

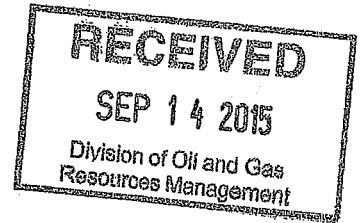


UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

SEP 08 2015

REPLY TO THE ATTENTION OF:
WU-16J

Richard Simmers, Chief
Division of Oil and Gas Resources
Ohio Department of Natural Resources
2045 Morse Road, Building F-2
Columbus, Ohio 43229



Dear Mr. Simmers:

I am writing to provide a report from a review of Ohio's program for protecting drinking water from Class II underground injection wells. The U.S. Environmental Protection Agency performed the review to determine whether Ohio is administering the program in accordance with EPA's 1983 approval.

EPA found that Ohio runs a good quality program for Class II wells, and is administering the program in accordance with the approval. The program is strong in several areas including permitting, inspections, and resolving violations found during inspections. Ohio has invested significant new resources in the program and is a leader in terms of addressing seismic potential during the review of permit applications and well operations.

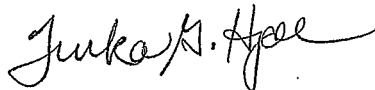
Ohio should improve its program by: (1) identifying operator reporting gaps or inaccuracies and taking enforcement action for reporting violations, and (2) escalating enforcement for recalcitrant and repeat violators.

In a reply to this letter, please identify actions that Ohio will take by a date or dates certain to improve its program as recommended above and in the report. Please provide the reply by October 30, 2015.

As noted on page 15 of the report, Ohio is reexamining ways to communicate with the public. In the forthcoming reply to this letter, EPA asks Ohio to provide an update on any policies, procedures, or practices that it has adopted since April 2014 or will adopt to strengthen citizen engagement in the program.

Thank you for making your staff and files available for the review. Do not hesitate to contact me if you wish to discuss the report, or you may contact Stephen Jann, Chief, Underground Injection Control Branch, at (312) 886-2446 or jann.stephen@epa.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Tinka G. Hyde", with a stylized flourish at the end.

Tinka G. Hyde
Director, Water Division

Enclosure

**Safe Drinking Water Act
Underground Injection Control Program
Periodic Program Review**

**Ohio
Class II**

**U.S. Environmental Protection Agency
Region 5**

**Final Report
September 8, 2015**

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Introduction

This report presents the results of EPA's periodic review of the Class II Underground Injection Control (UIC) program implemented by the Ohio Department of Natural Resources (ODNR). EPA approved Ohio's Class II program under Section 1425 of the Safe Drinking Water Act (SDWA) in 1983 after determining that Ohio's program was effective to prevent contamination to underground sources of drinking water (USDW). EPA's approval was based on extensive review of State laws and regulations and the description of Ohio's technical and administrative procedures. EPA's Region 5 Underground Injection Control Branch conducted the present review as part of ongoing oversight of the approved State program. For this review, EPA discussed program operations with State staff and managers, reviewed State well files, and looked at new regulations and procedures enacted since the last review in 2009. EPA did not re-evaluate the laws, regulations and procedures that the State used in its original demonstration of the program's effectiveness.

Summary

EPA Region 5 reviewed the Ohio Class II UIC program as implemented by the ODNR. EPA based the review findings on file review criteria and metrics, conversations with program management and staff, and new regulations and procedures enacted since the last review in 2009.

Overall, EPA finds that Ohio is operating the Class II UIC program consistent with its primacy approval. The State has taken concrete steps to address emerging issues, and in particular has adopted regulations to reduce risk from injection-induced seismicity. It has enhanced public participation practices. The review findings indicate the program is strong in several areas. Furthermore, while some ODNR implementation procedures have been altered over the years and Ohio has adopted new regulations, EPA finds that these changes enhance rather than reduce the effectiveness of the program EPA approved. EPA review findings also identify specific program areas where files and records could be made complete, or where the State should improve its program. EPA is confident that ODNR and EPA can work together to resolve these matters.

Areas of Strong Performance

- **Inspections**

ODNR has an active, frequent field presence that covers all aspects of well construction and operation. In the files EPA reviewed, ODNR staff witnessed many phases of well construction at permitted sites, and witnessed 100% of initial mechanical integrity tests since 1983, gave compliance assistance in the field, and identified mechanical integrity violations. ODNR's high inspection presence is a key component for a program that relies in part on inspections to ensure ongoing mechanical integrity of Class II wells. ODNR has strengthened its field inspections by adding staff inspectors whose time is fully dedicated to UIC inspections. Other ODNR oil and gas well inspectors continue to do UIC Class II inspections periodically as a partial duty.

- **Resolving violations found during inspections**

ODNR identifies violations in the field and resolves them, resulting in a timely return to compliance. EPA's review found examples of violations being addressed on the spot during inspections. The files further showed that when ODNR issued notices of violation, staff follows up to determine that the violations have been addressed.

- **Permitting (including siting, construction, and maximum injection pressure requirements)**

ODNR is issuing permits in accordance with its approved primacy program. File reviews indicate that ODNR is implementing its requirements for construction and maximum injection pressure in permits. EPA's review found that ODNR issues permits based on complete siting information, and ODNR consults with the Ohio Division of Geologic Survey, the Mineral Resource Management Division, and, as needed, the Ohio Environmental Protection Agency.

- **Changes to keep pace with demands on Ohio Class II program**
ODNR has added staff and resources to meet the increasing demand on the program as oil and gas fluid disposal has doubled in recent years. Ohio has added new authorities to address the potential for seismicity and to require additional tests and monitoring from operators, including continuous annulus and injection pressure monitoring. Ohio has also changed well construction regulations to codify methods for determining surface casing depth where the USDW is not mapped (these methods have been in use as permit conditions since 1983).

Areas for State Attention

- **Communicating annulus pressure expectations**
EPA understands Ohio's approach to evaluating mechanical integrity during field inspections of annulus pressure, and that positive annulus pressure is not required by either State or federal regulations. However, EPA's file review found that expectations for annulus pressure are not uniformly described by ODNR, resulting in conflicting documents and the appearance of inconsistent well oversight. Furthermore, ODNR may be applying expectations inconsistently and well operators may be unclear on their obligations regarding reporting. ODNR needs to make its expectations for annulus pressure clear to ODNR staff and operators and consistent across its permits, report forms, and inspection standard operating procedures.
- **Strengthening annular disposal well files**
EPA recommends that ODNR include additional information in annular disposal (AD) files as necessary or establish a link to oil and gas program information. The AD wells files reviewed by EPA did not have information on public notice or operator reports. (AD wells files did not include USDW information, but EPA could confirm the surface casing depth relative to the USDW base with supplemental information.)

Areas for State Improvement

- **Identifying operator reporting gaps or inaccuracies and taking enforcement actions for reporting violations.**
About one-third of conventional well files EPA reviewed had a reporting gap or inaccuracy. Other files showed that inspectors found instances of mechanical integrity loss that operators may not have been aware of. ODNR needs to improve on identifying operator reporting gaps and inaccuracies and take action when operator reporting is problematic, because the program relies in part on operator reporting to demonstrate ongoing mechanical integrity. Ohio's new requirement (since 2012) for continuous pressure monitoring on new wells should help reduce discrepancies and flag loss of mechanical integrity. EPA recommends that ODNR modify report requirements or permit conditions for collecting and reporting mechanical integrity information, such as annulus pressure, for wells without continuous monitoring. We also recommend that ODNR clarify reporting expectations for wells with continuous monitoring.
- **Escalating enforcement for recalcitrant and repeat violators.**
EPA found incidences where operators repeated violations or where the same operating violations were noted in successive inspection reports at a well site, without documentation of ODNR compliance or enforcement action. ODNR should revise its Enforcement Standard

Operating Procedures to establish specific guidelines, recommendations, and steps for escalation of enforcement for wells with repeat violations and wells that ignore citations of violations. In addition, EPA suggests that internal vetting of inspection reports would allow ODNR to identify all violations and determine appropriate responses. Administrative penalty orders (APOs), issued with the consent of the alleged violator, constitute one form of escalation. Referral of penalty cases to the Attorney General's office constitute another. Unilateral APOs are yet another form of escalation, however, ODNR does not have unilateral APO authority. EPA understands that the Ohio General Assembly would need to authorize ODNR to issue APOs unilaterally. In EPA's experience, penalties encourage timely return to compliance and deter future noncompliance.

I. Background

EPA's Authority for Class II Injection Wells

The Safe Drinking Water Act (SDWA) authorizes EPA to develop and enforce minimum federal requirements that protect public health and underground sources of drinking water (USDW) from endangering injection well practices (SDWA section 1421(b)). Under this authority, EPA's Underground Injection Control (UIC) program regulates the permitting, construction, operation, and closure of injection wells. EPA categorizes injection wells into six classes (I-VI) based on the type of fluid they inject and/or the well's purpose. See 40 C.F.R. § 144.6.

The focus of this report is regulation of Class II injection wells in Ohio. Class II wells are used to: dispose of fluids brought to the surface in the process of natural gas storage operations or production of oil and natural gas; inject fluids (typically brine or water) to recover residual oil or natural gas (enhanced recovery); or inject hydrocarbons for storage. The EPA UIC program does not regulate hydraulic fracturing, except where diesel fuels are used in the fracturing fluids, pursuant to an amendment to the SDWA. See SDWA § 1421(d)(1)(B)(ii).

When oil and gas are extracted, brine (i.e., salt water) is typically brought to the surface. The brine can contain fluids that were used in the production well. The brine is segregated from the oil and gas and is injected into an underground geologic formation. When states began to implement rules preventing disposal of brine to surface water bodies and soils, injection became the preferred way to dispose of this waste fluid.

EPA's Approval of State Class II Well Primacy Programs

SDWA allows EPA to authorize states to implement the UIC program. This authorization is called primacy. A state has the option to request primacy approval for Class II wells under either Section 1422 or 1425 of SDWA. Programs authorized under Section 1422 must meet EPA's minimum federal requirements for Class II wells described in 40 C.F.R. Part 145 and Part 146, Subparts A and C. Programs authorized under Section 1425 need demonstrate only that their existing standards are effective in preventing endangerment of USDWs (see Appendix 1 for Section 1425 of SDWA). Programs authorized under Section 1425 include permitting, inspection, monitoring, record-keeping, enforcement authorities, and reporting requirements. Section 1425 gives states flexibility to demonstrate, and allows EPA to approve, an effective program that differs from the federal program. In assessing whether to approve primacy under Section 1425, EPA carefully reviews a state's laws, rules, and procedures and may consider, as appropriate, on a case by case basis, EPA's guidance for state submissions¹.

¹ Guidance #19 *Guidance for State Submissions under Section 1425 of the Safe Drinking Water Act*.

EPA's Role Relative to Approved Class II UIC Programs

EPA maintains a permanent role relative to approved state UIC primacy programs. EPA reviews annual state reports, reviews annual grant workplans and grant performance reports, informs states on regulatory changes in the federal program, reviews relevant new state regulations (drafted or promulgated post-authorization), discusses emerging issues, and provides training. For example, EPA collects annual information on the number of Class II wells in the state (also known as a Class II inventory) and on various program statistics, such as the number of enforcement actions taken, permits issued, and inspections conducted. Region 5 also conducts in-depth state program reviews periodically. In Region 5, program review frequency is influenced by national guidance and Region 5 Standard Operating Procedures, as well as by national and Regional priorities, staff levels, and resources. Finally, EPA can also assume direct implementation of the program if it finds that a state's demonstration of an effective program is no longer valid.

In 2013, Congress asked the Government Accountability Office (GAO), its audit and evaluation arm, to review EPA's oversight of the Class II UIC program. GAO released the final report of its review in June 2014. EPA's work in response to the GAO report is an ongoing national process led by EPA Headquarters and is not addressed in this Regional program review report.

II. Review Framework

Goal

EPA's goal for this review is to evaluate implementation of the Class II UIC program that EPA approved as being effective for purposes of primacy under SDWA Section 1425.

Scope

EPA assessed whether the State is implementing standards as approved in 1983 and codified in 40 C.F.R. § 147.1800 in 1984 and as amended and codified under the same provision in 1988; whether there had been any change in such standards or implementation procedures since the last review; and whether any such changes affect the effectiveness of the program that was approved. EPA notes that SDWA 1425 requirements have not changed since 1983. The Ohio rules and laws upon which EPA based primacy authorization have not changed significantly, either, though the State enacted additional injection well authority as recently as 2012. EPA did not, in this review, do a fresh assessment of Ohio's laws, regulations, and procedures to determine whether these were as "effective" in preventing endangerment as when EPA first approved the program.

EPA's review covered the Class II well types that exist in Ohio. At the time of the review, there were no permits or applications for wells using diesel fuels for hydraulic fracturing. This review did not address activities outside the scope of the federally approved Class II UIC program. Other federal and state programs regulate or may regulate activities outside the scope of the federal Class II UIC program, such as: surface siting of wells; production wells; hydraulic fracturing where fluids other than diesel fuels are used; brine transportation, storage, and spreading; brine recycling facilities; discharges to surface water bodies; land application; and spill response.

Approach

To review whether the State is implementing the program as approved in 1983, EPA looked at 13 program areas, or *criteria*, covering permitting, compliance, and enforcement. Each criterion is supported by *metrics* - specific program standards or requirements. This approach is based in part on the EPA Office of Enforcement and Compliance Assurance State Review Framework (SRF). The SRF is a tool EPA developed with states to evaluate state compliance and enforcement performance for programs under the Clean Water Act, Clean Air Act, and Resource Conservation and Recovery Act. The SRF provides a means to evaluate elements essential to the operation of an effective state program. More information on the SRF can be found on EPA's website at <http://www2.epa.gov/compliance/state-review-framework-compliance-and-enforcement-performance>.

Criteria: Review criteria are based on the requirements of SDWA Section 1425, under which the Ohio program was authorized, and consider as appropriate on a case by case basis, factors specified in EPA's *Guidance #19: Review and Approval of Class II Programs Approved under Section 1425 of the Safe Drinking Water Act* and *Guidance #30*

Interim Guidance for Overview of the UIC Program. Program and file review criteria are also based on Ohio's Class II primacy program as approved by EPA, including Ohio laws and regulations, the primacy program description, and other agreements made with EPA.

Metrics: The metrics, that is, the standards that inform the criteria are the program requirements in Ohio's laws and regulations, as well as program requirements and practices as articulated in Ohio's primacy program description and Memorandum of Agreement with EPA. These are the elements EPA considered during primacy review and which EPA found constituted an effective State program for primacy approval and codified in 40 CFR Section 147.1800. As appropriate, EPA also used requirements from recent new rules, such as the requirements for continuous monitoring in wells permitted after October 2012.

EPA reviewed files to collect information on metrics and then aggregated the information from all file reviews to determine whether Ohio is meeting criteria.

To review whether any changes in Ohio's legal authorities had weakened the effectiveness of the program that was approved, EPA evaluated new Ohio rules or rule changes enacted since the last periodic review in 2009, such as the 2012 regulatory additions for seismic monitoring and testing.

Procedures

EPA developed a protocol to guide the Ohio Class II program review. The protocol consisted of:

1. Assembling documents and preparing materials

EPA assembled background documents including:

- Ohio Class II UIC regulations
- Ohio Class II primacy documents
- ODNr's 2002 Quality Management Plan
- ODNr grant applications and reports for fiscal year (FY) 2010 through FY 2013
- Annual "7520" data reports for FY 2010 through FY 2013
- Past evaluation reports
- A list of Ohio Class II active permits and enforcement actions for FY2010 through FY 2013

EPA prepared State-specific file review checklists using the criteria and metrics described above.

2. Program operations discussion with State staff: EPA spoke with ODNr Class II staff and managers several times throughout the program review process. EPA and ODNr discussed new regulations and policies, staffing, program funds, financial assurance (a well owner's financial commitment of funds held to plug wells), public involvement, and other areas. EPA visited the ODNr in Columbus, Ohio, in April 2014 and met with all program staff and managers. EPA also held several conference calls with ODNr staff to follow up on questions that emerged from file reviews or from discussions about the program.

3. Ohio Class II well file reviews: EPA reviewed 29 well files (see Appendix 2) using the checklists developed in step 1. EPA originally selected 30 files to review, but later found that one well application was withdrawn prior to the review; this file was dropped from review. Nineteen files were reviewed at the ODNR central office, where wells are permitted and files are kept, and ten were reviewed in EPA offices as electronic files or paper copies. Reviews focused on permit applications, permits, inspections, and compliance and enforcement actions. EPA selected 16 files by type and five by name. Another eight were selected randomly. Type selections were in two categories: (1) permits and applications dated between 2011 and 2013, because EPA wanted to review files that bracketed the dates of ODNR's reorganization and new regulations; and (2) permits featuring operational or construction parameters of interest to EPA, such as mechanical integrity test dates, depth of injection zone, or construction or injection pressure variances. The five files EPA selected by name were wells that have been the subject of citizen letters to EPA: Ginsburg, K&H #1, K&H #2 (application), and Hahn in Athens County, and Northstar #1 in Mahoning County. EPA tabulated information from file review checklists to evaluate program implementation and looked for implementation strengths, issues, and trends. EPA also reviewed additional file documents to follow up on questions that emerged after analyzing file review information collected in April 2014.
4. Program review report: EPA intends for the report to provide factual information on how Ohio is operating the approved program. The report captures the recommendations developed during the review process in order to facilitate improvements.

EPA built consultation with the State into the process to ensure that EPA and the State understand the causes of any issues and agree, to the degree possible, on actions needed to address them.

Public interest in Ohio's Class II program

Throughout the review process, citizens and non-governmental organizations such as the Ohio Chapter of the Sierra Club; Buckeye Forest Council; Center for Health, Environment, and Justice; Freshwater Accountability Project; and Ohio Citizen Action have expressed concerns about Ohio's Class II program to EPA. Concerns included the program's public input process, the disposal of fluids related to hydraulic fracturing activities, and the potential for injection wells to cause seismic events. Some expressed concerns that are outside the scope of the federal Class II program, such as concerns regarding hydraulic fracturing other than where diesel fuels are used, the composition of non-diesel fluids injected for hydraulic fracturing, brine and hydraulic fracturing fluid storage, and surface spills. Most asked EPA to review, suspend or withdraw Ohio's program and bring Class II wells in Ohio under direct federal regulation. EPA's review of the Ohio Class II program is independent of requests for program withdrawal; however, EPA has communicated information about its Ohio Class II program review with those who have requested it. In addition, EPA added specific wells identified by citizens to the list of files to review during the program review.

III. Ohio Class II UIC Program

Overview

EPA approved Ohio's Class II program under SDWA Section 1425 in 1983 after determining that the program was effective to prevent contamination to USDWs. EPA's approval was based on primacy documents that the State submitted with its request including governing State laws and regulations and a description of the State's Class II program. EPA's last in-depth review of Ohio's implementation of its Class II program was in 2009.

Ohio's Class II program includes disposal wells and enhanced recovery wells. Ohio permits two kinds of Class II disposal wells: "conventional" brine disposal wells and annular disposal (AD) wells. Conventional brine disposal wells, or salt-water injection wells as they are called in Ohio, dispose of brine through tubing set in well casing. AD wells dispose of brine in the annulus of an active production well. The annulus is the space between the tubing and casing or between a well's nested casings. AD wells dispose of brine under gravity without additional pressure. In Ohio, AD wells are limited to disposing an average of 10 barrels a day. If an AD well ceases to be used or never was used for brine disposal but remains operating as a production well, ODNR considers the well to be temporarily abandoned because it cannot be fully plugged and abandoned for disposal while in active production. An owner of an AD well in temporarily abandoned status can reapply for a permit and return the well to active disposal after passing a mechanical integrity test. AD wells have been allowed in Ohio since the original, approved application for primacy contained provisions for them. Since primacy was approved, EPA has worked with Ohio to reduce the number of active AD wells from more than 2,000 to less than 100. Ohio also permits enhanced recovery wells, which are injection wells used to recover residual oil or natural gas. Hydraulic fracturing using diesel fuels is also subject to Class II permitting requirements. However, Ohio has not received any permit applications for and thus has not issued any permits for this activity. Ohio rules require chemical disclosure to ODNR or into the FracFocus database during all aspects of the initial drilling process and during hydraulic fracturing, which is checked by State staff.

ODNR implements the Class II program in Ohio. It receives annual federal funding to support the program. In FY 2014, ODNR received \$143,000 for its Class II program, which ODNR estimates makes up 15% of its annual operating budget of about \$1.2 million (in 2014). ODNR's Class II program issues permits for disposal and enhanced recovery wells, inspects well construction and completion operations, and enforces operational requirements, including well tests and operator reporting. The program also conducts ground water contamination investigations related to the Class II program. The program maintains records of its well oversight and related actions. Annual data reported by ODNR include the number of Class II wells in Ohio, the number of enforcement actions, and the number of inspections. ODNR also regulates oil and gas production and other activities concerning brine transportation, storage, recycling, and spreading that are not part of the federal Class II program or the approved Class II primacy program, and therefore are not under EPA's UIC authority for oversight or review.

Annual Reporting

Class II Inventory for Federal FY 2013		
Active conventional disposal and enhanced recovery wells		330
Active annular disposal wells		83
Permitted conventional wells, pre-construction or under construction		31
	Total active/ permitted	444
Temporarily abandoned annular disposal wells		1075
	Total overall	1519

Annual Information ('7520' report) for Federal FY 2013		
Permit applications received	22	
Permits issued	42	(See page 15)
Wells with violations, total	57	significant noncompliance (SNC) ²
	14	other violation
	71	
Compliance and enforcement actions, total	65	notices of violation*
	6	administrative order
	71	*called 'compliance notices' in Ohio
Wells with violations returned to compliance, total	72	includes carryover from FY 2012 enforcement actions
Wells returned to compliance in 180 days after losing mechanical integrity (EPA national Program Activity Measure)	21	ODNR FY2013 commitment =14
Permit file reviews (to track compliance with construction and operating requirements)	362	"conventional" brine disposal wells
	529	AD brine disposal wells
Inspections ³	2088	"conventional" brine disposal wells
	508	AD brine disposal wells

² SNC violations in the federal UIC Class II program, are: any unauthorized injection where formal authorization is required; well operation without mechanical integrity which causes the movement of fluid outside the authorized zone – if injection of such fluid may have the potential for endangering a USDW; well operation at an injection pressure that exceeds the permitted or authorized injection pressure and causes the movement of fluid outside the authorized zone of injection – if such movement may have the potential for endangering a USDW; plugging and abandonment of an injection well in an unauthorized manner or "walking away from" a responsibility to plug and abandon a well, only when there is endangerment of USDW and there is an identifiable owner/operator; any violation of a formal enforcement action, including an administrative or judicial order, consent agreement, judgment, or equivalent State action; or, the knowing submission or use of any false information in a permit application, periodic report or special request for information about a well (Source: EPA Form 7520-2B). Ohio's UIC Class II program considers any loss of MIT or any incidence of overpressure injection as an SNC, whether or not fluid has moved out of injection zone.

³ Ohio counts every visit to well site by inspector as an inspection. Inspectors monitor well construction phases, rework, and mechanical integrity tests as well as quarterly well visits. Numbers include repeat visits to individual wells.

Recent Changes in and Additions to the Ohio Class II Program

The Ohio statutory and regulatory provisions upon which EPA approved Class II primacy for the State of Ohio have themselves not changed significantly since the program was first authorized. However, Ohio has enacted new requirements or authorities since the last EPA periodic review and as recently as 2012. Furthermore, the ODNR's program implementation has changed over the years as the organization, technology and issues have changed and as new State requirements have been enacted. ODNR officials explained during the program review that the State adopted many of these procedural changes in response to increasing demands on the program, while recent rule changes addressed emerging issues, such as seismicity.

EPA did not reassess the Ohio laws, regulations, and procedures that were reviewed as part of EPA's primacy authorization decision. EPA did, however, review newer regulations, such as the 2012 regulatory additions for seismic monitoring and testing and changes to procedures that were made since the last EPA review. EPA finds that the changes interpret or update existing authorities, add authority, or augment the internal review process. Significantly, EPA finds that these changes strengthen the program that was approved. EPA did not find that new regulations or changes reduce the effectiveness of the program EPA approved or prompt a re-examination of EPA approval of State primacy. The following is a list of changes and trends.

Administrative and process changes

- In 2011, the Division of Oil and Gas Resources Management (DOGRM), which includes the Class II program, was re-established as a division, separating from the Division of Mineral and Resource Management.
- ODNR's informal policy for responding to public comments now includes posting a single on-line response document when there are many comments on a specific application or when many people cite the same issues. If there are few comments, ODNR responds via e-mail or letter, in the manner in which the comment was received. ODNR tracks all comments received in a spreadsheet.
- Regulation changes in 2012 increased the public notice period from one day to five days.
- Within the last two years, ODNR changed permit issuance practices based on review of Ohio permit rules by ODNR attorneys. ODNR now issues a permit to drill and construct and a separate Chief's Order allowing injection once the well has passed a mechanical integrity test. EPA reviewed permits, Chief's Orders, and public notices dated before and after ODNR made the process change and determined that the current process is consistent with the approved primacy program description.
- Since the last review, ODNR managers reaffirmed the expectation that the program will respond to commenters, either online, when many similar comments are received, or by email or mail, when comments are few. EPA also notes that ODNR has been using staff who are skilled at public engagement, while senior technical staff continue to answer public inquiries.

Technical changes

- New Class II regulations went into effect in October 2012 and apply to wells permitted after that date; the rules may also apply to older wells as determined by the Chief. The new rules require continuous monitoring of annulus and injection pressure. New wells must have a shut-off switch on the injection pump set to the maximum allowable injection pressure preventing them from exceeding their injection pressure limits. The regulations give ODNR authority to request well tests such as radioactivity tracer survey, spinner survey, seismic survey, seismic monitoring, pressure fall-off testing, and an array of geophysical logs.
- ODNR prohibits injection wells in the Precambrian basement geologic strata, and ODNR can order existing wells finished in the Precambrian to plug back to a shallower zone.
- New regulations revised construction requirements for new wells and codify requirements for wells in areas where the USDW cannot be mapped because of widely variable geology (the southeastern part of Ohio). The requirements are based on the base depth of nearby streams, water wells, or springs. Requirements in this rule replace the "river county casing program," a policy which based casing depth on elevation in areas where USDWs could not be mapped.
- Inspectors spot-check fluid hauled in for injection, sending samples to an EPA-certified lab. ODNR does this to keep track of brine chemistry and determine that fluids are appropriate for Class II injection wells.
- The Class II program consults with the Division of Geologic Survey (DGS), and Division of Mineral Resource Management (MRM) during the permitting process. DGS reviews proposed new well locations for seismic potential, faults, mine shafts, and the depth to Precambrian basement. MRM provides information on mine locations. Consultation reports are included in the well files. ODNR also consults with the Ohio Environmental Protection Agency on specific wells or well applications.
- ODNR commonly installs seismometers before new Class II wells are operational and consults with DGS and the U.S. Geological Survey. ODNR internal staff, with periodic contractor support, obtain and review real-time seismic data.

Resources

- Since reorganizing, the ODNR UIC program increased staff from between five to seven FTE (full time equivalents) to 13 FTE in 2014. The program has four full time technical/administrative positions and four full time inspector positions. In the past, the program shared inspectors with the production well program; the four inspector positions are now dedicated for Class II work. DOGRM managers and other inspectors have partial UIC duties. DOGRM also has two staff attorneys assigned to Class II program work. (The same resources cover Class III wells, though Class II comprises most of the workload.)
- Since June 2010, Ohio requires a brine disposal fee for each barrel injected in Class II wells in Ohio. Fees are based on the brine source location relative to Ohio oil and gas resource management regulatory districts. Brine disposed within district or from an adjoining district is 5¢ per barrel. Brine coming from out of district or not from an adjoining district is 20¢ per barrel.

Emerging trends

- Brine disposal in Ohio increased from eight million barrels per calendar year in 2011 to 16 million barrels per calendar year in 2013. 52% of fluid disposed of in Ohio is from out of state (as of 2013). ODNR officials attribute this trend to increased Marcellus Shale development and limited brine disposal options in neighboring states disallowing brine treatment and surface discharge.
- The number of permit applications has increased in the last three years. EPA notes that in federal fiscal year (FFY) 2009 and 2011, ODNR issued 17 and 28 Class II permits respectively. Twenty-one permits were issued in early FFY 2012 (October - December 2011) and 42 in FFY 2013. These figures are skewed because ODNR did not issue Class II permits while the State drafted emergency rules relating to seismicity, beginning in late 2011 and ending in October 2012.
- ODNR has investigated seismic events to determine whether they were caused by deep well injection. Seismic events in Youngstown in 2011 led to new regulations that give Ohio more authority to require seismic testing, geophysical logging, and seismic monitoring.
- Public attention to injection wells has increased, with a greater demand for public hearings and meetings and more requests for ODNR Class II records.

Work in progress

- While ODNR has administrative authority to secure injunctive relief via a consent agreement and can issue administrative orders, ODNR does not have unilateral administrative penalty authority. ODNR must refer civil and criminal enforcement cases seeking penalties to the Ohio Attorney General, who decides whether to pursue a case. ODNR Class II UIC attorneys and technical staff are collaborating on a process to provide technical support to litigators with the goal of making referrals more successful.
- Each DOGRM section, including the UIC section, is writing a manual that narrates the group's function, describes processes, and references standard operating procedures (SOPs) where necessary.
- ODNR is reexamining ways to communicate with the public, in part due to increased public engagement in Class II well actions. EPA encourages ODNR to continue developing its policies and procedures for public input; EPA considers public input and communication an important part of an effective program.

EPA has identified actions that its Regional offices are taking to promote meaningful engagement in overburdened communities⁴. EPA believes these actions have value, and in such circumstances Region 5 has committed to, among other things, encourage outreach by permit applicants, as well as share information with community members through means such as holding informational meetings, writing public notices in plain language, ensuring that documents under review are accessible to the community, and extending the public comment period when appropriate. ODNR should take similar actions, to the extent it is not already doing so, to ensure that any environmental justice concerns are meaningfully considered and addressed as appropriate during the permitting process.

⁴ The term "overburdened" describes minority, low-income, tribal, and indigenous populations or communities in the United States that potentially experience disproportionate environmental harms and risks as a result of greater vulnerability to environmental hazards. This increased vulnerability may be attributable to an accumulation of negative and/or lack of positive environmental, health, economic, or social conditions within these populations or communities.)

IV. Findings and Recommendations

Findings represent EPA's conclusions regarding State performance. Findings are based on file reviews and may also be informed by:

- Follow-up conversations with State agency personnel.
- Review of previous evaluation reports, the EPA-ODNR Memorandum of Agreement, or other documents.
- Additional information.

There are three categories of findings:

Meets Criteria: This rating describes a situation where the criteria are met and no performance concern is identified. EPA may have advisory comments but will not monitor these recommendations for completion between reviews.

Area for State Attention: An activity, process, or policy for which file metrics show that criteria are not met. Where appropriate, the state could address the issue without additional EPA oversight. EPA may make recommendations to improve performance, but it will not monitor these recommendations for completion between reviews.

Area for State Improvement: An activity, process, or policy for which file metrics show that criteria are not met and are a significant problem that the agency should address. Recommendations should address root causes. EPA will work with the State and monitor these areas for improvement.

Total files reviewed 29

<u>Review type</u>	<u># files</u>
permit and compliance criteria review	25
enforcement and compliance criteria review	6
reviewed for both sets of criteria	2

<u>Well type</u>	
salt water disposal	22
enhanced recovery	2
annular disposal	5

<u>Well status</u>	
application	3
permitted/undrilled	2
permitted, drilled, not yet tested	1
active	19
plugged/abandoned	2
revoked	2

Metrics analysis

For conventional disposal and enhanced recovery wells, EPA reviewed files against permit criteria and compliance/enforcement (CE) criteria. For permit criteria, EPA made findings from well files it reviewed for permit metrics (20 files total). For CE criteria, EPA made findings based on well files it reviewed for both permit metrics (20 files) and enforcement metrics (an additional 4 files). EPA reviewed annular disposal wells separately because they have different permitting and operational standards. For example, since AD wells dispose brine under gravity flow, there is no permitted maximum injection pressure.

In many cases, a criterion or individual metric is relevant only for a subset of the well files reviewed. For example, a metric for annual reporting has meaning only for wells that have been in active status long enough to have sent an annual report. Criteria footnotes include information on the relevant file review sample for each criteria or metric, as necessary.

Relevant Metrics – table key

EXAMPLE TABLE

Metric number on file review checklist	4a	AOR meets Ohio minimum AOR requirement	10	of 10	# Files meeting metric standard
	4b	Wells in AOR needed Corrective Action	2	of 10	
		Evidence of corrective action	2	of 2	

Brief description of metric

Files reviewed for metric

Abbreviation Key:

AD	=	Class II annular disposal well
AOR	=	area of review (For Class II wells, the AOR is a fixed radius around a well in which other wells are reviewed to determine if their construction would allow fluid from the injection zone to move upwards into an underground source of drinking water.)
ERP	=	Class II enhanced recovery project
NOV	=	notice of violation (aka Compliance Notice in Ohio)
MIP	=	maximum injection pressure
MI	=	mechanical integrity
psi	=	pounds per square inch
SOP	=	standard operating procedure
SWD	=	conventional Class II disposal well
TAAD	=	temporarily abandoned annular disposal well
USDW	=	underground source of drinking water

Permit Criteria

Permit Criteria 1: Applications include required information.																											
Finding	Meets Criteria																										
Summary	Applications and/or files for conventional disposal and enhanced recovery wells contained information required by approved primacy program.																										
Explanation	EPA reviewed 20 files for operating wells and well applications and found that all include the basic information required by the program.																										
Relevant metrics	<table border="1"> <tr> <td>1a</td><td>Well location</td><td>20</td><td>of 20⁵</td></tr> <tr> <td>1b</td><td>Notification of owners injecting or producing from injection zone</td><td>20</td><td>of 20</td></tr> <tr> <td>1c</td><td>Average and maximum daily volume of fluid to be injected</td><td>20</td><td>of 20</td></tr> <tr> <td>1d</td><td>Estimated average and maximum injection pressure</td><td>20</td><td>of 20</td></tr> <tr> <td>1e</td><td>Schematic drawing of subsurface well construction</td><td>20</td><td>of 20</td></tr> <tr> <td>1g</td><td>Signature of well owner or authorized agent</td><td>20</td><td>of 20</td></tr> </table>			1a	Well location	20	of 20 ⁵	1b	Notification of owners injecting or producing from injection zone	20	of 20	1c	Average and maximum daily volume of fluid to be injected	20	of 20	1d	Estimated average and maximum injection pressure	20	of 20	1e	Schematic drawing of subsurface well construction	20	of 20	1g	Signature of well owner or authorized agent	20	of 20
1a	Well location	20	of 20 ⁵																								
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1d	Estimated average and maximum injection pressure	20	of 20																								
1e	Schematic drawing of subsurface well construction	20	of 20																								
1g	Signature of well owner or authorized agent	20	of 20																								
Recommendation	None.																										

⁵ Sample included files for conventional SWD and ERP wells that are active, in applications status, or are plugged/abandoned, excluding files reviewed for enforcement only. AD wells have separate requirements and are in a separate section of this report.

Permit Criteria 2/3: Permits achieve isolation of injection zone from USDW, based on geologic information.

Finding Meets Criteria

Summary Well files identified injection zones and contain evidence of USDW review.

Explanation

Ohio regulations require applications to include the name, description and depth of the geological zone or formation into which injection is to be made. EPA reviewed well files for permitted wells and for proposed wells in the application/review stage. All well files EPA reviewed met these metrics.

EPA found that ODNR is meeting the criteria set forth in its regulations and primacy program documentation based on discussion with program staff and file evidence, such as construction revision notes and a copy of the USDW map with the well location. The Ohio regulations and primacy program description do not expressly require the application or permit to identify confining zones or the name and base of the USDW. The primacy program description states that ODNR will review State geologic information, as appropriate, to determine the thickness, depth and geologic properties of the confining zone(s) and the depth to the bottom of all USDWs which may be affected by the injection. ODNR staff explained that permit files do not name specific confining zones because Ohio stratigraphy is well documented and includes many confining layers between USDWs and common injection zones. ODNR staff determine the base of the deepest USDW by referring to a State USDW map (a geological map that shows the contours of USDW depths across most of the State) and by reviewing nearby well logs, which are kept at ODNR offices. ODNR staff told EPA that the permitted outer casing depth acts in effect as the record of the USDW base, in areas of the State where the USDW can be mapped. Ohio rules require the surface casing to be at least 50 feet below the base of the USDW; that is, minimum surface casing depth = the USDW base + 50 feet, in areas where the USDW is mapped. Where the USDW was mapped, surface casing depth is based on elevation prior to 2012 or on the base depth of nearby streams, water wells, or springs after 2012 regulations.

Of the 20 files reviewed for metrics under this criterion, EPA noted that 13 named the USDW, one listed USDW base depth separate from casing depth, and none contained the confining zone name or depth.

Relevant metrics

2a	Injection zone name, description, and depth	20	of 20 ⁶
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Recommendation None.

⁶ Sample included files for conventional SWD and ERP wells that are active, in applications status, or are plugged/abandoned, excluding files reviewed for enforcement only. AD wells have separate requirements and are in a separate section of this report.

Permit Criteria 4: Corrective Action is taken on wells within the required AOR.**Finding** Meets Criteria**Summary** ODNR meets criteria for (1) evaluating wells within a proposed AOR for potential pathways to USDWs, and (2) addressing wells within the AOR that need modification to prevent contamination.**Explanation** In 20 of 20 files, ODNR demonstrated that they evaluated wells within the State-required AOR (usually ½ mile). In two well files EPA reviewed, other wells in the AOR required corrective action, and the files contained evidence of the completion of the corrective actions.**Relevant metrics**

4a	AOR meets Ohio minimum AOR requirement	20	of 20 ⁷
4c.1	Evidence of review of wells in AOR and corrective action if necessary	20	of 20
4b	Files in which wells in AOR needed Corrective Action	2	of 20
4c.2	Evidence of corrective action on wells within AOR	2	of 2

Recommendation None.

⁷ Sample included files for conventional SWD and ERP wells that are active, in applications status, or are plugged/abandoned, excluding files reviewed for enforcement only. AD wells have separate requirements and are in a separate section of this report.

Criteria 5: Permit issuance ensures public participation.

Finding	Meets Criteria
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Summary	ODNR is meeting criteria for public participation on permits in keeping with Ohio's primacy program and Ohio rules.
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Explanation	<p>Ohio is meeting approved criteria for public notice, public comment periods, and discretionary hearings. Ohio also implements additional measures that are not required by EPA but provide information to the public and allow additional public engagement. The additional measures are: responding to public comments, holding public information sessions, and appeal rights.</p> <p>Ohio's program includes requirements for a five-day public notice of a permit application and a 15-day public comment period, for an overall 20 day review and comment period (regulation changes in 2012 increased the public notice period from one to five days). 19 of 19 well files contained public notices for the well application. In the 19 well files with public notices, 10 contained records of public comments. EPA notes that a public notice reflects ODNR permit requirements and changes to the application made during the course of its review of the permit. Therefore, information that is made publicly available reflects what ODNR determines are acceptable permit conditions, not simply what the applicant has sought in its application.</p> <p>Per Ohio's regulations, the Division of Oil and Gas Chief rules upon the validity of the objections received during the public comment period; if the Chief considers any objection to be relevant to the issues of public health or safety, or to good conservation practices, or to have substance, a hearing is called. In the sample EPA reviewed, ODNR held a formal public hearing in three of ten instances where comments were received. ODNR has held several public informational meetings in the last five years, and has records of these meetings. EPA is aware that some nongovernmental organizations and citizens in Ohio are concerned that public hearings are not held on request, that informational meetings are held in lieu of hearings, or that ODNR determined that comments received on specific wells did not require permit changes or public hearings. However, these ODNR decisions are within the bounds of the EPA-approved program.</p> <p>EPA notes that ODNR responds to comments, though neither the primacy program nor Ohio rules require ODNR to respond to comments. In all ten wells for which ODNR received public comments, EPA reviewers found responses to comments in the well file. ODNR staff stated that the program may respond to comments in a single on-line response document if there are many similar comments, or individually by mail or email if commenters are few. The files also show that ODNR has held public meetings about permits in response to public interest. Under Ohio law, affected parties may appeal an ODNR Chief's order,</p>
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which follows a permit decision, to the Oil and Gas Commission – another public input venue that is not specifically required by EPA. Oil and Gas Commission decisions may be appealed to the Franklin County Court of Common Pleas.

Relevant metrics

5a	Public notice per Ohio rules.	19	of 19 ⁸
5c	Comments on the permit in file/online	10	of 19 well files with public notices had comments from public
5d	Response to commenter in file/sent/posted	10	of 10 well files with comments in file
5b	Wells for which ODNR held a public hearing	3	of 10 well files with recorded public comments

Recommendation None.

⁸ Sample included files for conventional SWD and ERP wells that are active, in applications status, or are plugged/abandoned, excluding (1) a well application that was not ready for public notice yet, and (2) files reviewed for enforcement only. AD wells have separate requirements and are in a separate section of this report.

Criteria 6: Wells are permitted such that casing/cementing prevents movement of fluids into USDW, based on USDW and injection zone hydrologic relationship.

Finding Meets Criteria

Summary ODNR is meeting its criteria for cementing surface casings in all types of wells reviewed. ODNR is meeting its well construction criteria for new wells.

Explanation Surface casings were cemented to the surface in 20 of 20 files. ODNR verified cementing in 15 of 15 constructed wells.

Twenty of 20 files met surface casing depth criteria. Nineteen of 20 files demonstrated that wells met long string casing depth criteria. The remaining well file documents an ODNR-approved variance for long string casing cement and this well passed mechanical integrity tests.

Relevant metrics	6a	Surface casing set (a) \geq 50 ft. below deepest USDW base/ or (b) per 'river county casing' permit conditions ⁹ or new regulations (effective August 2012)	20	of 20 ¹⁰
	6b	Surface casing cemented to surface	20	of 20
	6c	Cementing verified	15	of 15 ¹¹
	6d	Long string casing cemented \geq 300 ft. above top of injection zone	19	of 20
	6e	Packer set \leq 100 feet above injection zone	20	of 20
	6f.1	Construction Variances	1	
	6f.2	Variance basis documented, if 6f.1=Y	1	of 1 with a variance

Recommendation None.

⁹ 'River county casing' was an ODNR practice to determine well surface casing depths in areas where USDW's cannot be mapped, primarily in southeast Ohio counties where groundwater is limited and shallow. ODNR officials told EPA that the practice is now superseded by new rules under ORC 1501:9-1-08 which contain alternative requirements for well casing in such areas.

¹⁰ Sample included files for SWD and ERP well permits or applications, excluding files reviewed for enforcement only. AD wells have separate requirements. For applications or unconstructed wells, reviewers looked at proposed construction plans or permit requirements.

¹¹ Only wells that have been constructed were evaluated for cement verification.

Permit Criteria 7: ODNR establishes an MIP which assures that pressure in the injection zone does not initiate new fractures or propagate existing fractures.

Finding Meets Criteria

Summary ODNR is meeting its criteria for establishing maximum injection pressure in permits and relevant Chief's Orders.

Explanation

All permits and Chief's Orders reviewed included a specific MIP. Reviewed files for permits, Chief's Orders, and applications contained evidence that ODNR staff apply staff-calculated maximum injection pressure prior to public notice, though calculations are not recorded. Ohio regulations define the formula for calculating an MIP. EPA reviewed and approved these formulas during the program authorization process.

Within the last two years, ODNR changed permit issuance practices based on attorney review of Ohio permit rules. ODNR now issues a permit to drill and construct, which includes a calculated MIP, and a separate Chief's Order allowing injection once the well has passed a mechanical integrity test and meets other permit conditions. In four well files reviewed, ODNR approved MIP variances, as authorized by Sections 1501:9-3-06 and 1501:9-3-07 of the Ohio Administrative Code. In three out of these four instances, well files included supporting documentation for MIP variances, such as operator requests and supporting brine chemistry reports. In one instance, a well that was given more than one MIP variance was eventually shut in and investigated as a cause of seismic activity in the vicinity. One well file indicated that a different specific gravity was used to compute MIP, though the file did not contain a chemical analysis to support the variance.

ODNR is meeting the criteria set forth in its regulations and in its primacy program documentation.

Relevant metrics	7a	MIP established by ODNR per Ohio standard	20	of 20 ¹²
	7d.1	MIP variances given by ODNR	4	of 20
	7d.2	MIP variance reason(s) documented, such as fluid analysis, etc.	3	of 4 with variances

Recommendation None.

¹² Sample included files for SWD and ERP well permits or applications, excluding files reviewed for enforcement only. AD wells have separate requirements.

Permit Criteria 8: Permits/ Chief's Orders allow no significant leak in the casing, tubing, or packer.

Finding Meets Criteria

Summary ODNR meets its criteria for allowing no significant leaks by testing for mechanical integrity and through requiring operator mechanical integrity reporting.

Explanation

All well files reviewed for this criteria (14 of 14 active or previously active plugged wells) show that ODNR tested wells for mechanical integrity prior to initial injection in accordance with the Ohio rules. EPA could not find original MI demonstrations in 2 of 14 well files; however the two wells were permitted in 1980 and 1982, before primacy authorization. Both wells were active and met mechanical integrity requirements at the time of file review.

All permits reviewed required some form of ongoing MI demonstration per Ohio regulations and the approved primacy program, such as annual reporting of annulus pressure data, usually a "mini-test" in which the operator pressures up the annulus to 200 psi and monitors changes in pressure to detect leaks. In addition to reporting, inspection remains a significant tool for ODNR to detect loss of MI, specifically by checking annulus pressure during an inspection. Reviewers noted several instances where inspectors checked annulus pressure or required and witnessed a mini-test.

ODNR staff have long-maintained that operators are required to keep a positive pressure on the annulus. Past EPA reviews and ODNR's annual compliance strategies imply that operators must maintain a positive pressure, and during EPA's April 2014 visit to ODNR offices, ODNR staff reasserted that an annulus pressure of zero is not acceptable. In follow-up discussions, ODNR confirmed that maintaining a constant, permanent positive pressure is not required by regulation or permit. Rather, the permittee is required to conduct a monthly test at a pressure sufficient to detect leaks (the "mini-test"), or since 2012, continuously monitor the annulus. Inspectors also look for pressure differential between the annulus and injection well – if pressures equalize or if the annulus is on vacuum, the ODNR SOP instructs the inspector to test for MI or shut in well, depending on circumstances. (More discussion follows later in this report on page 35.)

Relevant metrics

14 conventional well files from EPA's selection for permitting review could be evaluated for initial MI testing (these were conventional wells that are active or plugged)

8a	Initial MI test to Ohio standard (SWD/ER)	14	of 14 ¹³
8b	Well passed initial MI test	14	of 14
8c	Initial MI test witnessed by ODNR	12	of 14
8e.1	Permits/Chief's Orders require ongoing MI demonstration, via reported monthly mini-test or 5-year MI test	14	of 14

Recommendation None.

¹³ Sample = all active and plugged conventional well files reviewed by EPA for permitting. Although plugged wells no longer operate, files included information on this criteria. Analysis omits: Undrilled wells, permit applications, wells not yet approved for injection, and AD wells.

Permit Criteria 9: Wells are plugged in a manner that does not allow movement of fluids into or between USDWs.

Finding Meets Criteria

Summary Plugged wells reviewed by EPA met criteria.

Explanation Ohio issues separate well plugging permits. Therefore, EPA evaluated that plugging criteria were met by reviewing files for plugged wells.

Well plugging was not a priority for this evaluation cycle; however EPA reviewed two files for plugged wells and found all criteria were met.

Relevant metrics

EPA reviewed two files for plugged wells.			
12a	Well plugged with appropriate material	2	of 2
12b	Zones to be plugged are identified	2	of 2
12c	Copy of (1) cementing ticket or (2) prepared clay purchase attached to the plugging report.	2	of 2
12d	Plugging verified	2	of 2
12e	Variances granted from requirements	0	of 2

Recommendation None.

Compliance and Enforcement Criteria

CE Criteria 1: Monitor monthly maximum injection pressure, injected volume, and annulus pressure¹⁴.

Finding	Area for State Improvement
Summary	EPA found that roughly a quarter of files checked had incomplete or missing reports. EPA also found gaps or inaccuracies in some operator reports that were not identified by ODNR.
Explanation	<p>Ohio's Class II program relies in part on operator reporting to demonstrate that an operator is maintaining mechanical integrity, making it a vital part of the primacy program. (Inspections to monitor operating conditions are discussed in CE Criteria 3, page 33.)</p> <p>EPA reviewed 12 files for presence of annual operator reports over the 2009 – 2013 period surveyed. Ten of 12 had all annual operator reports; the other two were missing one or more annual reports for the period. In seven of 12 files, the annual reports present contained all required information. Where reports were incomplete, information such as monthly annulus 'mini-tests' was not reported. ODNR took action against an operator in one of the two instances where a report was not received.</p> <p>For the 10 files that had all annual reports, all files had reports sent under signature of the owner/operator. In nine of 10 files, reports were filed within Ohio's required timeframe.</p> <p>Of 12 files reviewed for reporting, EPA identified five well files with potential reporting violations that ODNR did not identify in their files. EPA identified one instance where reports were missing without apparent follow-up (the other well file with a missing report had documentation of ODNR follow-up). In three of the files, permit-required information was not evident. In three cases, the operator's annual report included monthly maximum injection pressures that were lower than pressures reported by inspectors (though the higher pressures recorded by inspectors in these instances did not exceed permitted MIP). For instance, one operator reported a monthly maximum injection pressure of 1740 psi while an inspection report for the same month noted injection pressure as 1970 psi. Another operator consistently reported maximum injection pressure as 140 psi every month in 2009, but inspection reports note injection pressures of 160 psi and 180 psi for two months.</p>

¹⁴ Ohio's Class II program requires operators to report annulus pressure or results of a monthly mechanical integrity 'mini-test.'

Relevant metrics

12 conventional well files EPA reviewed could be evaluated for annual reports (wells that are: active or plugged and have been operational through one annual review cycle)			
10a	Up-to-date annual reports in file (all required reports present for 5-year period checked)	10	of 12 ¹⁵
10b	Complete annual reports (present reports include required information)	7	of 12
Well files with complete records (10) were evaluated for timeliness and signatures			
10c	Reports received 45 days after last day of calendar year (SWD/ER) or March 1 (AD)	9	of 10 ¹⁶
10d	Reports signed by owner/ authorized agent	9	of 10
12 conventional well files EPA reviewed could be evaluated overall for reporting issues (wells that are: active or plugged and have been operational through one annual review cycle)			
	Potential operator reporting violations	5	of 12
Description of reports with issues (file can have more than one report issue)			
	MIP discrepancy, without exceeding MIP	3	of 5
	Missing reports	1	of 5
	Missing information	3	of 5

Recommendation

EPA recommends that ODNR develop an approach to compare inspections to annual reports to identify whether there are inconsistencies. ODNR should take timely and appropriate enforcement action on wells when reporting is late, absent, incomplete, or is found to be false. ODNR should consider revisiting its Enforcement Standard Operating Procedure (part of the ODNR Quality Management Plan finalized with EPA in 2002) to establish guidelines to which staff should refer when developing recommendations for the enforcement response to a given violation or set of violations with respect to operator reporting. Ohio's new requirement (since 2012) for continuous pressure monitoring will help reduce discrepancies and flag loss of mechanical integrity.

¹⁵ Sample = wells that have been active long enough to have been through at least one reporting cycle (of files selected for enforcement review and files selected permit review).

¹⁶ Sample = wells that have been active long enough to have been through at least one reporting cycle (of well files selected for permit review)

CE Criteria 2: Prompt notice and resolution of loss of MI or other problems.

Finding	2.1 Meets Criteria (resolution of loss of MI) 2.2 Area for State Improvement (notice from operators)
Summary	2.1 ODNR takes action to return wells to MI when MI loss is reported or discovered during inspection. 2.2 MI loss was found through inspection more frequently than by operator report.
Explanation	<p>2.1 Of the well files EPA reviewed for this criteria, eight of 17 wells had lost MI at some point during their operation. (EPA recognizes that MI loss can occur. When it occurs, it is often due to internal tubing leaks or packer failure; this type of MI loss is not exceptional and must be corrected.) Of the eight wells which lost MI, seven were returned to compliance and five within 180 days, according to well files. The well which had not returned to compliance was undergoing corrective action and evaluation at the time of EPA's review.</p> <p>EPA reviewed five files where the well lost and was returned to MI to determine whether ODNR witnessed MI tests when wells return to operation. The review found inspection reports witnessing return-to MI tests in four of five files.</p> <p>2.2 Operators reported loss of mechanical integrity in two instances. In the remaining six instances, it appeared that the loss was detected by inspection. ODNR Class II regulations and permits require operators to notify ODNR when they become aware that mechanical integrity is lost. It is not clear whether operators in the six instances were aware that MI had been lost. In discussions, ODNR noted that enforcement begins when an inspector discovers loss of mechanical integrity, beginning with shutdown. Ohio's new requirement (since 2012) for continuous pressure monitoring will help reduce discrepancies and flag loss of mechanical integrity.</p>

Relevant metrics

17 conventional well files EPA reviewed for enforcement and compliance metrics could be evaluated for MI loss and return (wells that are active or plugged)

9a	MI loss in past	8	of 17
9b	MI loss discovered by	6	Inspection
		2	operator reported
9c	Follow-up MI tests witnessed for wells returned to MI	4	of 5*
9d	Returned to MI	7	of 8
9e	Returned to MI within 180 days ¹⁷	5	of 8

*EPA had complete files in for only 5 of 8 files that had lost MI. This reflects partial review, not incomplete files.

Recommendation

2.2 EPA recommends that ODNR modify report requirements or permit conditions for collecting and reporting mechanical integrity information, such as annulus pressure, for wells without continuous monitoring. We also recommend that ODNR clarify reporting expectations for wells with continuous monitoring.

¹⁷ EPA collects this information as part of a national EPA-reported program activity measure for the UIC program ("Percent of Classes I, II and Class III salt solution mining wells that have lost mechanical integrity and are returned to compliance within 180 days thereby reducing the potential to endanger underground sources of drinking water.")

CE Criteria 3: Inspection reports are complete and sufficient.

Finding	Meets Criteria
Summary	Inspection reports are complete, and ODNR addresses violations found during inspections with follow-up compliance or enforcement action.
Explanation	<p>ODNR has four UIC-dedicated field inspectors. It uses a computer-based inspection report system that feeds into the Risk Based Data Management System (RBDMS) and generates paper inspection reports for the file.</p> <p>That ODNR has an active inspection presence is evident from file review. All files for wells that have been constructed contained inspection reports, and most contained numerous inspection reports. ODNR's policy is to inspect wells every 12 weeks, inspect most phases of construction, and witness MI tests. All site visits are documented in ODNR's data system as inspections. EPA did not evaluate the number or frequency of inspections for each well reviewed; however, review indicated that wells were inspected frequently. EPA's review found that inspectors witness well construction and mechanical integrity testing. They also order and witness on-the-spot mini-tests at their discretion or based on on-site observations. Inspection reports EPA reviewed appear to provide all information required on ODNR's standard inspection form.</p> <p>EPA's review noted that in the 10 instances when inspectors noted violations, files documented follow-up. Inspection remains a significant tool for ODNR to detect loss of MI, and the well files indicated ODNR's active inspection presence for checking MI. In discussing ODNR's 2012 requirements for continuous annulus pressure monitoring, EPA advised that ODNR reflect the new requirements in its inspection procedures and checklists, such as how often inspectors will view past continuous monitoring records.</p> <p>In 18 wells that could be reviewed for inspections, EPA found one file with potential violations that were not noted or cited with ODNR "compliance notice" or other follow-up measure. In this file, the well was found to exceed MIP in six inspections over three months. EPA did not find documentation of compliance or enforcement action.</p>

Relevant metrics

EPA reviewed inspection records for 5 conventional well files in detail			
E3a	annulus pressure reported (unless surface facility report)	5	5
E3b	injection pressure reported (unless surface facility report)	5	5
E3c	ODNR inspection form used	5	5
18 conventional well files EPA reviewed could be evaluated for inspections (wells that are: active, plugged, and constructed if not yet active)			
P11	Well files include inspection reports	18	18
P11a	Files with Inspector-identified violations (related to UIC)	10	18
P11b	In files with inspector-identified violations, reports or file contains evidence of follow-up on the identified violation	9	of 10
11c	EPA file review: reviewer noted potential well operation violations in inspection report not identified by ODNR (discussed further in CE Criteria 4)	1	of 18

Recommendation

None.

CE Criteria 4: Violations are identified and appropriate actions are taken.

Finding	<p>4.1 Meets criteria (taking action on identified violations)</p> <p>4.2 Area for State Attention (communicating annulus pressure requirements)</p> <p>4.3 Area for State Improvement (appropriate actions for repeat violators)</p>
Summary	<p>4.1 ODNR takes compliance or enforcement actions on violations it finds during inspections or which are reported by operators.</p> <p>4.2 Annulus pressure expectations are not communicated uniformly.</p> <p>4.3 ODNR should address wells with repeat violations more consistently.</p>
Explanation	<p>4.1 EPA reviewed 18 files for inspections, and found that inspectors recorded a total of 10 UIC violations at these well sites. EPA noted that in 10 of these 10 instances, ODNR documented follow-up actions. In nine, ODNR documented the facility's return to compliance, with the remaining well undergoing corrective action and evaluation at the time of EPA's review. ODNR referred one Class II injection well case to the Assistant State Attorney General in the period between October 2009 and November 2013, and the well was ordered to close; this well was not included in EPA's file selection. (Potential violations and enforcement on reporting issues are discussed in CE Criteria 1.)</p> <p>4.2 From information in inspection reports and from discussions with ODNR, EPA noticed that expectations for annulus pressure have not been uniformly communicated. While federal regulations do not require a specific annulus pressure for Class II wells, ODNR had long indicated to EPA that Ohio Class II operators must maintain a positive pressure on the annulus at all times. ODNR staff reasserted this requirement during EPA's April 2014 visit to ODNR offices, stating that 0 psi on the annulus is not acceptable. In follow-up discussions, however, ODNR confirmed that maintaining a constant, permanent positive pressure is not required by regulation or permit. Rather, the permittee is required to conduct a monthly test at a pressure sufficient to detect leaks (the "mini-test") or, for wells constructed since 2012, continuously monitor the annulus. ODNR's inspection procedures describe options for proceeding when a well annulus is at 0 psi, but do not flag it as an automatic violation; the recommended option is to require an on-the-spot "mini-test" to determine whether the well has mechanical integrity. At the review and in subsequent conversations, ODNR stated that it considers pressure equalization between annulus and injection tubing to be the main field indicator of loss of mechanical</p>

integrity. EPA was already aware of this approach, which is part of Ohio's inspection SOP.

EPA's file review illustrates that expectations regarding annulus pressure vary. For example, in one file, reviewers noted that ODNR instructed the operator to put a positive pressure on the annulus when it was recorded at 0 psi. In another instance, ODNR sent a letter informing an operator that the annulus could not be left at 0 psi. In seven more files EPA reviewed, ODNR recorded annulus pressure as 0 psi on inspection reports one or more times without comment or action. It was not clear whether the different responses were due to operator discretion or from different expectations.

In its primacy program, ODNR uses inspections as a significant tool to detect loss of MI, in part by checking annulus pressure. However, since messages about annulus pressure requirements have been inconsistent, well operators might also be unclear on how to comply with State requirements.

- 4.3 EPA performed an in-depth review of six files for enforcement, selecting wells with a notice of violation or enforcement action between 2009 and 2013. Overall, three of six had repeated a violation. In one instance, ODNR ordered an operator to plug a well due to long-term inactivity following loss of MI. Over a number of years, the well was not plugged, despite ongoing inspections noting the failure to plug. (EPA found a similar situation in another well file outside the six selected specifically for enforcement review. Both wells eventually passed MI tests and are now active.) In another instance, a well exceeded its permitted maximum injection pressure three times, which inspection reports noted. The well received a variance to increase injection pressure following each injection over MIP. (Eventually the operator voluntarily shut in the well.) In another file review, the well was found to exceed MIP in six inspections over three months. EPA did not find documentation of compliance or enforcement action. Five of six well files reviewed for enforcement metrics had multiple violations. EPA acknowledges that files selected for enforcement actions may be skewed toward operators with a history of violations.

While ODNR has authority to secure injunctive relief via a consent agreement and can issue administrative orders, ODNR does not have unilateral administrative penalty authority (that is, ODNR does not have authority to levy fines for noncompliance). ODNR must refer civil and criminal enforcement cases seeking penalties to the Ohio Attorney General, who decides whether to pursue a case. EPA notes that ODNR is working to improve referrals to the Attorney General's office.

Relevant metrics		18 conventional well files EPA reviewed could be evaluated for inspections (wells that are: active, plugged, and constructed if not yet active)	
11a	Inspector-identified violations (related to UIC)	10	of 18
11b	Inspection reports or file contains evidence of follow-up to noted violations	9	of 10
11c	EPA file review: reviewer noted potential well operation violations in inspection report not identified or addressed by ODNR	1	of 18
EPA reviewed 6 well files with enforcement action histories			
	Wells repeating the same violation	3	of 6

Recommendation	
	<p>4.1 None.</p> <p>4.2 ODNR should clarify expectations for annulus pressure to operators and inspectors especially with regard to the 2012 regulations requiring continuous annulus monitoring in new wells.</p> <p>4.3 ODNR should revise its Enforcement SOP to establish specific guidelines, recommendations, and steps for escalation of enforcement for wells with repeat violations and wells that ignore citations of violations. In addition, EPA suggests that internal vetting of inspection reports would allow ODNR to identify all violations and determine appropriate responses.</p> <p>Administrative penalty orders (APOs), issued with the consent of the alleged violator, constitute one form of escalation. Referral of penalty cases to the Attorney General's office constitute another. Unilateral APOs are yet another form of escalation. However, ODNR does not have unilateral APO authority. EPA understands that the Ohio General Assembly would need to authorize ODNR to issue APOs unilaterally. In EPA's experience, penalties encourage timely return to compliance and deter future noncompliance.</p>

Annular Disposal Wells

AD Criteria 1: Permit/application information				
Finding	Area for State Attention			
Summary	AD well files contained required information for location, but were without examples of public notice in the Division circular.			
Explanation	<p>AD well files reviewed by EPA contained basic well location and signature certification information required by Ohio AD rules. Notices of AD applications are placed in the Oil and Gas Division Circular; however, no documentation of public notice was found in paper or online AD files.</p> <p>Ohio's AD well requirements were part of its EPA-authorized program. Ohio restricts annular disposal to gravity flow; that is, fluid disposed into an annular disposal well may not be injected under pressure. Ohio also places categorical limitations on disposal volumes. AD wells do not have an AOR requirement. Therefore EPA did not evaluate AD wells for metrics related to AOR review, injected volumes, or injection pressure.</p>			
Relevant metrics	1a	Well location	5	of 5
	5a	Notice in Division Circular	0	of 5
Recommendation	EPA recommends that ODNR include or link information on publication in the Division Circular with the AD well files.			

AD Criteria 2: Construction and operation requirements

Finding Meets Criteria

Summary Most AD wells met Ohio requirements for construction and mechanical integrity.

Explanation

In the AD well files EPA reviewed, cementing and testing information was present. Wells met cementing requirements. They also met initial mechanical integrity tests. The AD files did not include the type of information that reviewers used to determine USDW base, unlike disposal or enhanced recovery well files; however, EPA used supplemental information, including maps and well completion files, to determine whether surface casings were set at the state-required depth. Well files (plus supplemental information) indicate that surface casings are at the required depth in four of five instances.

AD wells are used for brine disposal and production simultaneously, and EPA recognizes that missing information may be with the production well file, which was not reviewed.

Relevant metrics

6a	Surface casing set \geq 50 ft. below deepest USDW base	5	of 5
6b	Surface casing cemented to surface	5	of 5
6c	Cementing verified	5	of 5
6f.1	Construction Variance	none	
8a	MI test to Ohio standard (SWD/ER)	5	of 5
8b	Well passed MI test	5	of 5
8c	MI test (initial) witnessed by ODNR	5	of 5

Recommendation None

AD Criteria 3: Compliance Reporting and Compliance/Enforcement Actions

Finding 3.1 Area for State Attention (operator reports, documentation)
3.2 Meets Criteria (compliance/enforcement actions)

Summary 3.1 EPA noted that AD well files reviewed did not contain the annual reporting required.
3.2 ODNR responded promptly when operators did not test for mechanical integrity on schedule.

Explanation 3.1 EPA noted missing, incomplete, and late annual reports in the AD well files reviewed, without documentation of follow-up. However, well files showed that ODNR takes immediate action when scheduled MI tests are missed (see next item).
3.2 EPA asked ODNR to provide samples of AD wells that had been revoked. In these two cases, ODNR revoked the AD permit when operators failed to test for mechanical integrity on schedule (every five years). ODNR's database generates automatic letters informing AD operators of MI testing requirements and flags AD wells that have not submitted required tests. AD wells are inspected in keeping with ODNR's inspection strategy.

Relevant metrics	9a	MI loss	0	of 5
	10a	Up-to-date annual reports in file (all required reports present for 5-year period checked)	0	of 5
	10b	Complete annual reports (reports that were present include required information)	1	of 5
	10c	Reports received within 45 days after last day of calendar year	1	of 5
		Has well been inspected? #well files with inspection reports in file	5	of 5
	11a	Inspector-identified violations (related to UIC)	0	of 5
	11c	EPA review: violations noted in addition to above	0	of 5
	EPA reviewed two revoked AD permits.			
		Other violations noted by ODNR	2	of 2
		Violations above addressed by ODNR	2	of 2

Recommendation EPA recommends ODNR take enforcement action when reports are incomplete or late.

Appendix 1: Safe Drinking Water Act (SDWA) Sections 1425 and 1421

Ohio's Class II program was approved under SDWA Section 1425, below. Programs authorized under Section 1425 need demonstrate only that their existing standards are effective in preventing endangerment of USDWs. Section 1425 refers to Section 1421 (b)(1), also below, in its description of components that programs authorized under Section 1425 must include: permitting, inspection, monitoring, record-keeping, and reporting requirements. The standards for these components do not have to be equivalent to federal regulations.

SDWA Section 1425 [42 U.S.C. 300h-4]

Optional Demonstration by States Relating To Oil or Natural Gas

(a) For purposes of the Administrator's approval or disapproval under section 1422 of that portion of any State underground injection control program which relates to—

(1) the underground injection of brine or other fluids which are brought to the surface in connection with oil or natural gas production or natural gas storage operations, or

(2) any underground injection for the secondary or tertiary recovery of oil or natural gas, in lieu of the showing required under subparagraph (A) of section 1422(b)(1) the State may demonstrate that such portion of the State program meets the requirements of subparagraphs (A) through (D) of section 1421(b)(1) and represents an effective program (including adequate recordkeeping and reporting) to prevent underground injection which endangers drinking water sources.

(b) If the Administrator revises or amends any requirement of a regulation under section 1421 relating to any aspect of the underground injection referred to in subsection (a), in the case of that portion of a State underground injection control program for which the demonstration referred to in subsection (a) has been made, in lieu of the showing required under section 1422(b)(1)(B) the State may demonstrate that, with respect to that aspect of such underground injection, the State program meets the requirements of subparagraphs (A) through (D) of section 1421(b)(1) and represents an effective program (including adequate recordkeeping and reporting) to prevent underground injection which endangers drinking water sources.

(c)(1) Section 1422(b)(3) shall not apply to that portion of any State underground injection control program approved by the Administrator pursuant to a demonstration under subsection (a) of this section (and under subsection (b) of this section where applicable).

(2) If pursuant to such a demonstration, the Administrator approves such portion of the State program, the State shall have primary enforcement responsibility with respect to that portion until such time as the Administrator determines, by rule, that such demonstration is no longer valid. Following such a determination, the Administrator may exercise the authority of subsection (c) of section 1422 in the same manner as provided in such subsection with respect to a determination described in such subsection.

(3) Before promulgating any rule under paragraph (2), the Administrator shall provide opportunity for public hearing respecting such rule.

SDWA Section 1421 [42 U.S.C. 300h]

(b)(1) Regulations under subsection (a) for State underground injection programs shall contain minimum requirements for effective programs to prevent underground injection which endangers drinking water sources within the meaning of subsection (d)(2). Such regulations shall require that a State program, in order to be approved under section 1422—

- (A) shall prohibit, effective on the date on which the applicable underground injection control program takes effect, any underground injection in such State which is not authorized by a permit issued by the State (except that the regulations may permit a State to authorize underground injection by rule);
- (B) shall require (i) in the case of a program which provides for authorization of underground injection by permit, that the applicant for the permit to inject must satisfy the State that the underground injection will not endanger drinking water sources, and (ii) in the case of a program which provides for such an authorization by rule, that no rule may be promulgated which authorizes any underground injection which endangers drinking water sources;
- (C) shall include inspection, monitoring, recordkeeping, and reporting requirements; and
- (D) shall apply (i) as prescribed by section 1447(b) 1, to underground injections by Federal agencies, and (ii) to underground injections by any other person whether or not occurring on property owned or leased by the United States.

Appendix 2: List of Ohio Class II UIC Files Reviewed for this Report

<u>Well Name</u>	<u>Permit number</u>
Black Run #1	8777
Campbell #1	21144
Clinton oil #2	3262
DM Chapin #7	4137
Dumbaugh #1	4222
Elshoff #2	P103
GeoPetro #2	43
Ginsburg #1	2704
Hahn #2	1899
Johnson#1	4063
K&H Partners #1	3821
K&H Partners #2	None
Kelly #1	4455
King (SWIW#3)	4515
Lasch #1	1293
McClenathan	221
Monroe #1	4523
Natale	3223
Browning 1	3719
Wyse/Blosser SWIW #2	92
Northstar #1	3127
Pander Wolf	None*
Red Bird #2	None
ROJ #1	968
Shea 1	7302
Soinski #1	4462
SWIW #12	2038
SWIW-27	8776
Thomas Joyce #1	3188
Urban D 1	8648

* Well file dropped from review; well application withdrawn by applicant in 2013, prior to review.

- A. SUMMARY OF OPERATING, MONITORING AND REPORTING REQUIREMENT
- B. PLUGGING AND ABANDONMENT PLAN
- C. FINANCIAL ASSURANCE MECHANISM
- D. CONTINGENT CORRECTIVE ACTION
- E. CONSTRUCTION DETAILS
- F. SOURCE AND ANALYSIS OF WASTE
- G. SPECIAL CONDITIONS RELATED TO REMOTE MONITORING

