



Underground Injection and Seismic Activity

EPA's new Underground Injection Control (UIC) regulations for Class VI wells helps ensure that CO₂ injection activities will not result in significant seismic activity. The regulations specify criteria for site selection and monitoring that must be met before a site can be considered suitable for CO₂ injection per 40 CFR 146.82 and 146.90. This permitting process identifies risks and eliminates unacceptable sites prior to injection.

Seismic activity

Most seismic events result from the natural geologic processes reshaping the earth. However, human activities such as primary or secondary oil recovery, solution mining, explosions, large impoundments of water, geothermal stimulation, or other fluid injection can also generate seismic events by increasing subsurface pressure. When this happens, portions of the subsurface can be induced to move, generating seismic events.

UIC safeguards against seismic activity

Owners or operators applying for a Class VI permit must supply information to the UIC Program Director demonstrating that seismic events of any origin would not interfere with containment of CO₂ (see the box to the right).

UIC Program's experience with seismic activity

The Class VI regulations are based on the strong track record of controlling injection-related seismic activity in other classes of injection wells since 1974. One of the most commonly cited examples of injection-related seismic events, Rocky Mountain Arsenal, occurred before the federal UIC Program was created and would have been prevented under today's regulations. Injection of water and hazardous waste at the Rocky Mountain Arsenal from 1962 to 1966 was linked to an increase in seismic activity, including magnitude 5.1 and 5.2 earthquakes. Later investigation determined that poor site selection and unmonitored injection pressures contributed to the events. Under today's UIC Program, that project would not be allowed because the site would fail to meet site characterization and operational requirements.

Class VI Permit Requirements

When applying for a Class VI permit, owners or operators must provide the following to ensure that seismic activity will not endanger or compromise a USDW, a Class VI well, or an injection or confining zone:

- Information on the seismic history of the region.
- Subsurface pressure data.
- Maximum planned injection pressure.
- The strength of the rock in the injection and confining zones.
- A map of any known or suspected faults near the injection zone.
- Geomechanical information for the injection and confining zones.