

3745-34-32 **Area of review.**

The area of review of each injection well or each field or project shall be determined according to either paragraph (A) or (B) of this rule. The director may solicit input from the owners or operators of injection wells within the state as to which method is most appropriate for each geographic area or field.

(A) Zone of endangering influence.

- (1) In the case of an application for a well permit under rule 3745-34-12 of the Administrative Code, the zone of endangering influence is the area for which the radius is the lateral distance where the pressures in the injection zone may cause the migration of the injection and/or formation fluid into an underground source of drinking water; or
- (2) Computation of the zone of endangering influence may be based upon the parameters listed below and should be calculated for an injection time period equal to the expected life of the injection well or pattern. The following modified Theis equation illustrates one form which the mathematical model may take.

$$r = [(2.25KHt) \ (S10^x)]^{1/2}$$

where

$$x = (4\pi KH [h_w - h_{bo} (S_p G_b)]) \ 2.3Q$$

r = Radius of endangering influence from injection well (length)

K = Hydraulic conductivity of the injection zone (length/time)

H = Thickness of the injection zone (length)

t = Time of injection (time)

S = Storage coefficient (dimensionless)

Q = Injection rate (volume/time)

h_{bo} = Observed original hydrostatic head of injection zone (length) measured from the base of the lowermost underground source of drinking water

h_w = Hydrostatic head of underground source of drinking water (length) measured from the base of the lowest underground source of drinking water

$S_p G_b$ = Specific gravity of fluid in the injection zone
(dimensionless)

π = 3.142 (dimensionless)

The above equation is based on the following assumptions:

- (a) The injection zone is homogenous and isotropic;
- (b) The injection zone has infinite area extent;
- (c) The injection well penetrates the entire thickness of the injection zone;
- (d) The well diameter is infinitesimal compared to “r” when injection time is longer than a few minutes; and
- (e) The emplacement of fluid into the injection zone creates instantaneous increase in pressure.

(B) Fixed radius.

- (1) In the case of an application for a well permit(s) under rule 3745-34-12 of the Administrative Code, a fixed radius around the well of not less than one-fourth mile may be used.
- (2) In determining the fixed radius, the following factors shall be taken into consideration: chemistry of injected and formation fluids; hydrogeology; population and ground water used and dependence; and historical practices in the area.

(C) If the area of review is determined by a mathematical model pursuant to paragraph (A) of this rule, the permissible radius is the result of such calculation even if it is less than one-fourth mile.

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