Montana Department of Environmental Quality

Water Protection Bureau
P.O. Box 200901
Helena, MT 59620-0901

PERMIT FACT SHEET

MONTANA GROUND WATER POLLUTION CONTROL SYSTEM (MGWPCS)

Permittee:	Frenchtown School District
Permit Number:	MTX000207
Permit Type:	Domestic wastewater
Application Type:	Renewal
Facility Name:	Frenchtown High School and Junior High School
Facility Location:	Section 34, Township 15 North, Range 21 West, Missoula County Latitude: 47.02168° Longitude: -114.24205°
Facility Address:	17620 Frenchtown Frontage Road, P.O. Box 117, Frenchtown, MT 59834
Facility Contact:	Randy Cline, School District Superintendent
Treatment Type:	Conventional Septic
Receiving Water:	Class I Ground Water
Number of Outfalls:	2
Outfall / Type:	001 / pressure-dosed subsurface drainfield with 6 zones 002/ pressure-dosed subsurface drainfield
Effluent Type:	Domestic strength wastewater
Mixing Zone:	Standard
Effluent Limit Type:	WQBEL
Effluent Limits:	Outfall 001 Total nitrogen: 5.39 lbs/day Outfall 002 Total nitrogen: 1.59 lbs/day
Flow Rate:	Design maximum: 14,700 gpd Total. (12,480 Outfall 001; 2,220 Outfall 002) Daily average: 5,582 gpd (both systems 2018 flow)
Effluent sampling:	Monthly, dose tanks
Ground water sampling:	Quarterly, MW-1A and MW-2A
Fact Sheet Date:	February 2019
Prepared By:	Darryl Barton

1.0 PERMIT INFORMATION

DEQ issues MGWPCS permits for a period of five years. The permit may be reissued at the end of the period, subject to reevaluation of the receiving water quality and permit limitations. This fact sheet provides the basis for DEQ's decision to renew a MGWPCS wastewater discharge permit Frenchtown School District (applicant) for the Frenchtown High School and Junior High School wastewater treatment system.

1.1 APPLICATION

DEQ received an application for renewal of the permit on December 6, 2018. Renewal fees accompanied the application. DEQ reviewed the submittal and issued a completeness letter on December 14, 2018.

1.2 PERMIT HISTORY

The prior permit became effective May 1, 2014. Effluent limits were set for total nitrogen at 5.03 lbs/day and total phosphorus of 690 lbs/year for Outfall 001 and total nitrogen 1.48 lbs/day and total phosphorus 402 lbs/year for Outfall 002. Flow limits for Outfall 001 is 12,480 gallons per day (gpd) and for Outfall 002 2,220 gpd. Original permit became effective December 1, 2008.

1.3 CHANGES TO THIS PERMIT

New effluent limits have been calculated using updated ambient ground water data. The proposed Outfall 001 effluent limit for total nitrogen is 5.39 lbs/day and for Outfall 002 total nitrogen is 1.59 lbs/day. There will not be a limit for phosphorus. In the original permit breakthrough time for phosphorus was calculated to be 85.9 years for Outfall 001 and 281 years for Outfall 002. Breakthrough time of greater than 50 years is considered to be nonsignificant according to Montana's nondegradation criteria.

2.0 FACILITY INFORMATION

2.1 LOCATION

The Frenchtown School District wastewater treatment system is located just northwest of Frenchtown on the north side of Interstate 90. The school's property is 56.6 acres in size. It serves an estimated population of about 980 individuals on a seasonal basis with a low volume of discharge during the summer (**Figure 1 and Figure 2**).

The facility consists of two systems: one system that serves the high school and junior high school and a second system that serves the vocational building and stadium **(Figure 2)**.

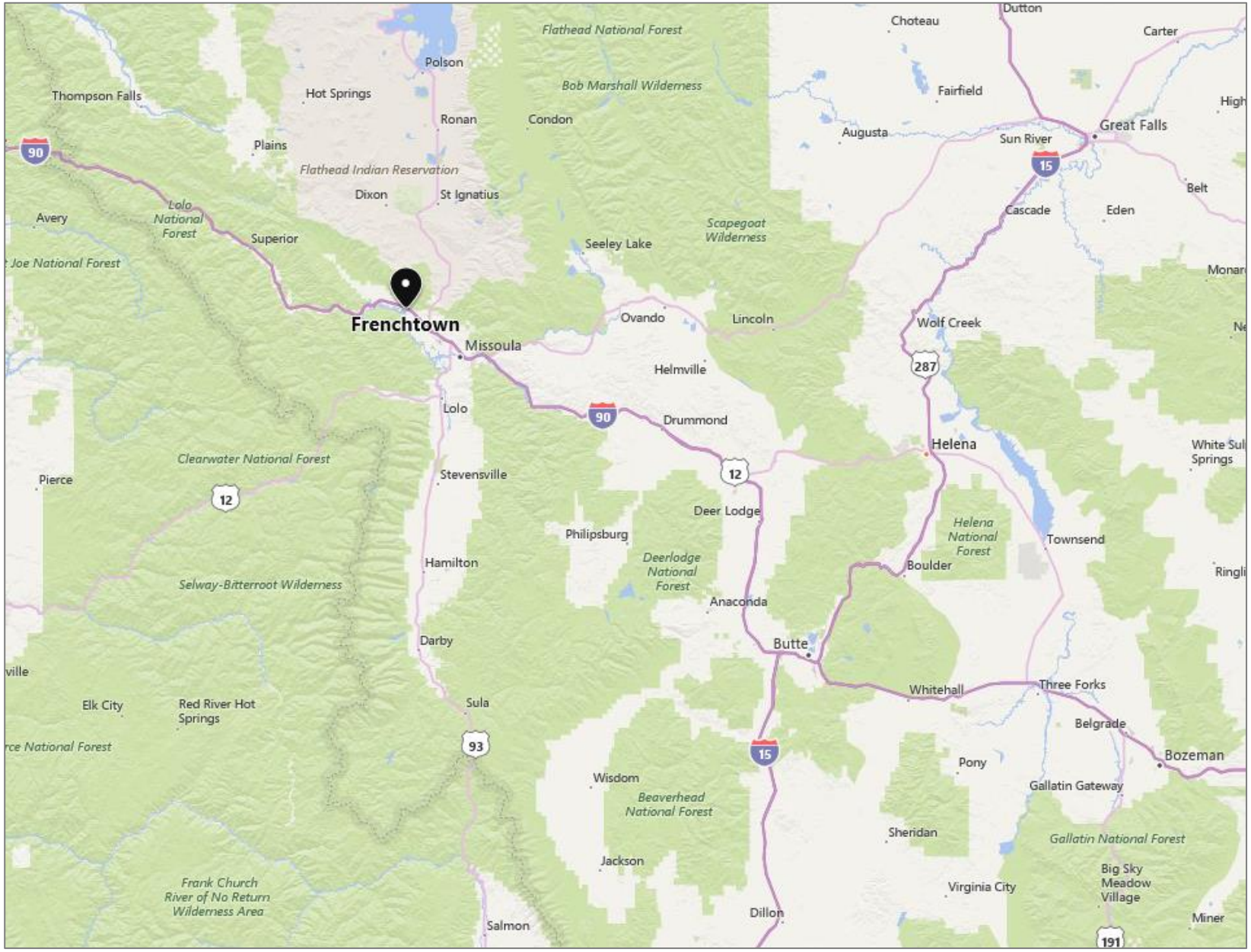


Figure 1. Location of FRENCHTOWN SCHOOL DISTRICT

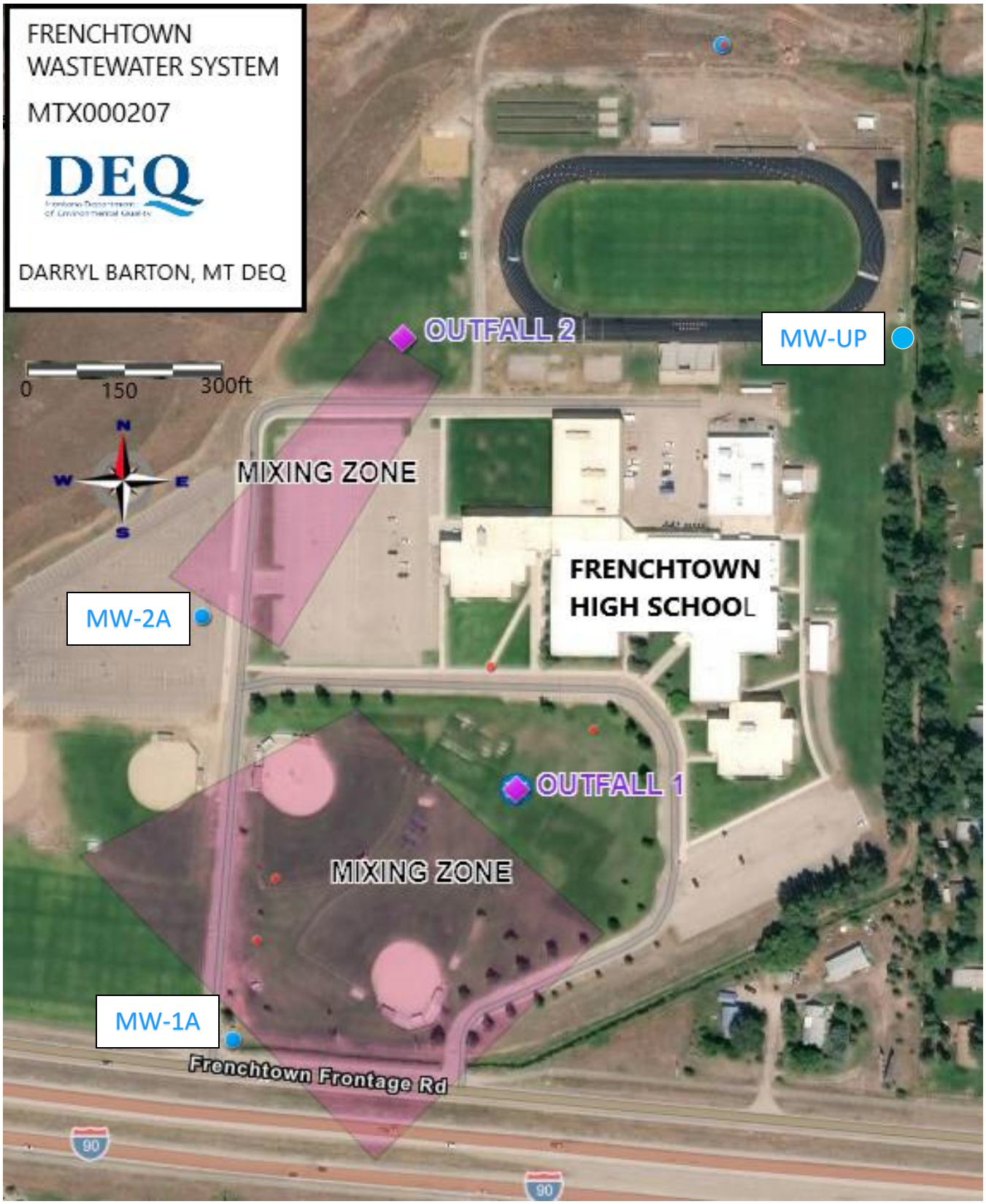


Figure 2. FRENCHTOWN SCHOOL DISTRICT Wastewater System

2.2 OPERATIONS

System operations are summarized below in **Table 1**.

Table 1: Collection, Treatment, and Disposal System Summary
Inflows
Contributing Sources of Wastewater: Domestic In-Nature Standard Industrial Code(s) (SIC) of contributing sources: 4952, 8211
Treatment
Individual septic tanks and two pressure-dosed drainfields
Treatment Level: Conventional
Location: Section 34, Township 15 North, Range 21 West, Missoula County
Septic Tank 001: Latitude: 47.02147°, Longitude: -114.24304°
Septic Tank 002: Latitude: 47.02226°, Longitude: -114.24177°
Disposal System
Disposal Structures: Outfall 001 & Outfall 002
Method of Disposal: Two subsurface pressure dosed drainfields discharging into ground water
Location: Section 34, Township 15 North, Range 21 West, Missoula County Outfall 001: Latitude: 47.02083°, Longitude: -114.24297°; Outfall 002: Latitude: 47.02271°, Longitude: -114.24354°
Flow volume Outfall 001: Maximum daily design flow: 12,480 gallons per day Flow volume Outfall 002: Maximum daily design flow: 2,220 gallons per day
Effluent Sampling Location: EFF-001: Drainfield dose tank Effluent Sampling Location: EFF-002: Drainfield dose tank
Flow Monitoring Equipment: FM-001: 4" Magmeter; Location: Meter vault Flow Monitoring Equipment: FM-002: Water Specialties ML03 3" Turbine Meter; Location: Meter vault

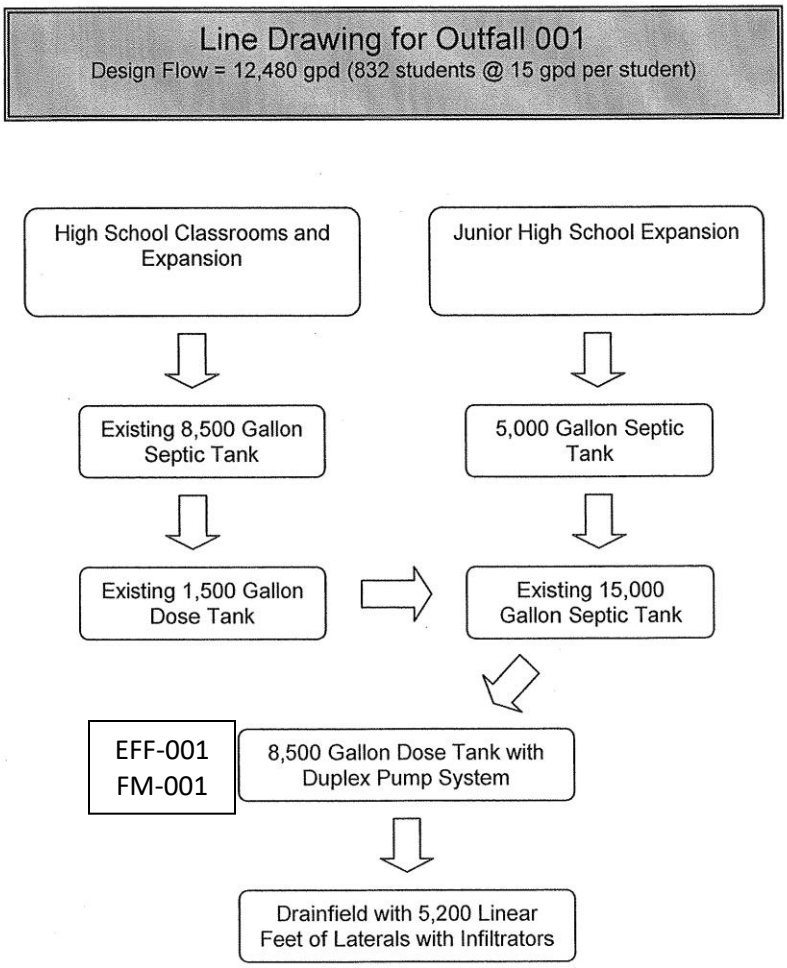
The raw waste from the high school enters an 8,500 gallon septic tank. Effluent from this tank then enters a 1,500 gallon dose tank that is connected to a 15,000 gallon septic tank via a force main. Raw waste from the junior high enters a 5,000 gallon septic tank; effluent from this tank also flows into the same 15,000 gallon septic tank. A 4-inch force main pumps the effluent from the 15,000 gallon septic tank into an 8,500 gallon dose tank. The effluent is then pressure-dosed into a subsurface drainfield (Outfall 001) that discharges to ground water.

The raw wastes from stadium restrooms enter a 2,500 gallon septic tank under the bleachers. The effluent from this tank then enters a 5,000 gallon septic tank via an 8-inch PVC pipe; the raw waste from the vocational building also enters this same 5,000 gallon septic tank. Effluent from this tank is pumped to a 2,000 gallon dose tank, and pressure-dosed into a subsurface drainfield (Outfall 002) that discharges to ground water.

Effluent sampling locations are the drainfield dose tanks for both outfalls.

Monitoring and sampling requirements are further discussed in **Section 6**.

Figure 3 is line drawings of the collection, treatment, and disposal process.


Line Drawing for Outfall 001
Design Flow = 12,480 gpd (832 students @ 15 gpd per student)
High School Classrooms and Expansion
Junior High School Expansion
Existing 8,500 Gallon Septic Tank
5,000 Gallon Septic Tank
Existing 1,500 Gallon Dose Tank
Existing 15,000 Gallon Septic Tank
EFF-001
FM-001
8,500 Gallon Dose Tank with Duplex Pump System
Drainfield with 5,200 Linear Feet of Laterals with Infiltrators

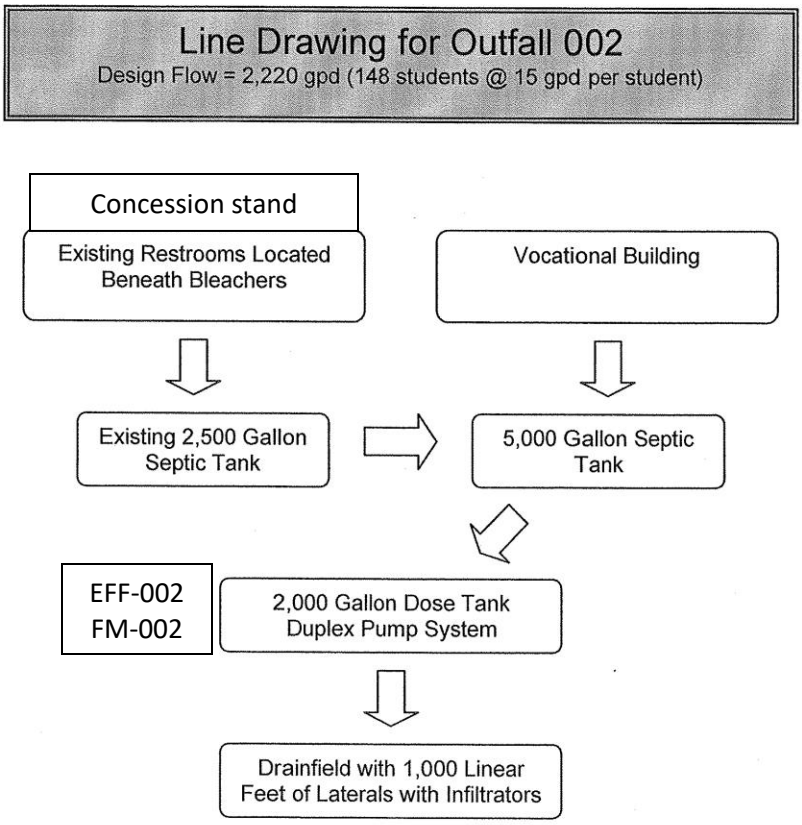


Figure 3. Wastewater Treatment System Line Diagrams.

2.3 EFFLUENT CHARACTERISTICS

DEQ requires a permit applicant to disclose the quality of the effluent so that DEQ may evaluate the potential for pollution of state water. During the previous permit cycle, the facility sampled and reported effluent quality criteria to DEQ in the form of discharge monitoring reports (DMRs). These data are summarized below in **Table 2**. The majority of the concentrations are reported in units of milligrams per liter (mg/L), which is equivalent to one part per million.

Table 2: Effluent Quality Data from Outfall 001 and Outfall 002

Parameter[1]	Units	Reported DMR values			2014 Limit	# of Samples
		Minimum	Maximum[2]	Average		
Outfall 001						
Biochemical Oxygen Demand (BOD_5)	mg/L	21.0	240	143	-	57
Flow rate	Gallons/day	643	5710	2928	-	57
Nitrogen, nitrate + nitrite	mg/L	0.01	0.66	0.047	-	57
Nitrogen, total Kjeldahl	mg/L	8.50	160.0	98.2	-	57
Nitrogen, total[3]	mg/L	9.00	160.0	98.2	-	57
	pounds/day	0.27	4.42	2.42	5.03	57
Phosphorus, total	pounds/day	0.040	0.480	0.236	-	57
	pounds/year	83	92	86	690	4
Total suspended solids	mg/L	10	139	54	-	57
Outfall 002						
Biochemical Oxygen Demand (BOD_5)	mg/L	4.0	300	38.5	-	57
Flow rate	Gallons/day	ND	3229	733	-	57
Nitrogen, nitrate + nitrite	mg/L	ND	1.50	0.23	-	57
Nitrogen, total Kjeldahl	mg/L	3.90	204.0	60.3	-	57
Nitrogen, total[3]	mg/L	4.4	204.1	60.7	-	57
	pounds/day	ND	5.91	0.42	1.48	57
Phosphorus, total	pounds/day	ND	0.60	0.047	-	57
	pounds/year	13	33	17	402	4
Total suspended solids	mg/L	6	81	20	-	57

Footnotes:
(1) Conventional and nonconventional pollutants only, table does not include all possible toxics.
(2) Maximum value recorded of all quarterly reported Daily Maximum Values.
(3) Total Nitrogen = Nitrate + Nitrite + Total Kjeldahl Nitrogen (as N)
Source of data: DMR = Self-Reported Discharge Monitoring Reports
ND = Not detected: below the laboratory limits of detection
Period of Record: May 2014 – January 2019

2.4 GEOLOGY

The Natural Resources Conservation Service (NRCS) Soil Survey indicates two soil types present in the valley area of the facility: the Alberton very fine sandy loam (coarse-loamy, mixed, superactive, frigid Aridic Haploxerolls), 0 to 2 percent slopes (1), and the Moiese gravelly loam (sandy-skeletal, mixed, frigid Calcic Haploxerolls), 0 to 2 percent slopes (72) (NRCS, 2013). The Alberton, a stream terrace formed from alluvium parent material, is a very fine sandy loam that grades into loamy sand with depth. The Moiese forms stream terraces and alluvial fans from loamy alluvium over sandy and gravelly alluvium parent material and grades from a gravelly loam into extremely gravelly sand with depth. Based on an evaluation of the NRCS data, the Alberton is present in the mixing zone for Outfall 001 and in both the subsurface drainfield mixing zone for Outfall 002 while the Moiese is present in both the subsurface drainfield and mixing zone for Outfall 001. The NRCS data matches up very well with the on-site soil profiles completed in March 2007 (SK Geotechnical, 2007).

The general geology in the vicinity of the facility consists of Holocene and Pleistocene age deposits. The Holocene alluvial unconsolidated deposits of gravel, sand, silt and clay form flood plains, low terraces, and alluvial fans along the drainage of the Clark Fork River and its tributaries. The Pleistocene lake sediments of clay and slit, with a few lenses of gravel as well as scattered boulders, from the bottom deposits of Glacial Lake Missoula tend to form vertical cliffs along the current drainage of the Clark Fork River and its tributaries.

2.5 HYDROGEOLOGY

The underlying aquifer in the area surrounding the facility, the Missoula Aquifer, is recharged from leakage and underflow of the Clark Fork River and its tributaries as well as from rainfall and snowmelt in the surrounding hills of the Missoula-Ninemile Valley (Pattee, 2006; SK Geotechnical, 2007).

The hydraulic conductivity, hydraulic gradient, and ground water flow direction for the facility were determined during a ground water investigation conducted on-site. The value for hydraulic conductivity was estimated using pump tests while the hydraulic gradient and the ground water flow direction were determined via static water level measurements collected from monitoring wells on-site (Lauerman, 1999). The current permit application indicates a hydraulic conductivity (K) of 857 ft/day, a hydraulic gradient (I) of 0.002 ft/ft, and a ground water flow direction of S30°W (Frenchtown School District, 2013).

The nearest surface water to the facility is the Frenchtown Irrigation Ditch. The Frenchtown Irrigation Ditch is hydraulically upgradient of the facility and is located about a half mile to the north-northwest. The closest surface water hydraulically downgradient from the discharge from the facility, based on the reported ground water flow direction, is Mill Creek located about 0.5 miles south of the facility.

Important hydrogeologic characteristics are summarized below in **Table 3**.

Table 3. Hydrogeologic Summary	
Average depth to ground water	11 feet
General ground water flow direction	S30°W
Hydraulic conductivity	857 feet per day
Hydraulic gradient	0.002 feet/feet
Nearest downgradient surface water	Mill Creek (half mile)

2.6 GROUND WATER MONITORING WELLS

There are two monitoring wells associated with this permit: MW-1A and MW-2A. Both of these wells are plotted on **Figure 2**. Monitoring well construction details are provided below in **Table 4**. MW-1A represents groundwater quality downgradient of Outfall 2 at the end of the mixing zone. MW-2A represents groundwater quality downgradient of Outfall 1 at the end of the mixing zone. Driller's logs for monitoring wells are available in **Appendix A**.

Table 4. Monitoring Well Summary	
Monitoring Well: MW-1A	
MBMG GWIC ID:	
Location- Latitude / Longitude:	500-feet downgradient of Outfall 001 at the end of the mixing zone. Latitude: 47.01969° Longitude: -114.24455°
Rationale:	Post mixing zone ground water quality
Depth; screened interval:	30-foot depth; screened 15 – 30-feet
Constructed on:	2/17/2010
Notes:	
Monitoring Well: MW-2A	
MBMG GWIC ID:	
Location- Latitude / Longitude:	500-feet downgradient of Outfall 002 at the end of the mixing zone. Latitude: 47.02124° Longitude: -114.24477°
Rationale:	Post mixing zone ground water quality
Depth; screened interval:	30-foot depth; screened 15 – 30-feet
Constructed on:	2/17/2010
Notes:	
Monitoring Well: MW-UP	
MBMG GWIC ID:	
Location- Latitude / Longitude:	800-ft upgradient (northeast) of Outfall 001. 700-ft east of Outfall 002 Latitude: 47.02274° Longitude: -114.24041°
Rationale:	Ambient receiving ground water quality
Depth; screened interval:	38-foot depth
Constructed on:	7/29/1986
Notes:	

If a DEQ-approved monitoring well is abandoned, destroyed or decommissioned, or is no longer able to be sampled due to fluctuations in the ground water table, the permittee must install or designate a new well to replace the abandoned, destroyed, decommissioned, or non-viable well.

2.7 GROUND WATER QUALITY CHARACTERISTICS

Groundwater sampling results from are provided below in **Table 5**. Based on the 295 microsiemens per centimeter (µS/cm) specific conductance, the receiving water is Class I ground water. Data reported in the table is taken from Data Monitoring Reports (MW-1A and MW-2A) and lab reports submitted with application (MW-UP).

Table 5 – Ground Water Monitoring Results – Reported DMR Values

Parameter	Units	Monitoring Location(1)	Minimum Value	Maximum Value(2)	Average Value	Number of Samples
Chloride (as Cl)	mg/L	MW-UP	2	2	2	3
Escherichia coli Bacteria	CFU/100 ml	MW-UP	<1	<1	<1	3
Nitrate + Nitrite (as N)	mg/L	MW-UP	0.14	0.51	0.38	3
Total Kjeldahl Nitrate (as N)	mg/L	MW-UP	ND	ND	ND	3
Organic Carbon	mg/L	MW-UP	ND	ND	ND	3
Specific Conductivity @ 25°C	µS/cm	MW-UP	284	300	295	3
Total Dissolved Solids	mg/L	MW-UP	156	172	185	3
MW-1A						
Chloride (as Cl)	mg/L	MW-1A	4.0	12	7.5	18
Escherichia coli Bacteria	CFU/100 ml	MW-1A	<1	2	1	18
Nitrate + Nitrite (as N)	mg/L	MW-1A	0.33	2.0	1.3	18
Total Kjeldahl Nitrate (as N)	mg/L	MW-1A	ND	0.50	0.31	18
Phosphorus, Total (as P)	mg/L	MW-1A	0.048	0.27	0.089	18
Specific Conductivity @ 25°C	µS/cm	MW-1A	390	457	416	18
MW-2A						
Chloride (as Cl)	mg/L	MW-2A	3.0	19	6.9	18
Escherichia coli Bacteria	CFU/100 ml	MW-2A	<1	2	1	18
Nitrate + Nitrite (as N)	mg/L	MW-2A	0	1.1	0.51	18
Total Kjeldahl Nitrate (as N)	mg/L	MW-2A	0	0.50	0.31	18
Phosphorus, Total (as P)	mg/L	MW-2A	0	0.78	0.14	18
Specific Conductivity @ 25°C	µS/cm	MW-2A	300	404	361	18

Footnotes:
CFU = Colony Forming Units
DMR = Self-Reported Discharge Monitoring Reports
ND = Non-Detect (below limits of laboratory detection)
(1) Refer to Section 2.6 of the Fact Sheet for the existing location of the monitoring wells. Monitoring well location is also mapped in Figure 2.
(2) Maximum value recorded of all monthly or quarterly reported values.
Period of record: May 2014 – December 2019

The total nitrogen concentration in ambient groundwater is calculated by adding nitrate + nitrite concentration and total Kjeldahl nitrogen. Total nitrogen in the receiving water is **0.38 mg/L.**

3.0 WATER QUALITY STANDARDS AND NONDEGRADATION

Ground water is a water of the state. The State of Montana uses several water quality measures to protect, sustain, and improve the quality of state waters. These water quality limitations provide the basis for effluent limits that DEQ applies to discharge permits (**Section 5**). DEQ protects all designated uses of state water by basing effluent limits on the most restrictive water quality limitations, intended to protect the most sensitive uses.

3.1 BENEFICIAL USES

With a specific conductivity of 295 µS/cm (**Table 5** above), the receiving water is Class I ground water and therefore a high-quality water of the State. Class I ground waters must be maintained suitable for the following uses with little or no treatment:

- Public and private drinking water supplies
- Culinary and food processing purposes
- Irrigation
- Drinking water for livestock and wildlife
- Commercial and industrial purposes

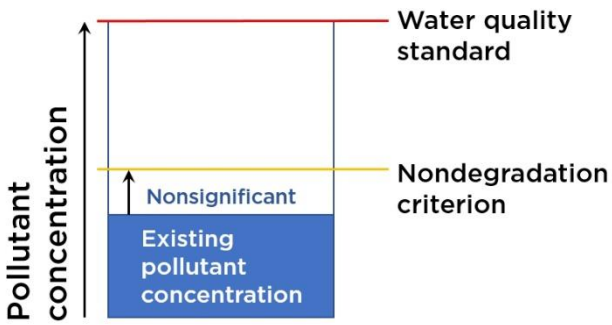
DEQ protects all the assigned beneficial uses by protecting the most sensitive. Drinking water is the most sensitive use of this receiving water.

3.2 WATER QUALITY STANDARDS

Montana has water quality standards for both surface water and ground water. The numeric criteria for each are different because they must support different uses. DEQ writes permits to protect the most sensitive, thereby protecting all uses. DEQ's ground water standard for nitrate is 10.0 mg/L, as is the standard for nitrate + nitrite (as nitrogen). Class I ground water must be maintained suitable for use as a drinking water supply with little or no treatment, and therefore must meet the corresponding human health standard of 10.0 mg/L total nitrogen. These water quality standards may not be exceeded outside a designated mixing zone (**Section 4**).

3.3 NONSIGNIFICANCE

When developing the initial permit (2008), DEQ determined that discharges in compliance with this permit result in nonsignificant changes in water quality. This discharge has not increased or changed in character since this determination, therefore DEQ did not perform a new significance determination for this permit renewal. DEQ determined that the discharge continues to meet ground water nonsignificance/nondegradation criteria at the end of the mixing zone (**Section 4**). DEQ used these criteria and updated ground water quality data to establish effluent limits (discussed in **Section 5**). This permit includes monitoring, reporting and corrective action requirements to establish, confirm, and maintain compliance with permit limitations.

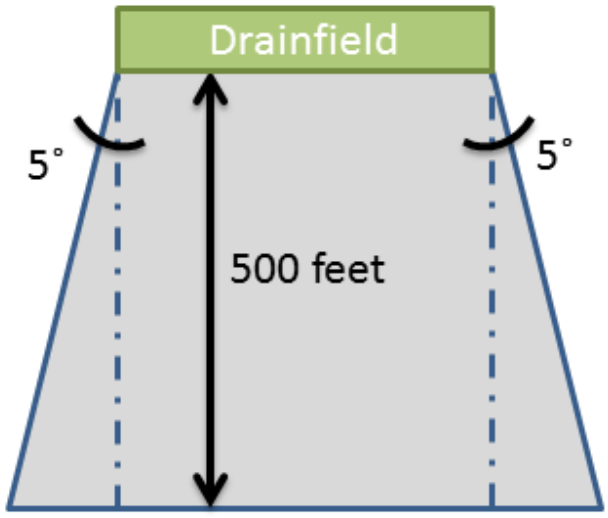


DEQ must determine whether the proposed discharge will result in significant changes in water quality.

4.0 Mixing Zone

DEQ authorizes a standard mixing zone for total nitrogen discharged from Outfall 001 and 002. A mixing zone is a specifically defined area of the receiving water where water quality standards may be exceeded. DEQ evaluates the suitability according to criteria established in the Administrative Rules of Montana. The mixing zone is then defined in the permit. The applicant requested a standard mixing zone for this discharge, consistent with previous permit cycles.

A standard mixing zone extends 500 feet downgradient from the source. The upgradient boundary is equal to the width of the source (measured perpendicular to the of ground water flow direction). The mixing zone widens in the downgradient direction by 5° on either side. The width of the downgradient boundary is calculated by adding the increased width for each side (the tangent of 5° (0.0875) times the mixing zone length) to the width of the upgradient boundary. Standard mixing zones extend 15 feet below the ground water table.



The volume of ground water (Q_{GW}) available to mix with the effluent is calculated using Darcy's Equation: $Q_{GW} = KIA$

Where:
Q_{GW} = ground water flow volume (feet^3/day)
K = hydraulic conductivity (feet/day)
I = hydraulic gradient (feet/feet)
A = cross-sectional area (feet^2) at the downgradient boundary of the mixing zone.

Table 6 summarizes the variables used in Darcy's equation and the resulting volume of ground water available to mix at Outfall 001 and 002. These values are drawn from the previous fact sheet.

Table 6: Hydrogeologic and Mixing Zone Information

Parameter	Units	Outfall 001	Outfall 002
Mixing Zone Type	-	Standard	Standard
Authorized Parameters	-	Total Nitrogen	Total Nitrogen
Ambient Ground Water Concentrations, Nitrate + Nitrite	mg/L	0.38	0.38
Ground Water Flow Direction	azimuth/bearing	S30°W	S30°W
Length of Mixing Zone	feet	500	500
Thickness of Mixing Zone	feet	15	15
Outfall Width, Perpendicular to Ground Water Flow Direction	feet	570	115
Width of Mixing Zone at Down Gradient Boundary	feet	657.5	202.5
Cross Sectional Area of Mixing Zone (A)	ft^2	9862.5	3037.5
Hydraulic Conductivity (K)	feet/day	857	857
Hydraulic Gradient (I)	ft/ft	0.002	0.002
Volume of Ground Water Available for Mixing (Q_{gw})	ft^3/day	16,904	5,206

In order to determine whether a mixing zone is allowable, DEQ calculates a predicted concentration at the downgradient end of the mixing zone. This mixing calculation follows the following procedure:

- Volume of ground water times the concentration of the parameter = existing load;
- Volume of discharge times the concentration of the parameter = waste load; and
- (Existing load + waste load) / total volume = predicted concentration.

Because the predicted concentration must satisfy the most stringent nonsignificance criterion (**Section 3**), DEQ can calculate water quality based effluent limits (WQBELs) by rearranging the equation and solving for the effluent concentration (**Section 5**).

5.0 PERMIT CONDITIONS

Discharge permits include conditions that ensure compliance with the Montana Water Quality Act and the regulations used to implement it. These conditions include effluent limits as well as any special conditions that DEQ deems necessary to protect the quality of the receiving water.

Montana's numeric water quality standards are published in Circular DEQ-7. Water quality criteria applicable to this permit are summarized below in **Table 7**. The permit establishes effluent limits that will meet water quality standards and nondegradation criteria, thereby protecting beneficial uses and existing high quality waters. The most restrictive criteria in **Table 7** provide the basis for the effluent limits.

Table 7. Applicable Ground Water Quality Criteria			
Parameter	Human Health Standard	Beneficial Use Support	Nondegradation Criteria
Nitrate plus nitrite (as Nitrogen[N])	10 mg/L	-	-
Total Nitrogen	-	10 mg/L	**5.0 mg/L**

This discharge permit includes numeric WQBELs that restrict the strength and volume of the discharge. DEQ calculates WQBELs by rearranging the mixing zone equation (**Section 4**) and solving for the effluent concentration that satisfies the water quality criteria. DEQ evaluates and recalculates the limits using updated water quality data as part of every permit renewal cycle. In this way, DEQ protects the receiving water quality by continually assessing cumulative impacts to the receiving water.

DEQ calculated the effluent limits using the same method as for the previous permit. DEQ uses updated ambient ground water quality data to re-evaluate the receiving water quality and the assimilative capacity for dilution.

5.1 TOTAL NITROGEN EFFLUENT LIMIT

The nonsignificance criterion of 5.0 mg/L is the most restrictive of the water quality criteria applicable to this permit; therefore it is the water quality target for this effluent limit. DEQ established the final WQBEL for this discharge by back-calculating the effluent concentration that results in 5.0 mg/L at the end of the mixing zone, given the available dilution. Available dilution is determined by recent ground water quality sampling of the receiving water. Ambient total nitrogen averaged 0.38 mg/L (**Section 2.7**). DEQ calculates an effluent limit that protects receiving water quality and beneficial uses according to the following equation:

$$\text{Equation 1: } C_{lmt} = C_{std} + D(C_{std} - C_{gw})$$

Where:

C_{lmt} = effluent limitation concentration
C_{std} = limiting water quality criterion
C_{gw} = ambient receiving ground water concentration
D = dilution ratio (Q_{gw} / Q_{eff})
Q_{gw} =ground water flux at the end of the mixing zone
Q_{eff} = average maximum daily discharge

Using the values provided above in **Table 6**, the result for Outfall 001 C_{lmt} is 51.81 mg/L. This is the final WQBEL expressed as a concentration. Load limits are more appropriate for discharges to ground water since the long-term loading is the greater concern in absence of aquatic life considerations. Additionally, load limits control both the strength and volume of the discharge. A discharge of 12,480 gallons per day containing 51.81 mg/L total nitrogen is equivalent to **5.39 pounds per day**. The limit calculations are provided in detail in **Appendix C**.

Using the values provided in **Table 6**, the result for Outfall 002 C_{lmt} is 86.04 mg/L. A discharge of 2,220 gallons per day containing 86.04 mg/L total nitrogen is equivalent to **1.59 pounds per day**. The limit calculations for Outfall 002 are also provided in detail in **Appendix C**.

5.2 TOTAL PHOSPHORUS EFFLUENT LIMIT

DEQ determined in the original permit (2008) breakthrough time for phosphorus was 85.9 years for Outfall 001 and 281 years for Outfall 002. A phosphorous breakthrough time of greater than 50 years is considered nonsignificant.

Based on the information and analyses presented above, DEQ proposes the following numerical effluent limitations in **Table 8**.

Table 8. Final Numeric Effluent Limits

Outfall	Parameter	Units	Daily Maximum(1)
Outfall 001	Total Nitrogen – Load(2)(3)	lbs/day	5.39
Outfall 002	Total Nitrogen – Load(2)(3)	lbs/day	1.59

Footnotes:
(1) See definitions, Part I.A of the permit
(2) Load calculation: lb/d = [(mg/L) x flow (gpd) x (8.34 x 10–6)]
(3) Detailed Load calculations are found in Appendix A

6.0 MONITORING AND REPORTING REQUIREMENTS

DEQ requires effluent and ground water monitoring to assure compliance with the effluent limitations and therefore water quality standards. Effluent monitoring and ground water monitoring is required as a condition of this permit. All monitoring and sampling required by this permit must be representative; therefore the permit identifies specific monitoring locations. Monitoring requirements and rationale are summarized below.

6.1 EFFLUENT MONITORING

This permit includes numeric effluent limitations with specific magnitudes and durations to ensure the discharge will not cause or contribute to an exceedance of an applicable water quality standard (see **Section 3**). Accordingly, the permittee is required to monitor and report at a specified frequency in order to demonstrate compliance with these limitations.

Effluent samples and discharge flow measurements must be representative of the nature and volume of the effluent. The effluent sample location for Outfall 001 (EFF-001) is located at the dose tank as shown in **Figure 3**. The effluent sample location for Outfall 002 (EFF-002) is located at the dose tank as shown in **Figure 3.** The permittee is required to install, maintain and report flow measurements using a flow-measuring device capable of measurements that are within 10 percent of the actual flow. The flow measuring device (FM-001) is located at the dose tank (**Figure 3**). The flow measuring device (FM-002) is located at the dose tank (**Figure 3**). The flow measuring device must be installed and in operating condition prior to discharge.

Effluent monitoring and reporting requirements are summarized in **Table 9**.

Table 9: Effluent Monitoring and Reporting Requirements - Outfalls 001 and 002

Parameter	Monitoring Locations	Units	Sample Type[1]	Minimum Sampling Frequency	Reporting Requirements[1][2][3]	Reporting Frequency	Rationale
Flow Rate[4]	Effluent Flow Meter for each Outfall	gpd	Continuous	Continuous	Daily Maximum and Monthly Average	Monthly	Permit Compliance/ Effluent Characterization
BOD_5	Dose Tank for each Outfall	mg/L	Grab	1/Month	Monthly Average	Monthly	Proper O & M/ Effluent Characterization
TSS	Dose Tank for each Outfall	mg/L	Grab	1/Month	Monthly Average	Monthly	Proper O & M/ Effluent Characterization
Nitrate + Nitrite (as N)	Dose Tank for each Outfall	mg/L	Grab	1/Month	Daily Maximum and Monthly Average	Monthly	Permit Compliance/ Proper O & M
Total Kjeldahl Nitrogen (as N)	Dose Tank for each Outfall	mg/L	Grab	1/Month	Daily Maximum and Monthly Average	Monthly	Permit Compliance/ Proper O & M
Total Nitrogen (as N)[5]	Dose Tank for each Outfall	mg/L	Calculated	1/Month	Daily Maximum and Monthly Average	Monthly	Permit Compliance
		lbs/day[6]					
Total Phosphorus (as P)	Dose Tank for each Outfall	mg/L	Grab	1/Month	Daily Maximum and Monthly Average	Monthly	Permit Compliance/ Effluent Characterization

Footnotes:
(1) See definitions in Part V of the permit.
(2) Daily Maximum: Report highest measured daily value for the reporting period on Discharge Monitoring Report (DMR) form.
(3) The geometric mean must be reported if multiple samples are taken during a reporting period.
(4) If no discharge occurs during the reporting period, "No Discharge" shall be recorded on the DMR report form.
(5) Total Nitrogen is the sum of the Nitrate + Nitrite and Total Kjeldahl Nitrogen parameters.
(6) Load calculation: lbs/day = the average of all calculated individual daily loads (lbs/day) recorded during the reporting period.

If no discharge occurs during the reporting period, "no discharge" shall be recorded on the effluent Discharge Monitoring Report (DMR) report forms.
Grab sample will represent concentration for a 24-hour period.
Parameter analytical methods shall be in accordance with the Code of Federal Regulations, 40 CFR Part 136, unless specified above

6.2 GROUND WATER MONITORING

As a special condition, this permit requires ground water monitoring to provide long term ambient and downgradient characterization of the aquifer. Ground water monitoring will be required at monitoring wells MW-1A and MW-2A. Data collected via ground water monitoring will be used for mixing zone evaluation and aquifer characterization in future permit renewals. Ground water monitoring and reporting requirements are summarized in the table below.

Ground water monitoring and reporting requirements are summarized in **Table 10**. All analytical methods must be in accordance with the Code of Federal Regulations, 40 CFR Part 136 for each monitored parameter. If any monitoring well(s) are abandoned, destroyed or decommissioned, or are no longer able to be sampled due to fluctuations in the ground water table; the permittee shall install a new well to replace the abandoned, destroyed, decommissioned, or non-viable well(s).

Table 10: Ground Water Monitoring and Reporting Requirements – MW1A and MW2A

Parameter	Monitoring Locations	Units	Sample Type(1)	Minimum Sampling Frequency	Reporting Requirements(2)(3)	Reporting Frequency
Chloride (as Cl)	MW1A, MW-2A	mg/L	Grab	1/Quarter	Quarterly Average	Quarterly
Escherichia coli Bacteria	MW1A, MW2A	CFU/100mL	Grab	1/Quarter	Daily Maximum and Quarterly Average(4)	Quarterly
Nitrate + Nitrite (as N)	MW1A, MW2A	mg/L	Grab	1/Quarter	Daily Maximum and Quarterly Average	Quarterly
Total Ammonia (as N)	MW1A, MW2A	mg/L	Grab	1/Quarter	Daily Maximum and Quarterly Average	Quarterly
Total Kjeldahl Nitrogen (as N)	MW1A, MW2A	mg/L	Grab	1/Quarter	Daily Maximum and Quarterly Average	Quarterly
Total Nitrogen (as N)	MW1A, MW2A	mg/L	Calculated	1/Quarter	Daily Maximum and Quarterly Average	Quarterly
Total Phosphorus (as P)	MW1A, MW2A	mg/L	Grab	1/Quarter	Daily Maximum and Quarterly Average	Quarterly
Specific Conductivity @ 25°C	MW1A, MW2A	µS/cm	Grab	1/Quarter	Quarterly Average	Quarterly
Static Water Level (SWL)(5)	MW1A, MW2A	Feet below ground surface	Instantaneous	1/Quarter	Quarterly Average	Quarterly

Footnotes:
(1) See definitions in Part V of the permit.
(2) Daily Maximum: Report highest measured daily value for the reporting period on Discharge Monitoring Report (DMR).
(3) The geometric mean must be reported if more than one sample is taken during a reporting period.
(4) Report the geometric mean if more than one sampling event occurs during a given monitoring period.
(5) Point of reference for SWL measurements shall be from ground surface and measured to within 1/100th of one foot.
CFU = Colony Forming Units
At no time shall the permittee mark or state "no discharge" on any monitoring well DMR form.
Each monitor well to be individually sampled and analyzed for each respective parameter listed above.
Submittal of discharge monitoring report forms (DMRs) will be required, regardless of the operational status of the facility or of each individual monitoring well.

PUBLIC NOTICE

Legal notice information for water quality discharge permits are listed at the following website: http://deq.mt.gov/Public/notices/wqnotices. Public comments on this proposal are invited any time prior to close of business on May 20, 2019. Comments may be directed to:

DEQWPBPublicComments@mt.gov

or to:

Montana Department of Environmental Quality
Water Protection Bureau
PO Box 200901
Helena, MT 59620

All comments received or postmarked prior to the close of the public comment period will be considered in the formulation of the final permit. DEQ will respond to all substantive comments pertinent to this permitting action and may issue a final decision within thirty days of the close of the public comment period.

All persons, including the applicant, who believe any condition of the draft permit is inappropriate, or that DEQ's tentative decision to deny an application, terminate a permit, or prepare a draft permit is inappropriate, shall raise all reasonably ascertainable issues and submit all reasonably available arguments supporting their position by the close of the public comment period (including any public hearing). All public comments received for this draft permit will be included in the administrative record and will be available for public viewing during normal business hours.

Copies of the public notice are mailed to the applicant, state and federal agencies, and interested persons who have expressed interest in being notified of permit actions. A copy of the distribution list is available in the administrative record for this draft permit. Electronic copies of the public notice, draft permit, fact sheet, and draft environmental assessment are available at the following website: http://deq.mt.gov/Public/notices/wqnotices.

Any person interested in being placed on the mailing list for information regarding this permit may contact the DEQ Water Protection Bureau at (406) 444-5546 or email DEQWPBPublicComments@mt.gov. All inquiries will need to reference the permit number (MTX000207), and include the following information: name, address, and phone number.

During the public comment period provided by the notice, DEQ will accept requests for a public hearing. A request for a public hearing must be in writing and must state the nature of the issue proposed to be raised in the hearing.

APPENDIX A – MONITORING WELL LOGS

MONTANA WELL LOG REPORT

Form No. 603 R2-99 Well ID# MW-1

This log reports the activities of a licensed Montana well driller and serves as the official record of work done within the borehole and casing and describes the amount of water encountered. **This form is to be completed by the driller and filed with DNRC within 60 days of completion of the work. Acquiring Water Rights is the well owner's responsibility and is not accomplished by the filing of this report.** Well log information is stored in the Groundwater Information Center at the Montana Bureau of Mines and Geology (Butte) and water right information is stored in the Water Rights Bureau records (Helena). For fields that are not applicable, enter NA. ***Optional fields are in italics.*** Record additional information in the REMARKS section.

1. **WELL OWNER:**
Name Frenchtown High School
Mailing address P.O. Box 117 Frenchtown, MT. 59834

2. **WELL LOCATION**: List ¼ from smallest to largest
_____ ¼ NW ¼ SE ¼ NW ¼, Section 34
Township 15 N Range 21 W County Missoula
Lot _____ *Tract/Blk* _____ *Subdivision Name* _____
Well Address 17620 Frenchtown Frntg Rd. Frenchtown, MT. 59834
GPS ☐*Yes* ■ *No*
Latitude _____ *Longitude* _____
Error as reported by GPS locator (± feet)
Horizontal datum ☐ *NAD27* ☐ *WGS84*

3. **PROPOSED USE:** ☐ Domestic ☐ Stock ☐ Irrigation
☐ Public water supply ■ Monitoring Well ☐Other:_____

3. **TYPE OF WORK:**
■ New well ☐ Deepen existing well ☐ Abandon existing well
Method: ☐ Cable ■ Rotary ☐ Other:_____

5. **WELL CONSTRUCTION DETAILS:**
Borehole:
Dia. 6 in. from 0 ft. to 30 ft.
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.
Casing:
Steel: Wall thickness ☐ Threaded ☐ Welded
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to ft.
Plastic: Pressure Rating _____ lbs. ■ Threaded ☐ Welded
Dia. 2 in. from 0 ft. to 30 ft.
Perforations/Slotted Pipe:
Type of perforator used _____
Size of perforations/slots _____ in. by _____ in.
_____ no. of perforations/slots from _____ ft. to _____ ft.
_____ no. of perforations/slots from _____ ft. to _____ ft.
Screens: ■ Yes ☐ No
Material PVC
Dia. 2 Slot size 0.020 from 15 ft. to 30ft.
Dia. _____ Slot size _____ from _____ ft. to _____ ft.
Sand Packed: ■ Yes ☐ No
Size of gravel 10/20 Silica Sand
Sand placed from 14 ft. to 30 ft.
Packer: ☐ Yes ■ No
Type _____ Depth(s)_____
Grout: Material used Cement
Depth from 0 ft. to 3 ft. OR ☐ Continuous feed

6. **WELL TEST DATA:**
A well test is required for all wells. *(See details on well log report cover.)*
☐ Static water level 15 ft. below top of casing **or**
☐ Closed-in artesian pressure _____ psi.
How was test flow measured:
bucket/stopwatch, weir, flume, flowmeter, etc _____
Yellowstone groundwater closure area only - Water Temperature _____ °F
☐AQUIFER TEST DATA FORM ATTACHED
Test - 1 hour minimum
Drawdown is the amount water level is lowered below static level.
All depth measurements shall be from the top of the well casing.
Time of recovery is hours/minutes since pumping stopped.
Air test*
_____ gpm with drill stem set at _____ ft. for _____ hours
Time of recovery _____ hrs/min. Recovery water level _____ ft.
OR Bailer test*
_____ gpm with _____ ft. of drawdown after _____ hours
Time of recovery _____ hrs/min. Recovery water level _____ ft.
OR Pump test*
Depth pump set for test _____ ft.
____ gpm pump rate with ____ ft. of drawdown after ____ hrs pumping
Time of recovery _____ hrs/min. Recovery water level _____ ft.
OR Flowing Artesian*
_____ gpm for _____ hours
Flow controlled by _____
**During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

7. **WELL LOG:**

Depth, Feet From	Depth, Feet To	Material: Color/rock and type/descriptor (example: blue/shale/hard, or brown gravel/water, or brown/sand/heaving)
0	2"	Asphalt Pavement
2"	12"	Crushed Base Course (Fill)
12"	10'	Brown Clayey Sand
10'	20'	Brown Sand with Gravel / water
20'	30'	Brown Sandy Gravel / water

☐ADDITIONAL SHEETS ATTACHED

8. **DATE WELL COMPLETED:** 2-17-10

9. ***REMARKS:*** Well completed with flush mount cover

10. **DRILLER/CONTRACTOR'S CERTIFICATION:**
All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.
Name, firm, or corporation (print) SK Geotechnical Corp.
Address P.O. Box 16123, Missoula, MT 59808
Signature _____
Date 3-30-10 License no. 425

Montana DNRC P.O. BOX 201601 HELENA, MT 59620-1601 444-6610

MBMG ID # _____

MONTANA WELL LOG REPORT

Form No. 603 R2-99 Well ID# MW-2

This log reports the activities of a licensed Montana well driller and serves as the official record of work done within the borehole and casing and describes the amount of water encountered. **This form is to be completed by the driller and filed with DNRC within 60 days of completion of the work. Acquiring Water Rights is the well owner's responsibility and is not accomplished by the filing of this report.** Well log information is stored in the Groundwater Information Center at the Montana Bureau of Mines and Geology (Butte) and water right information is stored in the Water Rights Bureau records (Helena). For fields that are not applicable, enter NA. ***Optional fields are in italics.*** Record additional information in the REMARKS section.

1. **WELL OWNER:**
Name Frenchtown High School
Mailing address P.O. Box 117 Frenchtown, MT. 59834

2. **WELL LOCATION:** List ¼ from smallest to largest
_____ ¼ SE ¼ SE ¼ NW ¼, Section 34
Township 15 N Range 21 W County Missoula
Lot _____ *Tract/Blk* _____ *Subdivision Name* _____
Well Address 17620 Frenchtown Frntg Rd. Frenchtown, MT. 59834
GPS ☐ *Yes* ■ *No*
Latitude _____ *Longitude* _____
Error as reported by GPS locator (± feet)
Horizontal datum ☐ *NAD27* ☐ *WGS84*

3. **PROPOSED USE:** ☐ Domestic ☐ Stock ☐ Irrigation
☐ Public water supply ■ Monitoring Well ☐ Other: _____

3. **TYPE OF WORK:**
■ New well ☐ Deepen existing well ☐ Abandon existing well
Method: ☐ Cable ■ Rotary ☐ Other: _____

5. **WELL CONSTRUCTION DETAILS:**
Borehole:
Dia. 6 in. from 0 ft. to 30 ft.
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.
Casing:
Steel: Wall thickness ☐ Threaded ☐ Welded
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to ft.
Plastic: Pressure Rating _____ lbs. ■ Threaded ☐ Welded
Dia. 2 in. from 0 ft. to 30 ft.
Perforations/Slotted Pipe:
Type of perforator used _____
Size of perforations/slots _____ in. by _____ in.
_____ no. of perforations/slots from _____ ft. to _____ ft.
_____ no. of perforations/slots from _____ ft. to _____ ft.
Screens: ■ Yes ☐ No
Material PVC
Dia. 2 Slot size 0.020 from 15 ft. to 30ft.
Dia. _____ Slot size _____ from _____ ft. to _____ ft.
Sand Packed: ■ Yes ☐ No
Size of gravel 10/20 Silica Sand
Sand placed from 14 ft. to 30 ft.
Packer: ☐ Yes ■ No
Type _____ Depth(s) _____
Grout: Material used Cement
Depth from 0 ft. to 3 ft. OR ☐ Continuous feed

6. **WELL TEST DATA:**
A well test is required for all wells. *(See details on well log report cover.)*
☐ Static water level 18 ft. below top of casing **or**
☐ Closed-in artesian pressure _____ psi.
How was test flow measured:
bucket/stopwatch, weir, flume, flowmeter, etc _____
Yellowstone groundwater closure area only - Water Temperature _____ °F
☐ AQUIFER TEST DATA FORM ATTACHED
Test - 1 hour minimum
Drawdown is the amount water level is lowered below static level.

All depth measurements shall be from the top of the well casing.
Time of recovery is hours/minutes since pumping stopped.
Air test*
_____ gpm with drill stem set at _____ ft. for _____ hours
Time of recovery _____ hrs/min. Recovery water level _____ ft.
OR Bailer test*
_____ gpm with _____ ft. of drawdown after _____ hours
Time of recovery _____ hrs/min. Recovery water level _____ ft.
OR Pump test*
Depth pump set for test _____ ft.
____ gpm pump rate with ____ ft. of drawdown after ____ hrs pumping
Time of recovery _____ hrs/min. Recovery water level _____ ft.
OR Flowing Artesian*
_____ gpm for _____ hours
Flow controlled by _____
**During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

7. **WELL LOG:**

Depth, Feet From	Depth, Feet To	Material: Color/rock and type/descriptor (example: blue/shale/hard, or brown gravel/water, or brown/sand/heaving)
0	12"	Dark Brown Silty Sand
12"	25'	Brown Sandy Gravel / water @ 18'
25'	30'	Brown Sand / water

☐ ADDITIONAL SHEETS ATTACHED

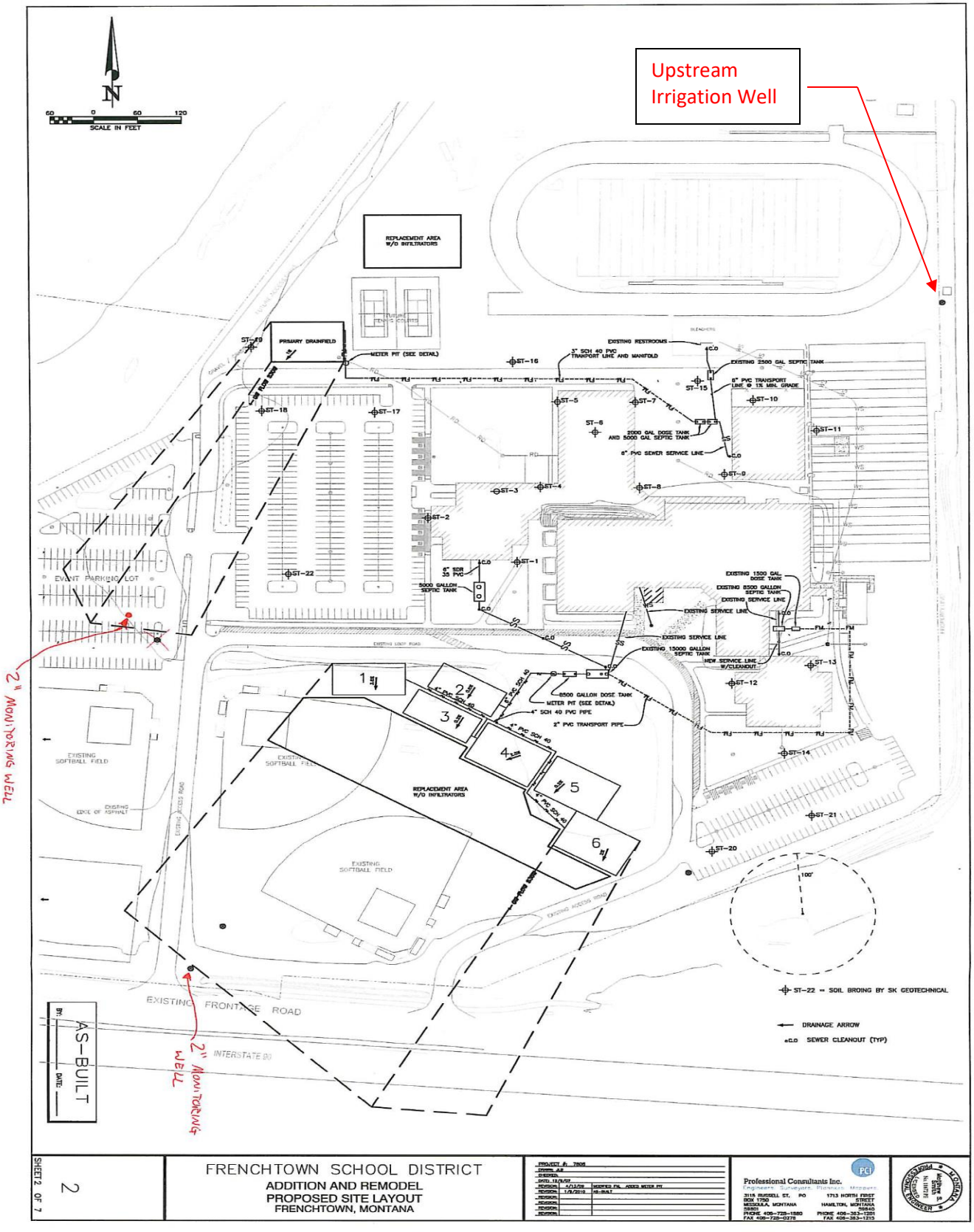
8. **DATE WELL COMPLETED:** 2-23-10

9. ***REMARKS:*** Well completed with protective steel riser

10. **DRILLER/CONTRACTOR'S CERTIFICATION:**
All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.
Name, firm, or corporation (print) SK GEOTECHNICAL CORP.
Address ~~1173~~ P.O. Box 16123, Missoula, MT, 59808
Signature _____
Date 3-30-10 License no. 425

MBMG ID # _____

APPENDIX B – WASTEWATER SYSTEM DIAGRAM MAP


Upstream Irrigation Well
2" Monitoring Well
2" Monitoring Well
REPLACEMENT AREA W/O INFILTRATORS
PRIMARY DRAINFIELD
EXISTING RESTROOMS
EXISTING 2500 GAL SEPTIC TANK
EXISTING 1500 GAL DOSE TANK
EXISTING 8500 GALLON SEPTIC TANK
EXISTING 15000 GALLON SEPTIC TANK
8500 GALLON DOSE TANK
EVENT PARKING LOT
EXISTING SOFTBALL FIELD
EXISTING FRONTAGE ROAD
INTERSTATE 90
AS-BUILT
ST-22 = SOIL BROING BY SK GEOTECHNICAL
DRAINAGE ARROW
SEWER CLEANOUT (TYP)
FRENCHTOWN SCHOOL DISTRICT
ADDITION AND REMODEL
PROPOSED SITE LAYOUT
FRENCHTOWN, MONTANA
Professional Consultants Inc.
SHEET 2 OF 7
2

APPENDIX C – EFFLUENT LIMIT CALCULATIONS

To protect beneficial uses [ARM 17.30.1006(1)(b)(ii)], there shall be no increase of a parameter to a level that renders the waters harmful, detrimental, or injurious to the beneficial uses. Therefore, no wastes may be discharged such that the waste either alone or in combination with other wastes will violate or can reasonably be expected to violate any standard. DEQ establishes the effluent limitations for nitrogen based on the projection that the entire nitrogen load in the wastewater stream may ultimately be converted to nitrate (USEPA, 2002a).

The allowable discharge concentrations are derived from a mass-balance equation (ARM 17.30.517) which is a simple steady-state model, used to determine concentration after accounting for other sources of pollution in the receiving water and any dilution as provided by a mixing zone. The mass-balance equation (Equation 1) derived for ground water is as follows:

Equation 1:

$$Q_{gw}C_{gw} + Q_{eff}C_{eff} = Q_{comb}C_{proj}$$

Where:

Q_{gw}	=	ground water available for mixing
C_{gw}	=	ambient receiving ground water concentration
Q_{eff}	=	maximum design capacity of wastewater system
C_{eff}	=	effluent pollutant concentration
Q_{comb}	=	combined ground water and effluent ($Q_{comb} = Q_{gw} + Q_{eff}$)
C_{proj}	=	projected pollutant concentration (after available mixing)

The mass-balance equation has been arranged to calculate effluent limits so that the discharge does not cause or contribute to an exceedance of the most restrictive water quality standard. This equation can be applied to any effluent and receiving water where the applicable dilution ratio is known. This equation will only be used for nitrogen which has been authorized for mixing (Section 4).

Outfall 001

Equation 2:

$$C_{lmt} = C_{std} + D(C_{std} - C_{gw})$$

Where:
C_{lmt} = effluent limitation concentration (mg/L)
C_{std} = water quality standard concentration = 5.0 mg/L
C_{gw} = ambient receiving ground water concentration = 0.38 mg/L
D = dilution ratio (Q_{gw} / Q_{eff}) = 126,450 gpd / 12,480 gpd

$$C_{lmt} = 5.0 + (126{,}450 / 12{,}480)(5.0 - 0.38) = 51.81 \text{ mg/L}$$

A mass-balance approach is used to calculate the effluent quality of the discharge that meets the most restrictive water quality standard at the end of the mixing zone. Numeric effluent limitations are expressed as loads since this type of limitation inherently regulates both volume and strength of the effluent as prescribed by 75-5-402(3), MCA. Load limits ensure compliance with the ground water standards at the end of the mixing zone. Based on the proposed design capacity, the respective load effluent limitation is:

5.39 lb/day
[(8.34*10-6)* 51.81 mg/L*12,480 gpd]
as based on the following equation:

Outfall 001

Equation 3:

$$L_{lmt} = CON * C_{eff} * DC_{eff}$$

Where:
L_{lmt} = effluent limitation-load
C_{eff} = allowable effluent concentration
DC_{eff} = design capacity of wastewater treatment system (gpd)
CON = conversion factor [$8.34*10^{-6}$]

The Final Effluent Limits are summarized in Table 8 for Outfall 001.

Outfall 002

Equation 2:

$$C_{lmt} = C_{std} + D(C_{std} - C_{gw})$$

Where:
C_{lmt} = effluent limitation concentration (mg/L)
C_{std} = water quality standard concentration = 5.0 mg/L
C_{gw} = ambient receiving ground water concentration = 0.38 mg/L
D = dilution ratio (Q_{gw} / Q_{eff}) = 38,943 gpd/ 2,220 gpd

$$C_{lmt} = 5.0 + (38{,}943 / 2{,}220)(5.0 - 0.38) = 86.04 \text{ mg/L}$$

A mass-balance approach is used to calculate the effluent quality of the discharge that meets the most restrictive water quality standard at the end of the mixing zone. Numeric effluent limitations are expressed as loads since this type of limitation inherently regulates both volume and strength of the effluent as prescribed by 75-5-402(3), MCA. Load limits ensure compliance with the ground water standards at the end of the mixing zone. Based on the proposed design capacity, the respective load effluent limitation is:

1.59 lb/day
[(8.34*10-6)* 86.04 mg/L*2,220 gpd]
as based on the following equation:

Outfall 002

Equation 3:

$$L_{lmt} = CON * C_{eff} * DC_{eff}$$

Where:
L_{lmt} = effluent limitation-load
C_{eff} = allowable effluent concentration
DC_{eff} = design capacity of wastewater treatment system (gpd)
CON = conversion factor [$8.34*10^{-6}$]

The Final Effluent Limits are summarized in Table 8 for Outfall 002.

APPENDIX D – REFERENCES

40 CFR § 136 – Guidelines Establishing Test Procedures for the Analysis of Pollutants. 2017.

Administrative Rules of Montana, Title 17, Chapter 30, Water Quality:

- Subchapter 2 – Water Quality Permit Fees.
- Subchapter 5 – Mixing Zones in Surface and Ground Water.
- Subchapter 6 – Surface Water Quality Standards and Procedures.
- Subchapter 7 – Nondegradation of Water Quality.
- Subchapter 10 – Montana Ground Water Pollution Control System.
- Subchapter 13 – Montana Pollutant Discharge Elimination System.

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Department of Environmental Quality. 2018. Administrative Record of Montana Ground Water Pollution Control System (MGWPCS) permit application and supplemental materials, Frenchtown High School and Junior High, MTX000207.

Department of Environmental Quality, Water Quality Circulars:

- Circular DEQ-2 – Design Standards for Wastewater Facilities.
- Circular DEQ-4 – Montana Standards for On-Site Subsurface Sewage Treatment Systems.
- Circular DEQ-7 – Montana Numeric Water Quality Standards, Required Reporting Values, and Trigger Values.

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U.S. Geological Survey, Groundwater Basics, http://water.usgs.gov/ogw/basics.html, 2016.

Woessner, W., Troy, T., Ball, P. and D.C. DeBorde. 1998. Virus Transport in the Capture Zone of a Well Penetrating a High Hydraulic Conductivity Aquifer Containing a Preferential Flow Zone: Challenges to Natural Disinfection. In Proc. Source Water Protection Int., Dallas, TX. 28–30 Apr. 1998. National Water Research Inst., Fountain Valley, CA.