**Section 730.165 Construction Requirements**

a) General. All existing and new Class I hazardous waste injection wells must be constructed and completed to accomplish each of the following:

1) Prevent the movement of fluids into or between USDWs or into any unauthorized zones;

2) Permit the use of appropriate testing devices and workover tools; and

3) Permit continuous monitoring of injection tubing and long string casing as required pursuant to Section 730.167(f);

b) Compatibility. All well materials must be compatible with fluids with which the materials may be expected to come into contact. The owner or operator must employ any compatibility testing method specified by permit condition. The owner or operator may otherwise refer to "Technical Assistance Document: Corrosion, Its Detection and Control in Injection Wells", USEPA publication number EPA-570/9-87-002, incorporated by reference at 35 Ill. Adm. Code 720.111.

c) Casing and Cementing New Wells

1) Casing and cement used in the construction of each newly drilled well must be designed for the life expectancy of the well, including the post-closure care period. The casing and cementing program must be designed to prevent the movement of fluids into or between USDWs, and to prevent potential leaks of fluids from the well. The Agency must consider the following information as required by Section 730.170 in determining and specifying casing and cementing requirements:

A) The depth to the injection zone;

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

C) The hole size;

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

E) The corrosiveness of injected fluid, formation fluids, and temperature;

F) The lithology of the injection and confining zones;

G) The type or grade of cement; and

H) The quantity and chemical composition of the injected fluid.

2) One surface casing string must, at a minimum, extend into the confining bed below the lowest formation that contains a USDW and be cemented by circulating cement from the base of the casing to the surface, using a minimum of 120 percent of the calculated annular volume. The Agency may require more than 120 percent when the geology or other circumstances warrant it.

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:

A) Of sufficient quantity and quality to withstand the maximum operating pressure; and

B) In a quantity no less than 120 percent of the calculated volume necessary to fill the annular space. The Agency must require more than 120 percent when the geology or other circumstances warrant it.

4) Circulation of cement may be accomplished by staging. The Agency may approve an alternative method of cementing in cases where the cement cannot be recirculated to the surface, provided the owner or operator can demonstrate by using logs that the cement is continuous and does not allow fluid movement behind the well bore.

5) Casings, including any casing connections, must be rated to have sufficient structural strength to withstand both of the following conditions for the design life of the well:

A) The maximum burst and collapse pressures that may be experienced during the construction, operation, and closure of the well; and

B) The maximum tensile stress that may be experienced at any point along the length of the casing during the construction, operating, and closure of the well.

6) At a minimum, cement and cement additives must be of sufficient quality and quantity to maintain integrity over the design life of the well.

d) Tubing and Packer

1) All Class I hazardous waste injection wells must inject fluids through tubing with a packer set at a point specified by permit condition.

2) In determining and specifying requirements for tubing and packer, the following factors must be considered:

A) The depth of setting;

B) The characteristics of injection fluid (chemical content, corrosiveness, temperature, and density);

C) The injection pressure;

D) The annular pressure;

E) The rate (intermittent or continuous), temperature, and volume of injected fluid;

F) The size of casing; and

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

3) The Agency may approve the use of a fluid seal if it determines in writing that the following conditions are met:

A) The operator demonstrates that the seal will provide a level of protection comparable to a packer;

B) The operator demonstrates that the staff is, and will remain, adequately trained to operate and maintain the well and to identify and interpret variations in parameters of concern;

C) The permit contains specific limitations on variations in annular pressure and loss of annular fluid;

D) The design and construction of the well allows continuous monitoring of the annular pressure and mass balance of annular fluid; and

E) A secondary system is used to monitor the interface between the annulus fluid and the injection fluid and the permit contains requirements for testing the system every three months and recording the results.

BOARD NOTE: Derived from 40 CFR 146.65 (2017).

(Source: Amended at 42 Ill. Reg. 24145, effective November 19, 2018)