DRAFT - NOT FOR FILING

3745-34-14 Class I permit to drill applications.

(A) In addition to the information required in accordance with rules 3745-34-12 and 3745-34-13 of the Administrative Code, the owner shall include the following in a permit application for a permit to drill a class I injection well: a plan for the testing, drilling and construction of the proposed new class I injection well.

(B) Whenever required by the director to protect the public welfare or to safeguard life, health, or property, or whenever the contemplated expenditure by the state, any of its political subdivisions, or any municipal corporation for the completed project exceeds five thousand dollars, plans for the design of new class I wells shall be prepared by a professional engineer registered under Chapter 4733. of the Revised Code.

(C) In addition, for projects containing a high degree of complexity, non-standard technology, unusual features, or deviations from standards or guidelines used by the agency, the director may require that the owner or operator demonstrate the knowledge and experience of the project designer.

(D) The plan shall include the following:

(1) Design specifications demonstrating that the proposed class I injection well shall be constructed and completed by owners and operators to accomplish the following:

(a) Prevent the movement of fluids into or between underground sources of drinking water (USDWs) or into any unauthorized zones.

(b) Permit the use of appropriate testing devices and workover tools.

(c) Permit continuous monitoring of injection tubing and long string casing as required pursuant to rule 3745-34-56 of the Administrative Code.

(2) Documentation that the proposed class I well will be cased and cemented to prevent the movement of fluids into or between USDWs and that the casing and cement used in the construction of the well is designed for the life expectancy of the well, including the postclosure care period. The owner shall include a discussion of the following factors in this documentation:

(a) Depth to the injection zone.

(b) Injection pressure, external pressure, internal pressure, and axial loading.

(c) Hole size.

(d) Size and grade of all casing strings (wall thickness, diameter, nominal weight, length, joint specification, and construction material).

(e) Corrosiveness of injected fluid, formation fluids, and temperatures.

(f) Down hole temperatures.

(g) Lithology of injection and confining intervals.

(h) Type or grade of cement. Cement used shall be American petroleum insitute class A cement or equivalent and shall meet the provisions of paragraph (D)(3)(e) of this rule.

(i) Quantity and chemical composition of the injected fluid.

(3) A design for the class I injection well that includes the following:

(a) At a minimum, one surface casing string that extends into the confining bed below the lowest formation that contains a USDW and extends at least one hundred feet below the bottom of the lowest formation that contains a USDW. A sufficient number of centralizers shall be used including, at a minimum, one centralizer for every other joint of casing. The design shall specify that the surface casing string is cemented by circulating cement from the base of the casing to the surface, using a minimum of one hundred twenty per cent of the calculated annular volume. The director may require more than one hundred twenty per cent when the geology or other circumstances warrant to protect USDWs.

(b) At least one long string casing. The design of the long string casing shall conform to the following:

(i) Use a sufficient number of centralizers including, at a minimum one spacer for each joint of casing in the bottom five hundred feet of the long string casing and every one hundred feet above that elevation for the length of the long string casing.

(ii) Extend to the injection zone.

(c) Cementing the long string casing by circulating cement from the base of the casing to the surface in two or more stages. The director 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 and the final well construction is still protective of USDWs. The cement design shall include:

(i) Sufficient quantity and quality of cement to withstand the maximum operating pressure.

(ii) A quantity no less than one hundred twenty per cent of the calculated volume necessary to fill the annular space. The director may require more than one hundred twenty per cent when the geology or other circumstances warrant to protect USDWs.

(iii) Cement data, including the proposed type and class, additives, amount, and circulate for the surface casing, long string, and other casings.

(d) Casings, including any casing connections, that shall be rated to have sufficient structural strength to withstand, for the design life of the well.

(i) The maximum burst and collapse pressures that may be experienced during the construction, operation, and closure of the well.

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

(e) Cement and cement additives must be compatible with the injected waste and formation fluids and of sufficient quality and quantity to maintain integrity over the design life of the well. The integrity and location of the cement shall be verified using technology capable of evaluating cement quality radially and identifying the location of channels to ensure that USDWs are not endangered.

(4) A design for the class I injection well that includes injection through tubing with a packer set immediately

above the injection zone or point approved by the director. The tubing and packer seal shall be designed for the expected service.

(a) In determining and specifying requirements for tubing and packer, the following factors shall be considered in the design:

(i) Depth of setting.

(ii) Characteristics of injection fluid (chemical content, corrosiveness, and density).

(iii) Injection pressure.

(iv) Annular pressure.

(v) Rate, temperature and volume of injected fluid.

(vi) Size of casing.

(vii) Tubing tensile, burst, and collapse strengths.

(b) The plan shall include a description of the packer including the following:

(i) Proposed type.

(ii) Name and model number.

(iii) Setting depth.

(iv) Compatibility with proposed annular fluid and proposed injection fluid.

(5) A written analysis demonstrating that the various parts of the casing, tubing, and cement will be compatible with or resistant to corrosion from the formation fluid and injection fluids to which the casing, tubing, and cement will respectively be exposed. This shall include design specifications demonstrating that all well materials used in the construction of the proposed class I injection well shall be compatible with fluids with which the materials may be expected to come into contact. This shall include a design for the proposed class I injection well where all areas of the proposed well that may come into contact with corrosive wastes shall be constructed of corrosion-resistant materials. A well shall be deemed by the director to have compatibility as long as the materials used in the construction of the well meet or exceed the requirements of this chapter.

(6) A schematic or other appropriate drawings of the proposed well with proper setting depths, including wellhead and gauges and a written description of the proposed surface and subsurface construction details of the well including the following:

(a) Hole size.

(b) Surface casing, intermediate, long string casing, and injection tubing packer information, including the following:

(i) Size.

(ii) Weight.

(iii) Grade.

(iv) Depth-ground level.

(v) Thickness.

(vi) Diameter.

(vii) Nominal weight.

(viii) Length.

(ix) Joint specification.

(x) Construction material.

(xi) Tubing tensile, burst, and collapse strength.

(7) A description of the proposed bottom hole completion.

(8) A plan for the proposed stimulation program including a description of the stimulation fluids to be used and a determination that stimulation will not interfere with containment.

(9) Plans for recovering whole cores or sidewall cores of the confining and injection zones and formation fluid samples from the injection zone. The director may accept cores from nearby wells if the owner or operator can demonstrate that core retrieval is not possible and that such cores are representative of conditions at the well. The director may accept cores from nearby wells if the owner or operator can demonstrate that core retrieval is not possible and that such cores are representative of conditions at the well. The director may require the owner or operator to core other formations in the bore hole.

(10) Procedures for core analysis including analysis for at least the following:

(a) Permeability.

(b) Porosity.

(c) Percent saturation.

(d) Sample description.

(e) Sieve analysis of sand.

(f) Compatibility testing of cores with waste stream for permeability reduction.

(11) Proposed formation testing program to obtain analysis of the chemical, physical and radiological characteristics of and other information on the injection formation and the confining zone including, but not limited to the following:

(a) Fluid pressure and static water level.

(b) Temperature, pH, and specific conductivity.

(c) Fracture pressure.

(d) Other physical and chemical characteristics of the injection formation and confining zone including formation fluids.

(e) Compatibility of the injected fluids with the formation fluids.

(f) Corrosiveness.

(g) Other applicable information.

(12) Plans for conducting appropriate logs, surveys, and other tests during the drilling and construction of new class I wells to determine or verify the depth, thickness, porosity, permeability, and rock type of, and the salinity of any entrained or formation fluids in all relevant geologic units to ensure conformance with performance standards of this rule and to establish accurate baseline data against which future measurements may be compared. At a minimum, such logs and tests shall include the following:

(a) Deviation checks during drilling on all holes constructed by first drilling a pilot hole, and then enlarging the pilot hole by reaming or another method. Such checks shall be at sufficiently frequent intervals to determine the location of the borehole and to ensure that vertical avenues for fluid migration in the form of diverging holes are not created during drilling.

(b) Such other logs and tests as may be needed after taking into account the availability of similar data in the area of the drilling site, the construction plan, and the need for additional information that may arise from time to time as the construction of the well progresses. In determining which logs and tests shall be required, the following logs shall be considered for use in the following situations:

(i) For surface casing intended to protect USDWs, the following:

(a) Resistivity, spontaneous potential, and caliper logs before the casing is installed.

(b) A cement bond, temperature, or density log after the casing is set and cemented.

(ii) For intermediate and long strings of casing intended to facilitate injection, the following:

(a) Resistivity, spontaneous potential, porosity, caliper, and gamma ray logs before the casing is installed.

(b) Fracture finder logs.

(c) A cement bond, temperature, or density log after the casing is set and cemented.

(iii) The director may allow the use of an alternative to the above logs when an alternative will provide equivalent or better information.

(c) Mechanical integrity tests consisting of the following:

(i) A pressure test with liquid or gas.

(ii) A radioactive tracer survey.

(iii) A temperature or noise log.

(iv) A casing inspection log.

(v) Any other test required by the director.

(13) A plan for injectivity testing, including provisions to test for pressure/time relationships to determine permeability, transmissivity, and reservoir limits, if any.

(14) Procedures, forms, and methods for collecting the following information:

(a) Drilling and completion records including:

(i) Daily reports.

(ii) Driller's log or record of strata.

(iii) Casing and tubing records.

(iv) Pipe tally.

(v) Detailed screen and liner setting.

(vi) Details of centralizers, scratchers, and other such equipment.

(vii) Engineering drawings of the following:

(a) Well completion.

(b) Packer assembly and setting.

(c) Wellhead parts list.

(b) Testing records including the following:

(i) Well testing including the following:

(a) Static fluid level.

(b) Bottom hole temperature and pressure.

(c) Injectivity test result; permeability determination; reservoir limits and storage.

(d) Spinner or tracer surveys.

(e) Casing testing results including those to demonstrate mechanical integrity pursuant to the requirements of rule 3745-34-34 of the Administrative Code.

(ii) Laboratory testing results including the following:

(a) Cores for permeability.

(b) Cores for compatibility.

(c) Cores for porosity.

(d) Analysis of formation water.

(e) Descriptive core analysis and sieve analysis.

(15) A proposed schedule of all logging and testing. This schedule shall be updated and given to the director thirty days prior to conducting the initial test. The director reserves the right to witness all logging and testing required by this rule.