



ADMINISTRATIVE RULES OF MONTANA

36.22.1425 AREA OF REVIEW

- (1) The area of review for each injection well or each field, project, or area of the state shall be determined according to both (2) and (3), or (4) of this rule unless a variance from these requirements is granted by the board.
- (2) The zone of endangering influence shall be:
 - (a) in the case of application(s) for single well Class II permits, that area the radius of which is the lateral distance in which 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
 - (b) in the case of an application for an area permit, the project area plus a circumscribing area the width of which is the lateral distance from the perimeter of the project area, in which the pressures in the injection zone may cause the migration of the injected and/or formation fluid into an underground source of drinking water.
- (3) 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.

$$r = \left(\frac{2.25KHt}{S10^x} \right)^{1/2}$$
$$x = \left(\frac{4pKH(h_w - h_{bo} \cdot S_p G_b)}{2.3Q} \right)$$

where:

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)

$p = 3.142$ (dimensionless)

The above equation is based on the following assumptions:

- (a) the injection zone is homogenous and isotropic;
 - (b) the injection zone has infinite areal 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.
- (4) To determine the fixed radius:
- (a) in the case of application(s) for individual Class II permit(s), a fixed radius around the well of not less than one-fourth mile may be used;
 - (b) in the case of an application for an area permit, a fixed width of not less than one-fourth mile for the circumscribing area may be used;
 - (c) in determining the fixed radius, the following factors shall be taken into consideration:
 - (i) chemistry of injected and formation fluids;
 - (ii) hydrogeology;
 - (iii) population and groundwater use and dependence; and
 - (iv) historical practices in the area.
- (5) If the area of review is determined by a mathematical model pursuant to (3) of this rule, the permissible radius is the result of such calculation even if it is less than one-fourth mile.

Implementing statute(s): 82-11-111, 82-11-121, 82-11-123, 82-11-124, 82-11-127, 82-11-137, MCA

History: NEW, 1996 MAR p. 1308, Eff. 5/10/96; AMD, 2000 MAR p. 3542, Eff. 12/22/00.