**Section 730.186 Injection Well Construction Requirements**

a) General. The owner or operator must ensure that its Class VI injection wells are constructed and completed to fulfill the following requirements:

1) The well construction and completion must prevent the movement of fluids into or between USDWs or into any unauthorized zone;

2) The well construction and completion must permit the use of appropriate testing devices and workover tools; and

3) The well construction and completion must permit continuous monitoring of the annulus space between the injection tubing and long-string casing.

b) Casing and cementing of Class VI injection wells.

1) The casing, cement, and other materials used in the construction of each Class VI injection well must have sufficient structural strength and be designed to last for the life of the geologic sequestration project. All well materials must be compatible with fluids with which the materials may be expected to come into contact, and the owner or operator must submit sufficient documentation to the Agency to support a determination that the casing, cement, and other materials meet or exceed standards developed for these materials by the American Petroleum Institute, ASTM International, or a comparable industry standards organization. The casing and cementing program must be designed to prevent the movement of fluids into or between USDWs. In order to allow the Agency to determine and specify casing and cementing requirements, the owner or operator must provide the following information to the Agency:

A) The depth to the injection zones;

B) The injection pressure, external pressure, internal pressure, and axial loading;

C) The hole size;

D) The size and grade of all casing strings (the wall thickness, external diameter, nominal weight, length, joint specification, and construction material);

E) The corrosiveness of the carbon dioxide stream and formation fluids;

F) The down-hole temperatures;

G) The lithology of the injection and confining zones;

H) The type or grade of cement and cement additives; and

I) The quantity, chemical composition, and temperature of the carbon dioxide stream.

2) The surface casing must extend through the base of the lowermost USDW and be cemented to the surface through the use of a single or multiple strings of casing and cement.

3) At least one long-string casing, using a sufficient number of centralizers, must extend to the injection zone and must be cemented by circulating cement to the surface in one or more stages.

4) The circulation of cement may be accomplished by staging. The Agency must approve an alternative method of cementing when it determines that the cement cannot be recirculated to the surface, provided the owner or operator can demonstrate, by using logs, that the cement does not allow fluid movement behind the well bore.

5) The cement and cement additives must be compatible with the carbon dioxide stream and formation fluids and of sufficient quality and quantity to maintain integrity over the design life of the geologic sequestration project. The integrity and location of the cement must be verified that uses technology capable of evaluating cement quality radially and which identifies the location of channels to ensure that USDWs are not endangered.

c) Tubing and packer.

1) The tubing and packer materials used in the construction of a Class VI injection well must be compatible with fluids with which the materials may be expected to come into contact, and the owner or operator must submit sufficient documentation to the Agency to support a determination that the tubing and packer meet or exceed standards developed for these materials by the American Petroleum Institute, ASTM International, or a comparable industry standards organization.

2) The owner or operator of a Class VI injection well must inject fluids through tubing with a packer set at a depth opposite a cemented interval at the location approved by the Agency.

3) In order for the Agency to determine and specify requirements for tubing and packer, the owner or operator must submit the following information to the Agency:

A) The depth of setting;

B) The characteristics of the carbon dioxide stream (the chemical content, corrosiveness, temperature, and density) and formation fluids;

C) The maximum proposed injection pressure;

D) The maximum proposed annular pressure;

E) The proposed injection rate (intermittent or continuous) and the volume or mass of the carbon dioxide stream;

F) The size of the tubing and casing; and

G) The tubing tensile, burst, and collapse strengths.

BOARD NOTE: This Section corresponds with 40 CFR 146.86 (2011).

(Source: Added at 36 Ill. Reg. 1661, effective January 20, 2012)