FACT SHEET

Division of Drinking and Ground Waters
November 2014

Requirements for Class I Injection Wells and Class I Hazardous Waste Wells

Siting

Fluids must be injected into a formation that is below the lowermost formation containing an underground source of drinking water (USDW) within a quarter mile of the well. To demonstrate this, owners and operators are required to provide the following information:

Requirements for ALL Class I Wells	Additional Requirements for Hazardous Waste Wells
Geologic Studies of the injection and confining zones to determine that: • The receiving formations are sufficiently permeable, porous, homogeneous, and thick enough to receive the fluids at the proposed injection rate without requiring excessive pressure. • Formations are large enough to prevent pressure buildup and injected fluid would not reach aquifer recharge areas. • There is a low-permeability confining zone to prevent vertical migration of injection fluids. • Injected fluids are compatible with well materials and with rock and fluid in injection zone. • The area is geologically stable. • The injection zone has no economic value.	Additional **structural studies** to demonstrate: • Injection and confining formations are free of vertically transmissive fissures or faults. • Low seismicity and probability of earthquakes. • Proposed injection will not induce earthquakes or increase the frequency of naturally occurring earthquakes.
Area of Review (AoR) analysis of the surrounding area to identify artificial penetrations, such as other wells, that might allow fluid to move out of the injection zone. • Minimum area of review is ¼ mile. • Can be a fixed radius around the well or mathematically calculated. • Includes a corrective action plan to address improperly completed or plugged wells within the AoR.	Additional **review** required: • Minimum AoR of 2 miles. • No-migration petition demonstrating that fluids will remain in the injection zone for as long as they are hazardous (modeling conducted to show either the waste will remain in the injection zone for 10,000 years or it will be rendered non-hazardous before migration).

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Construction

Wells must have a multilayered design to prevent fluids from entering USDWs.

Requirements for ALL Class I Wells	Additional Requirements for Hazardous Waste Wells

• Approved engineering schematics and subsurface construction details.
• At least 2 layers of concentric casing and cement.
• Outer (or surface) casing cemented to the surface.
• Tubing and packer design based on:
  ○ Well depth
  ○ Characteristics of the injected fluid
  ○ Injection and annular pressure
  ○ Injection rate
  ○ Temperature and volume of injected fluid
  ○ Size of well casing
  ○ Cementing requirements
• Tests during drilling to ensure no vertical migration of fluid.
	• Detailed requirements for tubing and packer.
	• Long-string (inner) casing fully cemented to surface.
	• UIC Program approval of casing, cement, tubing, and packer prior to construction.

Operation

Provides multiple safeguards to ensure the injected wastewater is fully confined.

Requirements for ALL Class I Wells	Additional Requirements for Hazardous Waste Wells
• Maintain injection at pressures that will not initiate new fractures or propagate existing fractures. • Approved fluids and permitted pressures must be maintained in the annular space. • Continuous monitoring and recording devices.	• Automatic alarms and shutdown devices. • Notify permitting authority within 24 hours if problem occurs. • Cease injection and resume only with UIC Program Director's permission.

Contact

For additional Class I information, please visit U.S. EPA's web site at ***http://water.epa.gov/type/groundwater/uic/wells_class1.cfm***. For information specific to Ohio's Class I wells, visit ***www.epa.ohio.gov/ddagw/uic.aspx*** or call (614) 644-2752.