruce Suchomel, USEPA Region 8

Executive Summary

The peer review of the Class II UIC program administered by the Utah Division of Oil, Gas and Mining (DOGM) was conducted by a review team made up of UIC managers and technical staff from state Class II agencies of states outside of the EPA region in which Utah resides. This included an in-state interview of DOGM staff and management at the DOGM office in Salt Lake City, Utah on August 26th and 27th, 2015. The in-state interview was based on responses to a comprehensive questionnaire completed by the state UIC staff and follow-up questions posed to the UIC staff during the interview. In addition, the interview team members reviewed the state's statute and rules governing the UIC program and other materials provided by the state.

Program Overview

The Utah Class II UIC program is managed by the Utah DOGM under the authority of the Utah Oil and Gas Conservation Act (Title 40 Mines and Mining) and the Utah Oil and Gas Conservation General Rules (R649 et al.). Utah obtained primacy for the Class II UIC program under Section 1425 of the SDWA on October 8, 1982.

The UIC program is managed by a Field Operations Manager, and an Oil and Gas Permitting Manager. Overall management of the UIC program is supervised by the Associate Director of Oil & Gas. UIC program responsibilities are handled by two Environmental Scientists based in Salt Lake City and six field inspector positions in Price and Vernal. Additional support is provided by other Division staff including Permit Staff, a Bonding Technician and an Oil & Gas Information Specialist.

In 2015 overall funding for the UIC program was $225,052. This consisted of funds from two sources:

1. $136,052 in state funds
2. $90,000 in grant funds from USEPA

The current inventory of Class II UIC wells in Utah includes 706 enhanced recovery wells and 85 disposal wells. The inventory does not include approximately 600 wells in what is referred to as "Indian Country"; for which the state has assumed inspection responsibility but which are not part of the officially delegated primacy program. Therefore, the total number of Class II UIC wells managed by the state is approximately 1,390.

Permitting/ File Review

All UIC permits are issued from the Salt Lake City office. The UIC application review process is well conceived and designed to provide a good technical and administrative judgment of any proposed Class II well. Although permit reviews are conducted by more than one individual, routine communication is maintained between staff responsible for permit decisions. This insures consistent application of the principles used to determine permitting outcomes. The division does not distinguish between commercial and non-commercial wells for purposes of permit review. Reviews include a thorough technical review of well construction and operating specifications and also include a pre-drilling site evaluation and inspection process designed to insure protection of natural resources and the environment. Division staff indicated that there is not a specific frequency for file reviews. While atypical, this may not be particularly problematic given that initial reviews of Class II wells include a ½ mile "Area of Review" (AOR). This is twice the size of most other state programs and should be adequate to capture all wells that could pose a risk of acting as a conduit for upward fluid migration. Further, routine file reviews using a ½ mile AOR would be very time consuming and might result in the need to re-allocate resources away from more critical UIC tasks such as permit reviews, inspections or MIT witnessing. Overall, the review team concluded that the permitting process implemented by DOGM provided appropriate protection for USDWs

Financial Assurance

All wells in the UIC program must be bonded in accordance with R649-3-1. The amount of bond is determined by the proposed completion depth of a specific well and may be in the form of a surety, Certificate of Deposit, irrevocable letter of credit, cash or negotiable bond. Bonding is required for the duration of drilling, operation, plugging and site restoration of a well. An operator may seek approval for a blanket bond, whose amount is also dependent of the depth of the wells under permit to that operator. While the amounts required for blanket bonds exceed those of many other states, the review team suggests setting a limit on the number of wells which can be included under one blanket bond, as even DOGM's relatively high amounts would be inadequate to properly plug a relatively large field.

Inspections

Inspections of Class II UIC wells are conducted by division personnel at least annually and more frequently as needed. Although inspection districts are assigned geographically, there is typically considerable overlap between inspectors to avoid unnecessary travel. Inspectors witness over 95% of all casing/ tubing well integrity tests. Although there is no official complaint response time, the division stated that complaints are typically responded to within 24 hours. All of the inspectors currently employed by the division have undergone either the IOGCC Inspector Certification Course or the USEPA UIC Well Inspector Training Course. Overall the review team found that this portion of the DOGM program provided an adequate level of protection to USDWs

Well Construction

The DOGM requires newly constructed wells to cement surface casing below the lowest usable fresh water. However, if surface casing is not set below the lowest USDW the Division requires the setting and cementing of a second casing string. Cement on this string must be from the bottom of the casing up into the next cemented string of casing. This provides a continuous cement sheath across all USDWs. For wells converted to Class II the Division does not have a specific cement requirement above the injection zone. Further state rules allow for injection through the casing without the use of tubing and packer. However, only five wells in the state have this type of construction and staff indicated that four of these wells were expected to be plugged in the near term. Overall, while the review team believes the well construction requirements are adequate to protect USDWs from contamination from injected fluids, it suggests DOGM consider the following:

1. Adding a specific cement height requirement for cement on converted wells to insure a cement sheath on the injection casing above the injection zone sufficient to prevent the migration of fluids into USDWs; and
2. Removing the language in the rule that allows for injection through casing and adding language that specifies injection must be through tubing set on a packer placed inside cemented casing no more than a specific height above the injection zone.

Mechanical Integrity Testing

Utah uses the standard annulus pressure test (SAPT) as a demonstration of Part I well component integrity. To demonstrate Part II cement integrity, DOGM requires a Cement Bond log (CBL). If there is any doubt as to the results of the CBL, the DOGM requires the operator to conduct a RAT survey. This extra step assures a high level of confidence in the competence of cement. The addition of a Radioactive Tracer survey (RAT) survey in these cases results in a greater level of USDW protection since RAT surveys are a clear and well accepted method for evaluating fluid flow behind the pipe. This results in a two pronged demonstration which assures that cementation is both adequately placed and effective in preventing the migration of fluids between injection zones and USDWs.

Compliance/ Enforcement

The DOGM compliance and enforcement program relies heavily on the field presence of the inspection staff. Through their frequent visits and knowledge of the wells in their assigned areas, the inspectors are able to quickly respond to violations. Once a violation is identified, the operator is first called to see if the problem can be quickly resolved. After one of two attempts at resolution, depending on the nature of the violation, a Notice of Violation (NOV) is issued. For an exceedance of permitted injection pressure, the Central Office in Salt Lake City is immediately notified and an NOV is normally issued. Voluntary self-reporting of violations, when determined to be truthful, are typically treated informally. These procedures usually result in a 95% rate of return to compliance.

For those cases where normal procedures do not result in a return to compliance, it is necessary to refer the case to the Utah Board of Oil, Gas, and Mining. The Board can then refer the matter to civil authorities, in order to have fines levied, since DOGM does not have penalty authority. The review team is concerned that the lack of penalty authority may hamper the agency's ability to obtain compliance, especially in those cases where such authority would prevent environmental harm. The agency's coordination with the state DEQ; which has civil penalty authority has been helpful but relying on a separate agency in such situations is not optimal.

Public Outreach

Prior to the final determination of a permit application, a notice must be placed in a daily newspaper of general circulation in Salt Lake City and in the county where the proposed well is located. The notice must include the applicant's name, address and telephone number as well as the location of the proposed well and a description of the proposed operation. Comments are accepted for 15 business days following the latest of the two publication dates. The operator is required to send a copy of the application to all operators, owners and surface owners within ½ mile of the well location and must include an affidavit certifying that this has been done as part of the application.

Public comments regarding a permit application are initially handled by discussing the concerns via telephone conversations. This enables DOGM to resolve most issues informally by providing explanations to questions. Should an issue remain unresolved; the person who has a comment or objection to the permit will receive a hearing on the matter if they are determined to have standing. Public input is documented through the use of hearings transcripts and such comments are made a part of the application file.

Overall Program Findings

The review team performed an in-depth review of the Utah UIC Class II program via a review of Utah regulations, responses to a questionnaire, and a two day state interview of UIC and DOGM management staff. Information provided by the Utah DOGM prior to the peer review was of great assistance; however, much of the understanding of the program was achieved during the actual in-state interview. The Utah DOGM has a relatively small but knowledgeable staff, and

the managers and staff show great flexibility in covering a wide range of duties. The review team was impressed with the quality of staff and the manner in which the program was being implemented. The EPA representative was also very helpful in providing a perspective on EPA Region 8's oversight of the Utah program.

Recommendations have been provided to the Utah DOGM and the suggestions and review team concerns represent opportunities to further strengthen the Utah Class II UIC Program. In all subject areas investigated as a part of this peer review, The DOGM managed program has been found to provide the necessary elements, from both a regulatory and activity standpoint to protect USDWs.

Part I: General Administrative Overview

Statutory Authorities and Regulatory Jurisdictions

Overall responsibility for the Utah Class II UIC program has been mandated to the Utah Board of Oil, Gas, and Mining (Board). The Board is a quasi-judicial body composed of seven members that are attached for administrative purposes to the Department of Natural Resources (DNR) and is the policy making body for the Division of Oil, Gas, and Mining (DOGM). The Board, by law, must have no more than four members from the same political party. The Board shall contain two members who are knowledgeable in mining matters; two members who are knowledgeable in oil and gas matters; one member who is knowledgeable in ecological and environmental matters; one member who is a private land owner, owns a mineral or royalty interest and is knowledgeable in mineral or royalty interests; and one member who is knowledgeable in geological matters. All members are appointed by the governor with the consent of the Senate. (UC Title 40-6-4)

The Powers and Duties of the Board are found in UC 40-6-5. The Board has authority to adopt rules and make orders as necessary to administer operations for and relating to the production of oil and gas. The Board has exclusive jurisdiction over Class II injection wells and their related pits and ponds. The Board has jurisdiction to hear any questions regarding multiple mineral development conflicts with oil and gas operations and to rule with respect to those questions.

The USEPA granted the Board the primacy authority for permitting and regulating Class II injection in October 1982. This authority covers all lands of the state except those that are designated as Indian Country where the authority remains with US EPA Region VIII. At the time of this peer review, the DNR DOGM regulated a total of 85 Class II-D wells and 706 Class II-R wells.

Administration, Staffing and Funding

Utah funds the UIC program through two major sources. The EPA UIC grant of $90,000 also requires the state to fund at least 25% of the program. The bulk of the funding comes from the Oil and Gas Conservation Fund based on the severance tax that is levied on oil and gas

production. In the current fiscal year, DOGM has budgeted $226,052 for the UIC program which results in the state paying for 60% of the program costs. DOGM is required by Utah statutes and rules to administer the UIC program regardless of the amount of federal funding. A reduction in the amount of federal funding and/or Oil and Gas Conservation funding from tax revenues would severely impact the ability of DOGM to accomplish the UIC program goals, objectives and performance measures. Although 100% of the UIC grant is used to support the UIC program, in the past when prices of oil and gas were low, DOGM has occasionally needed to request allocations from the legislature to maintain the program needs. During those times when industry economics are good and the Oil and Gas Conservation Fund is buoyant, monies have been removed and added to the state general fund.

The DOGM staff as primarily related to the UIC program consists of an Associate Director of Oil and Gas, one Field Operations Manager, one Permitting Manager, two Environmental Scientists (geologists) and six field inspector positions. In addition, two additional permitting positions can support field activity when needed. However, one of these positions is currently vacant. DOGM intends to fill vacant positions with experienced individuals. The two managers have over 60 years of UIC experience between them. Utah has integrated their oil and gas program with their UIC program. The workload of the geologists varies according to the economics of industry and UIC permitting has required as much as 100% of their time. Field inspectors are highly qualified and experienced and include UIC responsibilities with the rest of their duties. UIC time is tracked via time sheets against the grant funding and the UIC grant is generally completely used by the middle of the federal fiscal year. In the event that funding was not available, special programs such as ground water monitoring and additional training would need to be cut or suspended. Additional funding would allow for expansion of the state's water sampling program.

Data Management Program

The DOGM uses RBDMS Classic as its data management system and is in the process of combining RBDMS Classic with its Oil and Gas Information System in RBDMS.net. The expected completion for the modification is spring, 2016. DOGM believes that RBDMS is very efficient and effective for tracking their UIC program data and for mandatory UIC quarterly reporting. RBDMS allows for the sharing of permitting, inspection and enforcement data among central office and field personnel. It also facilitates scheduling of Mechanical Integrity Tests (MITs) to ensure compliance with the 5-year cycle. GIS information for well sites is integrated into RBDMS. DOGM is fortunate in having IT personnel that support its database needs. At this point, DOGM is not uploading data to USEPA's new national database since that system is still under development and not fully implemented, and DOGM provides all required information to USEPA on a regular basis via the 7520 reporting forms.

Interagency Coordination

DOGM does not have any formal agreements or MOU's with any state or federal agencies which relate to coordination of UIC regulations or sharing of information. However, DOGM does have an informal agreement with the Utah Department of Environmental Quality (DEQ) regarding responsibility for handling spills and for issuing penalties for those situations. DOGM also has agreements covering state trust lands – those lands set aside by the state whose funds are dedicated to schools – to inspect wells, including UIC wells, on the properties. Lands included in Indian Country were ceded back to USEPA Region VIII for UIC regulation but although UIC wells in that area are not included in the state inventory, DOGM does issue state permits and inspects them in the interest of efficiency. DOGM forwards any UIC issues found to USEPA as these wells are not part of the state delegated UIC program.

Changes in Program Activities since Primacy

The DOGM UIC program has continued to operate effectively since primacy was approved, with only minor changes. The most significant has been the adoption of the RBDMS data management system, which has allowed effective tracking of all well related activities. The expansion of this system in 2016 to include electronic field data capture will further strengthen the program.

Identified Strengths

1) The Utah UIC program has been effectively administered by DOGM since the granting of primacy in 1982. This has included a commitment to assure maximum environmental protection throughout the entire state by conducting inspections on state trust lands and in Indian country.
2) The use of the RBDMS data management system allows the agency to store and utilize regulatory aspects of UIC data that are critical to management of the Class II program. The upcoming modification to RBDMS will include electronic field data capture which will improve the reliability, timeliness, accuracy and value of data gathered in the field during inspections and testing. The electronic field data capture system will allow inspectors to capture and transmit data directly to the agency data system in Salt Lake City without the problems associated with relying on field notes and the potential errors associated with secondary data entry. This is a positive upgrade of the data system.
3) With two staff members having over 60 years of UIC experience and the presence of other highly trained staff, the program benefits from an abundance of technical knowledge and expertise and a wealth of institutional knowledge. If possible, the agency should seek to impart this knowledge and expertise to junior staff to ensure continuity for the program in the future. This may require the hiring of new staff prior to the retirement of existing staff.

Review Suggestions

1) The agency must rely on coordination with DEQ for civil penalty authority. The lack of its own penalty authority may hamper DOGM's ability to obtain compliance. While coordinating with DEQ for civil penalty authority has been helpful, having to rely on a

separate agency in those situations is not optimal. The review suggests the DOGM seek the ability to issue civil penalties under its authority or through the authority of the Board.

2) While the pace of oil and gas production has recently slowed, when assessing the need for resources it is important to recognize that slower periods often increase the workload associated with well closures, both temporary and permanent. As a result, filling field operation vacancies should continue to be given priority consideration.

Part II: Permitting/Compliance Review

Permit Application Flow and Review Process

The Utah UIC applications are administered by DOGM's Permit Manager. Applications are distributed to an Environmental Scientist where they are screened for completeness according to R649-5 and any missing elements are requested from the operator. Depending on the operator's response, the decision to return an application is determined on a case by case basis. When the application is deemed to be complete, it is routed to Engineering for review and to the Permit Manager for administrative review. The majority (>95%) of Class II permits are conversions for wells in an EOR project. Disposal well applications, whether for commercial purposes or for a specific operator's project, are split between conversions (60%) and new wells (40%). Prior to receiving a Class II permit, the operator must submit an application to permit and drill the well location (APD) with a well type of enhanced recovery or disposal. When the APD is reviewed, the field inspector will perform a site inspection for the well location.

After a Class II application passes the technical review by the Environmental Scientist, the Permit Manager issues a conversion permit allowing the operator to convert the well to an injection well and conduct a mechanical integrity test (MIT). When the well passes the MIT, DOGM issues an injection permit and the operator may begin injection. If there is no objection to the permitting decision, the general turnaround time is 60 days. An applicant may challenge the permitting decision either informally or formally before the Board. An application for an enhanced recovery project requires a formal hearing before the Board. Formal hearings before the Board are controlled by the Administrative Procedures Act. All steps of the application process are tracked through RBDMS. The original application is stored in paper files prior to final approval. After approval, the application is scanned and made available online as well as being added to hard copy files. The Utah Oil and Gas program does not require a fee to process and review a permit application.

An operator may request a modification of an existing Class II permit. If the change is considered a major modification such as a change or addition of an injection zone, a new public notice is required with its attendant waiting period. Minor modifications such as injection pressure increases do not require a public notice.

Technical Aspects of the Review Process

Casing and cementing requirements are essentially the same for all wells in Utah and are governed by R649-3-8. Sufficient surface casing must be run to "reach a depth below all known or reasonably estimated utilizable, domestic, fresh water levels." The deepest underground source of fresh water (USDW) is estimated using maps and water quality data that are available from the Utah Geological Survey, the Utah Division of Water Quality and the U.S. Geological Survey. These maps and records are available to the oil and gas industry in hard copy and digitally. All data are reviewed by the DOGM environmental scientist. In situations where the USDW has not been mapped, the data available in literature and well files are reviewed. In addition, the required water analyses of the produced waters and the injection interval that are submitted with the application are evaluated. The injection fluid must be demonstrated to be compatible with the fluid that is inherent in the injection zone.

Well construction and cementation for a UIC well must conform to Oil and Gas Rules and sound engineering practices. The DOGM environmental handbook sets minimum surface casing depths, but the depth for a specific well is determined on a case by case basis, using the reviewer's knowledge and experience. Long string casing is generally cemented into the base of the cemented surface casing to provide the protection of a continuous cemented well bore. This creates at least one layer of protection, casing and cement, for all fresh water zones. A cement bond log or comparable log must be run on the cased and cemented well and submitted as part of the application. Copies of electrical or radioactive logs, including gamma ray logs, for the proposed well that were run prior to the installation of casing and that indicate resistivity, spontaneous potential, caliper and porosity must be submitted for review.

Drilling fluids for the surface casing or fresh water string may not use oil or produced water. Dual well completions are allowed that use concentric injection strings to isolate individual injection zones, thus allowing different injection pressures for each zone. The maximum allowable injection pressure (MAIP) is established by having the operator conduct a Step Rate Test (SRT) for each injection interval. The maximum injection pressure is typically 90% of breakdown pressure. In some cases, the initial shut-in pressure (ISIP) from fracture data or an estimated fracture gradient has been used to calculate the maximum pressure. The injection zone is allowed to be fractured but not above the fracture gradient for the confining zone. Injection rates are limited by the volume that the injection zone will take at the assigned injection pressure and no specific rate is assigned.

Area of Review (AOR) Consideration and Procedures

The environmental scientist performs a complete review of all wells within a fixed radius of ½ mile of each existing or proposed injection well. The fixed radius applies to all Class II wells. Each well is reviewed for its construction and for local variations in the geology. Specific attention is paid to the plugging records and cement bond logs to ensure the injected fluid will remain contained in the injection zone within AOR wells. In the event that a problem is

identified in an AOR well and the operator does not have the legal status to correct that problem, the permit application will be denied. DOGM requires each Class II permit to be evaluated on its own merits and does not issue area permits.

Administrative Aspects of Permit Application Review

Prior to the final determination of the permit application, a notice must be placed in a daily newspaper of general circulation in Salt Lake City and in the county where the proposed well is located. The notice must include the applicant's name, address and telephone number as well as the location of the proposed well and a description of the proposed operation. Comments are accepted for 15 calendar days following the latest of the two publication dates. The operator is required to send a copy of the application to all operators, owners and surface owners within ½ mile of the well location and must include an affidavit certifying that he has done so as part of the application.

Public comments regarding a permit application are initially handled by discussing the concerns via telephone conversations. This enables DOGM to resolve most issues informally by providing explanations to questions. DOGM will determine if the person who has a comment or objection to the permit has standing and should receive a hearing on the matter. However, that determination may be appealed to the Board. An enhanced recovery project requires a formal hearing and must be approved by the Board. A disposal well will require a formal hearing only if an objection to the permit issuance is filed with the agency. Formal hearings are held before the Board at the DOGM office in Salt Lake City on the fourth Wednesday of most months. Formal objections to the issuance of a permit are addressed at the Board's discretion during the hearing. Public input is documented through the use of hearings transcripts and such comments are made a part of the application file.

All wells in the UIC program must be bonded in accordance with R649-3-1. The amount of bond is determined by the proposed completion depth of a specific well and may be in the form of a surety, Certificate of Deposit, irrevocable letter of credit, cash or negotiable bond. Bonding is required for the duration of drilling, operation, plugging and site restoration of a well. An operator may seek approval for a blanket bond, whose amount is also dependent on the depth of the wells under permit to that operator. In the event that a bond is forfeited, the funds are used to complete well plugging and the restoration of the well site. If the forfeited funds were inadequate for plugging and site restoration, DOGM may seek to recover the additional costs needed to complete the task. On the other hand, if the forfeited funds were more than the amount needed for the plugging and site restoration, the unused funds are returned to the party from whom they were collected. In the event that a well with no responsible operator needs to be plugged, DOGM will obtain monies from the Orphan Well Fund, which is supported by a tax. This tax is levied on the operators of all producing wells, in proportion to the amount of oil and gas extracted. Since DOGM does not have penalty authority, any fines collected

through civil court actions or referrals to other agencies are not available to help support the Orphan Well Fund.

Aquifer Exemptions

Utah allows certain aquifers to be exempted from being classified as USDWs according to R649-5-4. An operator must supply data that demonstrates that the aquifer does not currently serve as a source of drinking water; is currently or potentially a source for commercial production of minerals, hydrocarbon or geothermal energy; is at a depth that makes recovery of water for drinking purposes economically or technologically impractical; is contaminated to the extent that it is impractical to make the water fit for human consumption; or is located above a Class III well mining area that is subject to subsidence or collapse. DOGM will review an application and determine if an aquifer exemption is required. If an exemption is required, DOGM will advise the operator to submit a request for exemption to the Board. An aquifer exemption must also receive the approval of the Utah Division of Water Quality and the USEPA before it is issued. In some areas the Green River formation was granted an aquifer exemption because the injection wells were drilled prior to creation of the UIC program. Only a few additional exemptions have been requested and approved since Utah received primacy.

Data Management Systems Used in Permit Application Review

Utah has used RBDMS since 1999 to manage the various components of the permitting and file review process. Operators are allowed to file documentation with DOGM electronically. Although applications to permit and drill may be viewed online during the permitting process so that an operator may verify an application's status, the UIC applications currently may not be viewed online while they are in the process of being reviewed. Completed and approved UIC applications are scanned and made available online after issuance. The DOGM database is a part of the state's centralized Information Technology group. DOGM computer servers are managed off-campus. DOGM has in-house programming expertise that supports system maintenance and updates to RBDMS.

Periodic File Review Process

DOGM does not have a schedule for performing file reviews on all UIC wells. Wells are usually selected for review as a result of other activities concerning the well, such as transferring the well to a new operator, modification to the permit conditions, complaints about the well, violations or compliance issues. A file review will include analysis of the Class II well's construction (casing and cement), its injection history, compliance history, inspection history and operator reporting. All wells within the AOR are evaluated for protection of the USDW during injection. In the event that a deficiency is discovered during the review, DOGM will contact the operator for additional data or to otherwise resolve the matter. DOGM estimates that approximately 5% of UIC wells are subjected to a file review each year.

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 and also include a pre-drilling site evaluation and inspection process designed to insure protection of natural resources and the environment.
2) The review team commends DOGM on the use of a ½ mile area of review. This is twice the size of most other state programs and should be adequate to capture all wells that could pose a risk of acting as a conduit for upward fluid migration.
3) The ability of the agency to hold or return permit applications based on the operator's responses, without the restriction of an artificial or arbitrary deadline, is a positive aspect of the program and should be continued.
4) The review team finds that the agency practice of relying on a step rate test with a 90% allowance as a safety factor provides sufficient protection for USDWs and effectively prevents fracturing of the confining zones above the injection intervals.

Review Suggestions

1) The review team suggests the agency consider implementing a permit application fee to help cover the costs of permit review, pre-site inspection, routine inspections, witnessing MITs etc. A non-refundable application fee would also deter the submission of incomplete applications that result in time-consuming reviews, which utilize state resources but do not result in the issuance of a permit.
2) The agency should consider clarifying or removing the term "moderately saline water" that is found in its documents and rules, inasmuch as it is described as being the same as USDW and its use could create confusion.
3) The review team suggests that clarification on who has standing to object to the issuance of a permit be made by appropriate personnel unrelated to the technical aspects of the application. More specific criteria should also be developed and used in making this determination.
4) The DOGM might consider adding a rule or policy that allows them to deny permits to operators who are not in compliance and to revoke permits for non-compliance. This rule should apply to operators by name and principals of companies regardless of company name.
5) Although Class II file reviews are not conducted on a routine basis, they are conducted on an as-needed basis such as during an enforcement action, as part of a contamination complaint or in conjunction with a change in permit conditions. Additional staff might enable the agency to establish a routine file review schedule, thereby ensuring that each Class II well receives a review periodically throughout its operational life. This is important because during the life of a well, field conditions change, new wells are drilled in AOR's, old wells are identified in AOR's and wells previously considered to be

adequately constructed may no longer be considered to be protective under current requirements and permit specifications.

6) While the amounts required for blanket bonds exceed those of many other states, the review team suggests setting a limit on the number of wells which can be included under one blanket bond, as even DOGM's relatively high amounts might be inadequate to properly plug a relatively large field.
7) The DOGM should consider adding an on-line notification related to the public notice of UIC permit applications to supplement newspaper publication.

Part III: Well Construction

MIT Procedures and Exceptions

Utah uses the standard annulus pressure test (SAPT) as a demonstration of Part I well component integrity. To demonstrate Part II cement integrity, DOGM requires a Cement Bond log (CBL). If there is any doubt as to the results of the CBL, the DOGM then requires the operator to conduct a radioactive tracer (RAT) survey. Although not commonly utilized, geophysical methods beyond CBL's can also be considered.

There are provisions in the Utah regulations which allow for monthly monitoring to demonstrate mechanical integrity. This requires director's approval and must follow an initial successful mechanical integrity test (MIT). This approach has not been commonly used in recent years.

At present, DOGM policy does not allow any pressure changes during the Part I pressure test. In the past, pressure gauges have not been precise and thus very small fluctuations have not affected test results. However, new electronic gauges can detect very small changes, which may lead to a greater percentage of test failures, even when there is no real threat to water supplies.

Cementing and Formation Packer Intervals

DOGM normally requires that casing set through USDWs be cemented to surface. However, when this is not possible, DOGM requires casing and cement in subsequent casing strings in order to provide a continuous cement column from bottom to top.

The DOGM requires, as a rule of thumb, 50 feet or less between packer setting depth and injection horizon. In certain circumstances DOGM will allow 100 feet or a bit more on a case by case basis.

Packers are routinely required for most newly completed and converted wells. However, the DOGM currently has five wells which have been grandfathered in without the use of tubing and a packer. For these wells, the DOGM requires that the well pass an initial MIT plus annual RAT survey and a 5 year SAPT, utilizing a retrievable packer.

Identified Strengths

1) The team finds that the agency practice of requiring a RAT survey whenever there is any doubt as to the results of the cement bond log provides a high level of assurance as to cement integrity and lack of fluid migration behind casing. The addition of a RAT survey in these cases results in a greater level of USDW protection since RAT surveys are a clear and well accepted method for evaluating fluid flow behind the pipe.
2) The team finds that the agency practice of allowing multiple cemented casing strings instead of surface casing set below the lowest USDW sufficiently protects USDWs, given that there is a continuous cement column from bottom to top in multiple stages.

Review Suggestions

1) While laudable, the policy of not allowing any pressure changes during the Part I pressure test may not remain viable as technology improves since electronic gauges can detect even minute changes in pressure. We suggest the agency revise the allowance for pressure changes during MITs to a de-minimus amount to avoid failed tests related to such technological advancement.
2) The team finds that a rule allowing for injection without the use of tubing and packer creates potential risks to USDWs. Given there are only five UIC wells in the state that utilize this construction and four of these may soon be plugged, there is no reason to believe that the practice has resulted in any USDW contamination. Regardless, the team suggests this allowance in the rule be removed and the practice be discontinued.

Part IV: Inspections

Witnessing of Mechanical integrity Testing

The DOGM has all Class II wells on five-year or more frequent testing schedule for mechanical integrity. The DOGM has the authority to require the operator to test more frequently if situations arise where this is desirable to protect water resources. DOGM inspectors witness about 90% of all EOR MITs and 100% of the MITs for disposal wells.

If a well fails an MIT, the operator is given an opportunity to re-take and pass the test. An effort is made to work out the problems on the day of the initial test. On a failed test in areas where aquifers are present, the DOGM field inspector will recommend shutting in the well. Wells must be taken out of service and then fixed within 180 days. A sundry notice is used to identify the plan to repair. Operators are required to address any failures. However, if the operator does not perform the necessary action to repair or plug the well, the DOGM can revoke the authorization to inject.

Conduct and Management of Field Operations by the Agency

Inspectors witness over 95% of all casing/ tubing well integrity tests. All of the inspectors currently employed by the division have undergone either the IOGCC Inspector Certification Course or the USEPA UIC Well Inspector Training Course. Overall the review team found that this portion of the DOGM program provided an appropriate level of protection for USDWs.

As in a large percentage of states, routine inspections of UIC Class II wells are conducted in conjunction with general inspections and regulatory activities associated with producing wells and lease facilities. DOGM inspects Class II wells at least once per year.

All field inspections are performed by DOGM employees in the Oil and Gas program. Most inspections are performed by six inspectors under the supervision of the Field Operations Manager, who is stationed in the DOGM office in Salt Lake City. These inspectors operate from the field offices in Price and Vernal, although some of them work primarily from their homes. The inspector's locations generally reflect the distribution of present Utah oil and gas production and evenly distribute the expected workload for all oil and gas regulatory activities including those related to UIC. UIC wells take approximately 20 to 25% of each Field Inspector's time. Four members of the permit staff in Salt Lake City can also be called upon when necessary to help out with field activity. These individuals are under the supervision of the Oil and Gas Permitting Manager, although one of the positions is currently vacant.

DOGM is in the process of implementing a risk based inspection protocol. UIC well integrity testing, and surface casing setting and cementing are high on the list of inspection priorities. Class II well inspections are also a high priority and these wells are inspected at least once per year. DOGM field personnel witness pipe setting as often as possible for oil and gas wells and nearly universally for UIC wells. Routine inspections of non-UIC wells and orphan well tracking efforts receive a lower priority level due to workload. Complaints are investigated on a sliding priority scale depending upon the seriousness of the problem.

Inspectors do not carry a pressure gauge as operators are expected to have gauges on injection line and casing/ tubing annulus, but this is not a rule requirement. Further, the rules do not specify that the operator must provide fittings on the injection tubing or casing/ tubing annulus for an inspector to attach a gauge. Although the majority of operators install gauges, in those cases where gauges are not installed no independent evaluation of pressures can be made without the presence of the operator.

Inspectors generally are trained on the job by accompanying another inspector for a period of time. More experienced inspectors are available for consultation and training on special problems. UIC training is accomplished in a similar manner. At full staff, the state has six inspectors, plus four central office permit staff as backup. Coordination between field and office staff occurs through cell phones, email and meetings.

Inspectors perform surveillance of all activities under Utah's DOGM jurisdiction. This has included inspecting UIC wells in Indian country, which are not a part of the delegated UIC program but which the agency believes are a part of their regulatory charge under the oil and gas program. DOGM forwards any UIC issues found to USEPA as these wells are not part of the state delegated UIC program.

Compliance and Enforcement

The DOGM enforcement procedures are spelled out in the Inspectors Handbook, which includes a flow chart for steps to be taken to address violations. Once a violation is identified,

the operator is first called to see if the problem can be quickly resolved. After one of two attempts at resolution, depending on the nature of the violation, a Notice of Violation is issued. For an exceedance of permitted injection pressure, the Central Office in Salt Lake City is immediately notified and an NOV is normally issued. Voluntary self-reporting of violations, when determined to be truthful, are typically treated informally. These procedures usually result in a 95% rate of return to compliance.

For those cases where normal procedures do not result in a return to compliance, the agency compliance officer is then contacted, and if compliance is still not achieved, the matter is referred to Utah Board of Oil, Gas, and Mining (Board). The Board can then refer the matter to civil authorities, in order to have fines levied, since DOGM does not have penalty authority. The Utah Department of Environmental Quality does possess penalty authority, so unresolved cases are sometimes referred to them. DOGM does have the authority under issued permits to suspend injection and this authority has sometimes been used for unresolved major violations.

Emergency and Citizen Complaint Response Procedures and Processes

Citizen complaints and emergency situations are considered a high priority by DOGM. Response times may vary from immediate to a few working days, depending on the nature of the complaint and the severity of the situation. Although there is no official complaint response time, the division stated that complaints are typically responded to within 24 hours. The response may be handled by the inspector, or if it is more complicated, it may be handled by DOGM management. An inspection is then conducted, along with interviews of principal involved parties. Appropriate documentation is then filed, and any actions deemed necessary are then taken by the Central Office. Documentation includes inspection reports, emails, phone logs, and written correspondence.

Identified Strengths

The inspection activities appear to be well coordinated between the Field Inspectors and the DOGM Salt Lake City Office. All MIT tests, documents and pressure charts are received and reviewed by the Field Operations Manager. This allows for a professional review and program consistency.

1) The DOGM is to be commended for effectively using RBDMS to coordinate the efficient tracking of wells for compliance in a timely manner and for follow-up on deficiencies. The use of the RBDMS data management system allows the agency to store and utilize regulatory aspects of UIC data that are critical to the management of the Class II program. The DOGM has used RBDMS to assist in scheduling MITs and to track failures since early 1997. The DOGM is planning to implement an electronic field data capture system during the first quarter of 2016. This system will allow inspectors to capture and transmit data directly to the DOGM data system in Salt Lake City without the problems associated with relying on field notes and errors associated with secondary data entry. This will improve the reliability, timeliness, accuracy and value of data gathered in the field on inspections and tests, and is a positive direction for the program.
2) The educational and experience qualifications for field inspectors are very good. Field inspectors need to have a professional degree in geology or in a physical science field,

and/ or oilfield experience. This has led to a very qualified and professional presence in the field.

3) The DOGM practice of inspecting each Class II well at least annually is a positive aspect of the Utah program.
4) Although inspectors have a general geographic area of responsibility, the practice of cross area inspector coordination appears to provide DOGM with a flexible approach that allows for a rapid response to field issues. This approach assists the DOGM's use of a risk based inspection protocol.
5) The DOGM has taken a proactive approach to inspector training by sending field inspectors to training programs such as the IOGCC inspector certification course and the USEPA UIC inspector training course.
6) The DOGM practice of conducting a pre-site evaluation and inspection during the Application for Permit to Drill (APD) process is commendable and tends to result in the mitigation of potential problems prior to their occurrence. This allows DOGM to pre-mitigate issues which then become non-issues and to establish permit conditions such as pit liners, diversions, erosion control, waste capture etc…. It also allows for the coordinated review of other state regulatory requirements unrelated to the oil and gas program but critical to an overall evaluation of the site.
7) The DOGM practice of inspecting UIC wells in Indian country, which are not a part of the delegated UIC program but which the DOGM believes are a part of their regulatory charge under the oil and gas program, has provided additional protection for USDWs and has been a net plus for the citizens of Utah.
8) The DOGM practice of responding to citizen complaints within 24 hours of receipt is a positive aspect of the program.
9) The team finds the DOGM practice of witnessing of a high percentage of MITs exceeds the requirements of the primacy agreement and provides better USDW protection than a lesser percentage of witnessed MITs. The DOGM witnesses about 90% of all EOR MITs and 100% of the MITs for disposal wells. This is an efficient use of DOGM resources as operators monitor disposal wells more closely than EOR wells.
10) The team also finds the DOGM practice of witnessing production and surface casing setting and cementing for most UIC wells provides better USDW protection than would otherwise exist.
11) The DOGM utilizes an excellent web based data viewer that shows positions of wells and links all data associated with each (production, open hole and cased hole logs, all permits and reports). This gives a spatial view of oil field activity that can be used by regulators and public.
12) The Review Team commends the DOGM for its plans to implement an electronic field data capture system during the first quarter of 2016. This system will allow inspectors to capture and transmit data directly to the agency data system in Salt Lake City without the problems associated with relying on field notes and errors associated with secondary data entry.

Review Suggestions

1) Until electronic data are available to field inspectors (first quarter 2016), DOGM should consider requiring operators to bring their permit documentation to MITs so that the inspector will have the operational conditions of the well in hand when the test is run.

2) While the DOGM is making efficient use of existing field personnel and will implement a risk based inspection protocol in the near future, additional field staff would create even greater flexibility and the ability to witness an even greater percentage of tests and well construction and conduct even more proactive inspections. As DOGM quite correctly points out, during times of lower permitting and drilling activity the importance of a field presence does not decrease. However, a paucity of oilfield operational funding tends to result in a great likelihood of temporary abandonments, well plugging and other potentially harmful practices due to a lack of field maintenance and oversight.
3) While the DOGM rules do not currently require the operator installation of pressure gauges on the injection tubing and casing/ tubing annulus, this is a requirement that should be considered.

Overall Program Findings

Overall the review team finds that the Utah Class II UIC program managed by the DOGM is well run and managed. The review team finds that the program provides appropriate protection for USDWs in accordance with the provisions of federally delegated UIC program requirements. The staff of the DOGM has the professional and technical knowledge and experience needed to implement the program in a manner that is efficient and meets the requirements for an effective Class II UIC program under Section 1425 of the SDWA. The program is well organized and makes excellent use of professional staff and the latest data management processes to assure that USDWs are adequately protected.

Suggestions made in this report are intended to provide the state with considerations the team believes would make the program even better than it is currently. They are not intended to convey shortfalls in the program.

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November, 2015