

Injection Wells 101 and Why USEPA Must Take Back Control of Ohio Class II Injection Wells

1. WHAT IS AN INJECTION WELL?

- Also known as saltwater injection wells, or SWIW, an industry-generated euphemism, an injection well is a drilled hole several thousand feet deep, which passes through our drinking water supplies for the purpose of disposing of toxic liquid waste into particular geological strata.
- Due to laws passed during the Reagan and Bush II administrations that exempted oil and gas waste from *being* classified as hazardous, oil and gas industry waste, no matter how toxic and radioactive, can go into Class II wells. Unlike Class I wells, built to receive hazardous waste and surrounded by monitoring wells to quickly detect any migration of toxic materials away from the intended “receiving” strata, Class II wells are not surrounded by any water monitoring wells.
- In Ohio, the Department of Natural Resources regulates oil and gas permitting, including injection wells. *ODNR does NO monitoring of water, air, or soil around Class II injection wells.*
- Even waste from a conventional shallow well is toxic and dangerous to consume in drinking water, which is why it must be disposed of safely.
- Oil and gas waste contains the chemicals that were injected into the well during drilling and fracturing plus the naturally occurring deep-earth material that comes back up with the waste. This material is highly radioactive due to its origins deep in the earth.¹
- Waste from unconventional, horizontally drilled, high-pressure fracked wells contains dozens of hazardous chemicals, such as toluene and benzene, and highly radioactive substances, including radium, radon, and strontium.² Frack waste from PA has been found to contain radioactivity hundreds of times the maximum level permitted for industrial discharge to water and several thousand times federal safe drinking water standards.³

¹ ellwoodcityledger.com/news/energy/report-radioactive-waste-from-fracking-plagues-ohio/article_8a66ff33-598d-5d51-941b-

² rwma.com/OHIO_FACT_SHEET_6-13-13.pdf

³ (Columbus Dispatch, 9-3-12).

- Frack waste trucks can simply be labeled BRINE, no matter how chemically laden and radioactive their contents are.
- The millions of gallons of waste being dumped in Ohio injection wells are primarily from out of state.
- There are not enough inspectors to regulate existing wells let alone the many newly permitted wells and those now in the permit process.
- Abandoned production wells can be turned into injection wells.
- Acidic contents and passage through abandoned coalmines accelerates deterioration of concrete and steel. Industry experts acknowledge that all wells eventually fail. Many fail within the first decade of operation. Even Class I wells, built to higher standards than Class II wells, have contaminated surrounding soil and water in Ohio.
- ODNR database shows 275,491 known wells in Ohio. Every year ODNR finds old wells that were not in their system. It is important to remember that in addition to current production wells Ohio has thousands of old wells that can act as conduits for contamination. Until they are found and plugged to current standards they pose a significant threat.
- In Ohio, injection wells may have swimming-pool-sized open pits where frack waste sits prior to injection. Waste tested at Athens County's Ginsburg well⁴ contained toluene, xylene, arsenic, barium, strontium, and radium. Exposure to passersby has caused health symptoms in as little as five minutes. See Athens County Commissioners' resolution⁵ calling on ODNR to shut down the Ginsburg well.

2. WHY IS OHIO ATTRACTING SO MUCH OUT-OF-STATE WASTE?

- Unlike neighboring states, which have USEPA-managed injection programs, Ohio manages its own injection well program. Ohio was granted this authority, or *primacy*, in 1983.
- US EPA's well permitting process is much stricter, more rigorous, and subject to public oversight. It is therefore more time-consuming. Dumpers would rather bring their waste to Ohio, where permitting happens quickly and with no

⁴ ecowatch.com/wp-content/uploads/2012/07/Brine-Testing-Results-API-34009227040000.pdf

⁵ acfan.org/wp-content/uploads/2012/05/Ginsburg-Injection-Well-Resolution.pdf

accountability. *ODNR has never granted a public hearing on objections to injection well permit applications*, unlike USEPA, where public hearings are standard and public objections can lead to delays and permit revisions.

- Unlike USEPA-managed programs, ODNR does not require reporting or approval of exact contents of injectate. USEPA states: “The permittee shall notify and obtain the Director's approval at least thirty (30) days prior to any...changes in the injection fluids. Within ten (10) days prior to injection, an analysis of new injection fluids shall be submitted to the Director for approval in accordance with Parts II(B)(2) and II(B)(3) of this permit.”⁶ *ODNR never approves of contents or even has a record of exact contents of injectate.*
- Ohio imposes no significant fines or penalties for violations or any escalation of enforcement actions. Even repeated mechanical integrity tests and other serious violations are followed by continued operation of the well, often with no correction of problems reported.⁷ Inconsistent and lax enforcement is the rule. Past USEPA audits do not examine this history or gather public concerns.

3. WHAT ARE THE DANGERS OF ODNR NEGLIGENCE?

- Careful analysis and management of contents have enormous safety implications, because determining appropriate pressure for the injection well depends on the specific gravity of the heaviest component of the injectate. Too high a pressure is associated with induced earthquakes, even in areas with no historic record of quakes, such as in Youngstown. (W. Kim, Induced seismicity associated with fluid injection into a deep well in Youngstown, Ohio, *J. of Geophysical Research: Solid Earth*, v.118, 2013) Pike County, Ohio, has also recently experienced its first recorded quakes within miles of six injection wells.
- Injection wells can cause even significant quakes, as occurred in Oklahoma, with a 5.7 quake among others in a recent injection-induced swarm (van der Elst et al., Enhanced remote earthquake triggering at fluid-injection sites in the Midwestern U.S., *Science*, v.341, July 2013). Quakes can occur long after injection and even after reduction of pressure or cessation of injection.
- Ohio’s new seismicity regulations would *not* have reported the seismic activity preceding the larger Youngstown quakes so could not have prevented them.⁸

⁶ (epa.gov/r5water/uric/westbay/index.htm)

⁷ See for example appalachiaresist.files.wordpress.com/2012/09/ginsburg-documents.pdf and acfan.org/wp-content/uploads/2012/05/Ginsburg-report2.pdf.

⁸ Ohio’s new regulations require adjustment of pressure only if quakes over 3.0 have occurred. The quakes preceding the large Youngstown quakes were all under 3.0 on the Richter scale.

- There is no seismic data required or included in the current K&H2 permit application, even though the volume of waste to be received (4000 barrels a day) will mean that its annual volume would equal 10% of all waste injected in Ohio in 2012.
- The unrealistically low maximum psi (pounds per square inch) allowed on the K&H2 application, given the high volumes that can be injected daily into non-porous shale through a 2 3/8" tube, suggest that the psi will likely be increased after the permit is granted, as occurred in Youngstown, where 2500 psi occurred prior to the earthquakes. ***This increase can be authorized by ODNR with little oversight over contents, understanding of reasons for inadequacy of previously approved pressure, and risks of increasing pressures.***⁹
- ODNR, unlike USEPA, does not require information on Geologic Data on Injection and Confining Zones. USEPA requires the applicant to "Provide the name, depth, thickness, and lithologic descriptions of the injection and confining zones." USEPA documents state:
- *"There are multiple ways that injected fluids could get into a USDW to endanger it. The review of geologic data helps ensure that natural conduits do not exist that may endanger a USDW. It is important that the formations intended to seal the injection interval from the USDWs are free of intersecting faults and fractures. If faults or fractures are present, the injected fluid, introduced into the injection interval at an elevated pressure, will seek the path of lower pressure and move upward into a USDW."*¹⁰
- *ODNR does not require this review and necessary assurance that there are no faults, fractures, or fissures that could provide pathways for toxic injectate to get into drinking water sources.* No mapping of geology is provided in the K&H2 permit application. Therefore ODNR's application CANNOT provide protection of groundwater supplies, as required by OAC 1501:9-3-06. Given that well owners can get approval for unlimited injection at increasingly high pressures with little oversight, the eventual migration of injectate into drinking water aquifers seems inevitable.
- There are no core samples or reports of the porosity and permeability of the formation or data to determine the structural setting of the reservoir in the

⁹ In contrast to USEPA requirements for complete quarterly analysis of contents and pre-approval of any changes in contents, Ohio requires only one sample to determine appropriate pressure and requires no approval or reporting of changed contents.

¹⁰ (water.epa.gov/learn/training/dwatrainig/upload/dwaUIC-uicpermit.pdf per 40 CFR 146.22(a))

K&H2 permit application. There is no geologist's report with any reference to the formation into which the waste will be injected.

- Unlike USEPA, ODNR does not require mapping of aquifers near proposed injection wells.
- There *is NO MAPPING OF AQUIFERS* in the southeast corner of Ohio.
- Whether or not some of the toxic material injected as “brine” into Class II wells has been exempted from regulation as hazardous waste does not mean it is not highly toxic and must therefore be handled in such a way so as not to endanger drinking water supplies per Ohio and federal law. Benzene is benzene. According to USEPA documents, “We all should recognize...that some Class II fluids are ten times nastier than some Class I injectates...There are many solvents, for example, that would be classified as hazardous and the wells injecting them as Class I if they were not used in conjunction with oil and gas production... On any given day, the injectate of a Class II.. well has the potential to contain hazardous concentrations of solvents, acids, and other listed and characteristic RCRA hazardous wastes.”¹¹

4. WHY MUST US EPA STEP IN AND TAKE BACK CONTROL OF THE CLASS II INJECTION WELL PROGRAM?

- Whether or not oil/gas waste injectate has been exempted from hazardous waste regulation does not remove responsibility from the Ohio and USEPA for preventing pollution and contamination by toxic, radioactive constituents per Ohio Revised Code (OAC) 1501 and U.S. 40 CFR 144.12. **Primacy is based on being able to fulfill this requirement.** Granting Ohio authority to manage its injection well program does not obviate USEPA of its legal obligation to protect drinking water (see **Groff testimony at acfan.org/injection-wells/**). ODNR's negligent management of the injection well program and complete lack of enforcement, penalties and deterrence for violations *require* that USEPA step in and take back control of the program.
- According to USEPA, “All UIC wells are prohibited from endangering USDWs [underground sources of drinking water] (40 CFR 144.12). The prohibition on endangerment includes not only everyday operations, but construction, conversion, well maintenance, and plugging and abandonment. The entire

¹¹ RCRA: Resource Conservation and Recovery Act – major federal hazardous waste law (water.epa.gov/learn/training/dwatrainng/upload/dwaUIC-uicpermit.pdf, p.1-7, 1-8)

purpose of EPA's requiring permits, your reviewing the application and writing conditions into the permit is focused on this one goal. The non-endangerment standard applies from the time the well begins construction until the end of time! As stated in the nonendangerment standard of 144.12: 'The applicant for a permit shall have the burden of showing that the requirements of this paragraph are met.' So, the *permit application must clearly demonstrate that USDWs will be protected and will not be contaminated throughout well construction through the operational life of the well, and even during and after plugging and abandonment of the well.*"¹² Ohio permit applications and management of the injection well program clearly do not meet this standard.

- Given that ODNR responds to increased pressure requests with inadequate data and examination and does NO mapping or monitoring of aquifers for contamination, such contamination may already be widely occurring. Given that ODNR allows wells, including Athens County's Ginsburg and Hahn wells, to reopen after they have failed mechanical integrity testing without determining if and how much fluid migration occurred, this lack of monitoring of area water supplies is clearly in violation of Ohio and federal law that require USEPA and ODNR to ensure protection of water supplies.
- Damaged aquifers and contaminated water sources cannot be restored to their original state. This is a significant concern since there are over 275,000 oil and gas wells in Ohio, 197 injection wells and fewer than 50 inspectors. These and other public health and safety issues **must be addressed by USEPA** since ODNR refuses to comply with ANY standards of safety or respond to ANY concerns, no matter how relevant and substantive, raised by Ohioans. Federal law requires that USEPA act now to take away primacy from this negligent state agency before more and greater endangerment of our water and communities occurs.

See acfan.org/injection-wells/
and acfan.org/water-air-and-health/ for more information.¹³

¹² water.epa.gov/learn/training/dwatraining/upload/dwaUIC-uicpermit.pdf p. 1-25

¹³ I'm sorry that live links don't seem to work in this pdf so that copying and pasting are necessary!