

Class II Disposal Well Reforms/Youngstown Seismic Activity Questions and Answers

- **What is a Class II disposal well? Where can I find more information on Class II disposal wells?** As part of U.S. EPA's Underground Injection Control (UIC) program, Class II disposal wells are used to inject brine, associated with the extraction of oil and natural gas, deep underground. According to the U.S. EPA, more than 144,000 Class II wells inject more than 2 billion gallons of brine every day in the United States. More information on the UIC program and Class II disposal wells can be found at <http://water.epa.gov/type/groundwater/uic/class2/>.
- **Why are Class II disposal wells used for brine disposal?** The U.S. EPA considers the deep injection of brine using Class II disposal wells as the preferred and environmentally safe method for disposal of oilfield fluid wastes. Prior to Class II disposal wells in Ohio, brine was stored in surface pits with harmful environmental results. By injecting the brine deep underground, Class II disposal wells prevent surface contamination of soil and ground water.
- **Are Class II disposal wells safe for the environment?** Yes. Since the 1983 introduction of the UIC program in Ohio, no subsurface ground water contamination incidents have been caused by Class II disposal wells. ODNR protects ground water and the environment by mandating well operators comply with strict construction, operating and monitoring standards. Extensive monitoring, reporting, and closure requirements are also a vital part of ODNR's regulatory framework. Wells must meet all regulatory requirements prior to permits being approved. In fact, Ohio's Class II disposal well regulations meet, and many instances, far exceed U.S. EPA regulations. For example, the U.S. EPA requires yearly unannounced inspections of Class II disposal wells. Ohio inspects these wells every 11-12 weeks. Also, Ohio continues to improve the safety of its Class II disposal wells with newly proposed construction and operational standards.
- **Did the Northstar 1 Class II disposal well cause earthquakes in the Youngstown area?** Geologists believe it is very difficult for all conditions to be met to induce seismic events. In fact, all the evidence indicates that properly located Class II disposal wells will not cause earthquakes. However, a number of coincidental circumstances appear to make a compelling argument that the Youngstown earthquakes were induced. Evidence gathered by ODNR regulators and geologists suggests that fluid from a deeply drilled injection well intersected an unmapped fault in a near-failure state of stress causing movement along the fault.
- **Eleven earthquakes occurred before the Northstar 1 well was shut down. Why didn't regulators act sooner?** Earthquakes typically occur in clusters, leading geologists to the assumption that these were naturally occurring events. Moreover, geologists do not naturally look to Class II disposal wells when evaluating the cause of seismic activity. There are more than 144,000 operational Class II disposal wells in the United States, but only six have been linked to earthquakes.

However, as the earthquakes continued, state geologists and regulators did broach the possibility of induced seismic activity. Between April 26 and Dec. 15, ODNR conducted 35 separate inspections of the Northstar 1 well. Each inspection indicated the well was operating within its permitted injection pressure and volume limits. In addition, tests showed injections were reaching appropriate zones and were within permitted injection intervals.

With only one seismometer deployed in the Youngstown area, state geologists lacked the necessary data on the earthquakes depth and exact location. When additional seismic equipment was deployed, the data acquired indicated the earthquakes were near the well's injection zone. The Northstar 1 well was immediately shut down.

- **What lessons were learned from the Youngstown earthquakes?** Induced seismic activity is extremely rare, but it can occur with the confluence of a series of specific circumstances. All of the conditions associated with induced seismic activity can be addressed in the well permitting and construction process by utilizing additional geologic data and prohibiting injection into Precambrian basement rock. Future earthquakes can be avoided.
- **How will ODNR improve the Class II disposal well program?** ODNR will improve the Class II disposal well program by prohibiting all drilling into the Precambrian basement rock. This mandate will address seismic activity by avoiding drilling near any possible fault lines in the Precambrian basement rock. Before drilling a new Class II disposal well, ODNR officials will review existing geologic data for known faulted areas within the state. If there are concerns about a proposed Class II disposal well being drilled near a faulted area, the concerns will be addressed by the new regulations. ODNR will also require companies to run a complete suite of geophysical logs on newly drilled Class II disposal wells, and companies are required to give ODNR a copy of the complete log suite and where required, provide analytical interpretation of the logging.

ODNR will now require all new Class II permit applications Ohio to install monitoring technologies to ensure public safety. Some of these changes include installing a continuous pressure monitoring system, which enables ODNR to review results electronically, and an automatic shut-off system. If the fluid injection pressure of a disposal well exceeds a maximum level (which will be set by ODNR), then the system will shut-off accordingly. To effectively track all fluids brought to the disposal site by a brine transporter, all disposal well operators in Ohio will be required to install an electronic data recording system.

- **When fully implemented, how will Ohio's new Class II disposal well regulatory framework compare with other states?** U.S. EPA allows Ohio to regulate the federal Class II disposal well program because state regulations meet and in many cases far exceed regulations in effect in states where the U.S. EPA solely administers the program. Adding these significant improvements to Ohio's already strong regulatory framework will place the state's Class II disposal well program among the most tightly regulated and closely monitored programs in the nation.

- **Will ODNR have the resources and staff to ensure strict compliance with these new regulatory standards?** Yes. ODNR's oil and gas regulatory unit is funded by permit and operating fees. As oil and gas production increases, so will ODNR's regulatory budget.

This year ODNR will triple the staff of its oil and gas inspection and regulatory unit, from 50 to approximately 150 employees. In addition, the regulatory unit will have more than 110 inspectors and field staff in place to make sure all laws and environmental regulations are observed and enforced. All critical aspects of well construction, production, and plugging are monitored by inspection staff.

- **How will these reforms be implemented?** All of the reforms will be considered during the permitting process for new Class II disposal wells and will be implemented as attached permit conditions until they are either codified in law or written into administrative rule, which carries the weight of law.
- **What will happen to the Youngstown area disposal wells affected by the moratorium?** The moratorium affecting five Youngstown area wells, Northstar 1, as well as the neighboring three drilled and one permitted but undrilled well, will remain in place.