

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

PHOSPHOROUS BREAKTHROUGH ANALYSIS

SITE NAME: Absaroka Investments Property, Pray MT
COUNTY: Park
LOT #: S25, T05 S, R08 E
NOTES: _____

<u>VARIABLES</u>	<u>DESCRIPTION</u>	<u>VALUE</u> <u>UNITS</u>
Lg	Length of Primary Drainfield as Measured Perpendicular to Ground Water Flow	150.0 ft
L	Length of Primary Drainfield's Long Axis	144.0 ft
W	Width of Primary Drainfield's Short Axis	32.0 ft
B	Depth to Limiting Layer from Bottom of Drainfield Laterals*	6.0 ft
D	Distance from Drainfield to Surface Water	7500.0 ft
T	Phosphorous Mixing Depth in Ground Water (0.5 ft for coarse soils, 1.0 ft for fine soils)**	0.5 ft
Ne		
Sw	Soil Weight (usually constant)	100.0 lb/ft ³
Pa	Phosphorous Adsorption Capacity of Soil (usually constant)	200.0 ppm
#	Number of Single Family Homes on the Drainfield or SFE	13.0

CONSTANTS

PI	Phosphorous Load per Single Family Home (constant)	6.44 lbs/yr
X	Conversion Factor for ppm to percentage (constant)	1.0E+06

EQUATIONS

Pt	Total Phosphorous Load = (PI)(#)	83.72 lbs/yr
W1	Soil Weight under Drainfield = (L)(W)(B)(Sw)	2764800.0 lbs
W2	Soil Weight from Drainfield to Surface Water = [(Lg)(D) + (0.0875)(D)(D)] (T)(Sw)	302343750.0 lbs
P	Total Phosphorous Adsorption by Soils = (W1 + W2)[(Pa)/(X)]	61021.7 lbs

SOLUTION

BT **Breakthrough Time to Surface Water = P / Pt** **728.9 years**

BY: M. Dyba
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NOTES: * Depth to limiting layer is typically based on depth to water in a test pit or bottom of a dry test pit minus two feet to account for burial depth of standard drainfield laterals.
 ** Material type is usually based on test pit. A soil that contains more than 35% silt and clay sized particles is considered fine grained.