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:	Bryant No. 3 Subdivision Homeowner's Association Inc.
Permit Number:	MTX000182
Permit Type:	Domestic wastewater
Application Type:	Renewal
Facility Name:	Bryant No. 3 Subdivision Community Wastewater Facility
Facility Location:	Northwest 1/4, Section 7, T10N, R3W, Lewis and Clark County Latitude: 46.642389° Longitude: -112.024227°
Facility Address:	760 Isy Loop, Helena MT
Facility Contact:	Integrated Water, Bette Moe (Board of Directors)
Treatment Type:	Level 2
Receiving Water:	Class I Ground Water
Number of Outfalls:	1
Outfall / Type:	001/Pressure Dose Subsurface Drainfield
Effluent Type:	Domestic strength wastewater
Mixing Zone:	Standard
Effluent Limit Type:	DBEL
Effluent Limits:	Total nitrogen: 24 mg/L, Maximum Daily
Flow Rate:	Design maximum: 20,000 gpd Design average: 20,000 gpd
Effluent sampling:	Monthly, EFF001
Ground water sampling:	Quarterly, MW1A, MW1B
Fact Sheet Date:	January 2020
Prepared By:	Rich Morse

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 Bryant No. 3 Subdivision Homeowner's Association Inc. for the Bryant No. 3 Subdivision wastewater treatment system.

1.1 APPLICATION

DEQ received an application for renewal of the permit on November 29, 2018. Renewal fees accompanied the application. DEQ reviewed the submittal and issued a completeness letter on December 28, 2018.

1.2 PERMIT HISTORY

The Bryant No. 3 Subdivision wastewater treatment facility was first permitted June 1, 2007 (as Bryant Acres No. 3 Subdivision). The permit was modified on March 19, 2010, to reflect the transfer of ownership of the facility from Bryant Land Development, LLC to the permittee (DEQ, 2010).

In addition to the pending renewal of the MGWPCS permit, the permittee received Subdivision Plan and Specification review and approval (EQ #06-2282) pursuant to 76-4-101 *et seq.*, Montana Code Annotated (MCA).

The 2014 permit required the installation of an upgradient monitoring well MW2. This well was installed May 2017 (GWIC #292456).

In a November 29, 2018 letter, the applicant requested that the current concentration limits be changed to load limits in the pending renewal.

A Compliance Evaluation Inspection was conducted on November 7, 2019 by DEQ's Lisa Kay Keen. Reporting violations and exceedances were cited in that Inspection Report. The applicant's operator has responded to those violations. The current operator (Integrated Water) credits recent exceedances to recent maintenance (flushing) of the recirculating sand filter during the 3rd and 4th quarter of 2018. Exceedances averaging 100 percent have continued through all quarters of 2019. This permit renewal will contain special conditions to address these exceedances.

The facility maintains a Public Water Supply (PWS) approval pursuant to 75-6-101 *et seq*., MCA. The PWSID for the facility is MT0004489. The Montana Ground-Water Information Center (GWIC) website lists two domestic water supply wells for the subdivision. The first well, GWIC #217858, was drilled to 187 feet below ground surface (bgs) and screened from 157-177 feet bgs in gravel and sand. The second well, GWIC #217848, was drilled to 174 feet bgs and screened from 150-170 feet bgs in gravel and sand with some coarse silt.

1.3 CHANGES TO THIS PERMIT

This permit continues the current concentration limit of 24 mg/L. The Total Phosphorus limit will not be applied in this permit cycle. Quarterly effluent monitoring will be changed to monthly. Special conditions are included in the new permit requiring the completion and submission of a plan to address current limit exceedances (see **Sections 5 and 6**).

2.0 FACILITY INFORMATION

2.1 LOCATION

The Byant No. 3 Subdivision wastewater treatment system is in the northern portion of the Helena Valley (see **Figure 1**). The system serves 56 residential units and two commercial office buildings. All wastewater is domestic in nature with a total volume of 20,000 gallons per day of effluent.

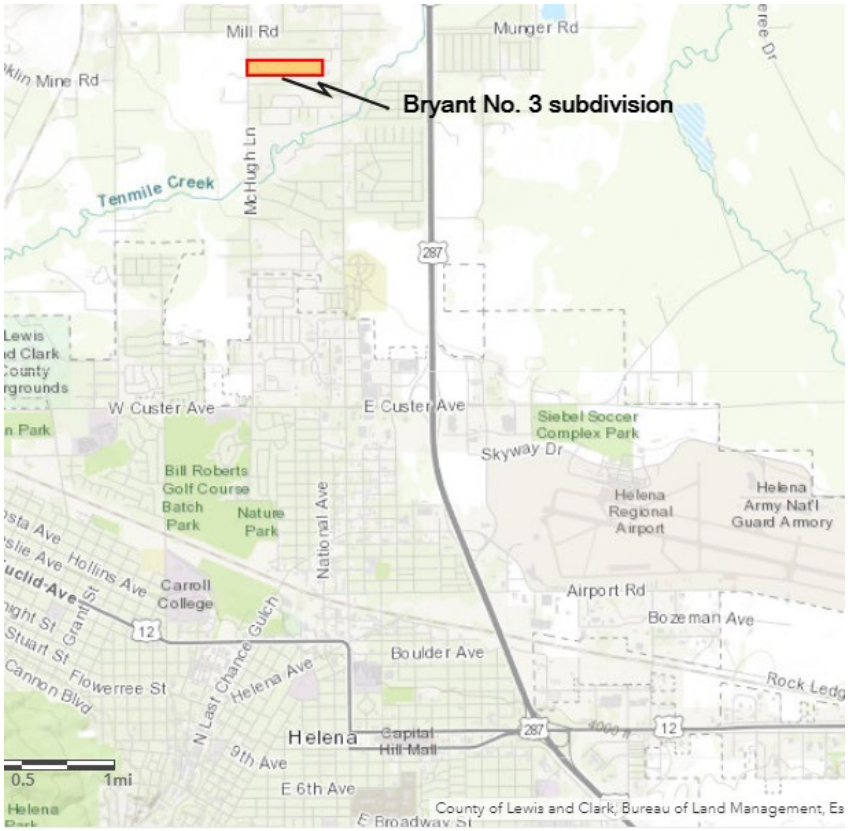


Figure 1. Location of Bryant No. 3 Subdivision

Figures 2 shows the location of the site west of Montana Avenue in Helena. **Figure 3** is a site map of the facility showing locations for the drainfield, monitoring wells and the hydraulic gradient relative to the site.

Figure 2. Bryant No. 3 Subdivision location

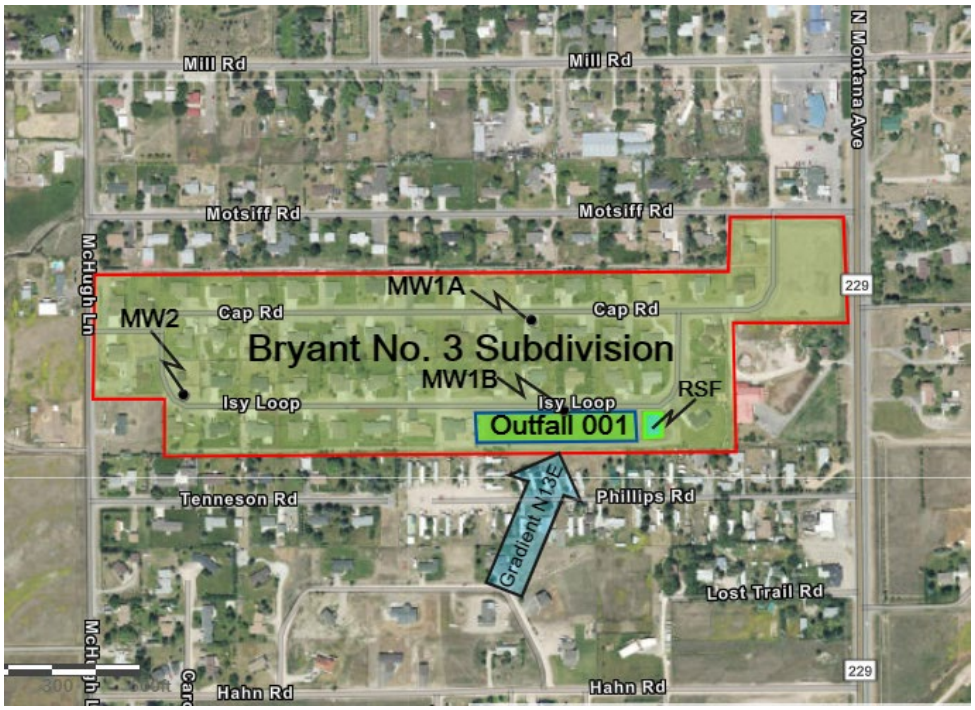


Figure 3. Site map of the facility.

Each lot has an individual septic tank (1,000 gallon capacity for residential lots and 3,000 gallon capacity for the commercial lots) with an effluent filter that removes most of the floatable and settleable solids from the raw waste stream from each individual lot. Effluent from each individual septic tank gravity feeds into an 8-inch sewer main via a 4-inch sewer line. From the sewer main, the effluent gravity flows into a 500 gallon lift station where it is then pumped via a 4-inch force main into a 30,000-gallon recirculation tank. The effluent is then pumped from the recirculation tank into a recirculating sand filter (RSF) with six zones (considered Level II treatment). The effluent that percolates through the RSF is collected and returned to the recirculation tank for either additional treatment or directed into the dose tank system for subsequent disposal. The return rate for the effluent is a 4:1 ratio, returning 80% of the effluent to the recirculation tank and diverting 20% of the effluent into the dose tank system. The dose tank system consists of a 1,500 gallon storage tank and a 3,500 gallon dose tank. The treated effluent is pressure-dosed into a subsurface drainfield that discharges into Class I ground water (see **Figure 4** of this fact sheet). There is a Sparling flow meter installed in a meter vault between the dose tank and the drainfield that records the volume of effluent discharged into the drainfield by the facility. The characteristics of the facility are summarized in **Table 1**.

The flow line diagram for the facility is **Figure 4**. The facility currently treats the wastes from the Bryant Acres No. 3 Subdivision; the two commercial lots are not yet developed. The waste stream entering the facility is residential strength in nature. The maximum daily design flow is 20,000 gpd. The wastes from the two commercial lots are expected to be residential strength in nature with a total flow of 2,150 gallons per day.

2.2 OPERATIONS

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

Table 1. Collection, Treatment, and Disposal Summary

Collection	
Contributing sources:	56 residences, 2 businesses (non-industrial)
Standard industrial code(s) of sources:	Office building 6512 Residential wastewater system 4952
Collection method:	Gravity-driven sewer lines to lift station
Flow volume:	Maximum daily design flow: 20,000 gallons per day
Treatment	
Treatment level:	Level 2
Treatment technology:	Individual residential septic tanks, to recirculating tanks, 3 recirculating sand filters, and eight pressure-dosed drainfields.
Treatment location:	46.642362° Latitude and -112.024193° longitude
Disposal	
Method of disposal:	Infiltration to ground water
Disposal structure:	Subsurface drainfield (Outfall 001)
Outfall location:	46.642392° Latitude and -112.025582° longitude

Effluent monitoring (EFF001) is at the drainfield dose tank. Flow monitoring (FM001) is in a vault between the drainfield and the drainfield dose tank (see **Figure 4.**). Monitoring and sampling requirements are further discussed in **Section 6**.

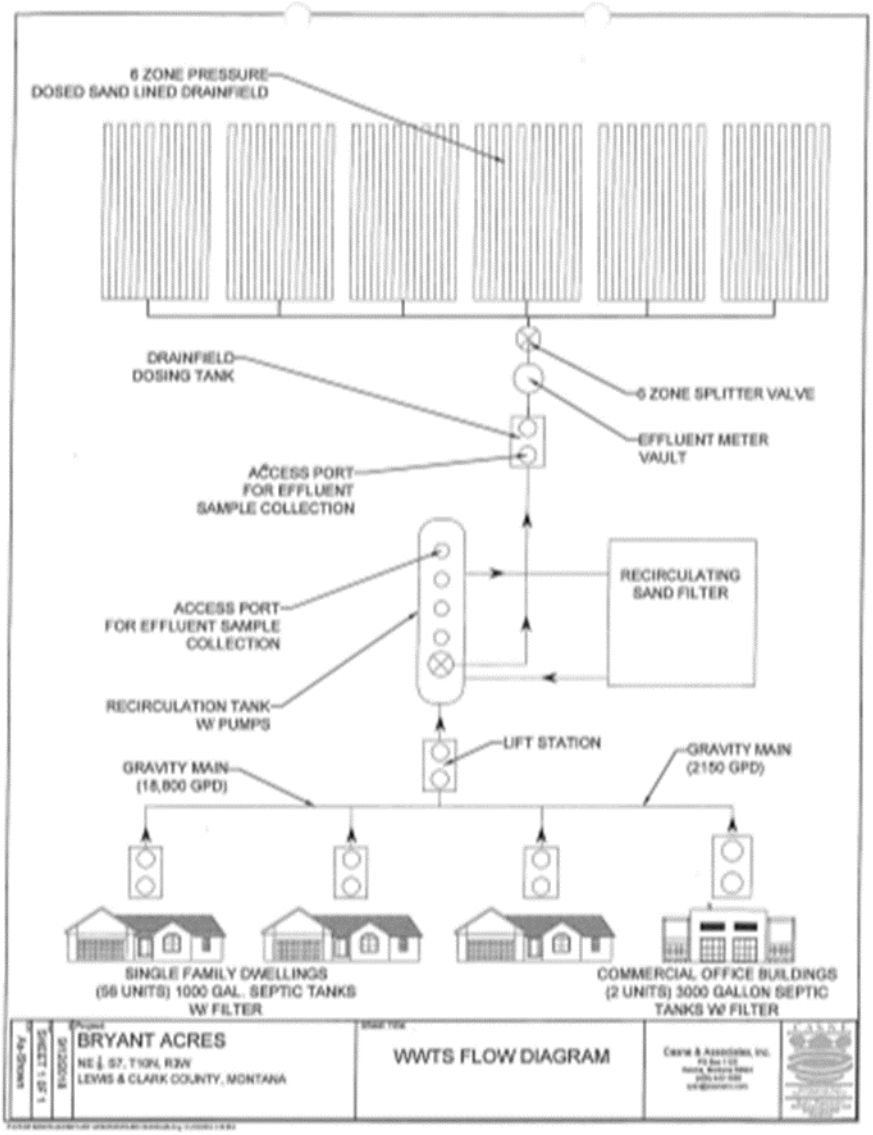


Figure 4. Flow Diagram for Bryant No. 3

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

Parameter	Units	Reported DMR values			2014 Limit	# of Samples
		Minimum	Maximum	Average		
Flow rate	Gallons/day	3,767	18,700	6,172	–	21
	Gallons/day (30 day average)	4,100	323,000	22,202	–	20
Nitrogen, nitrate+nitrite	mg/L	0.08	60.5	8.59	–	20
Nitrogen, total ammonia	mg/L	2.98	39.6	14.39	–	20
Nitrogen, total Kjeldahl	mg/L	5.9	49.7	18.7	–	20
Nitrogen, total*	mg/L	18.3	72.2	34.54	24	11
	pounds/day	0.175	11.2	1.62	--	20
Phosphorus, total	mg/L	3.0	8.04	6.1	–	20
	pounds/day	0.127	1.04	.31	--	20

*Total Nitrogen = Nitrate + Nitrite + Total Kjeldahl Nitrogen (as N)
Period of record: March 31, 2014 – September 30, 2019

2.4 GEOLOGY

The facility is located in the Helena Valley, an intermontane basin bounded by folded and fractured sedimentary, metamorphic, and igneous rocks of Precambrian to Cretaceous age (Briar and Madison, 1992). Water resources near the facility are associated with the Helena Valley aquifer system, an unconfined valley-fill aquifer that serves as the domestic water supply for a majority of the residents of the Helena Valley. The Helena Valley aquifer system is comprised of a thinner section of locally derived fine-to-coarse-grained Tertiary sediments that grade into Quaternary alluvium in the upper 100 feet of the valley-fill. This Quaternary alluvium unconformably overlays an estimated 6,000 feet of Tertiary sediments that are primarily composed of a thick section of fine-grained lacustrine ash and volcaniclastic sediments with localized lenses of gravel (Briar and Madison, 1992).

2.5 HYDROGEOLOGY

The hydrogeologic characteristics of the Helena Valley aquifer system are described as follows: recharge occurs through the infiltration of streamflow, leakage from the irrigation canals, the infiltration of excess irrigation water, the infiltration of precipitation, and inflow from fractures in the bedrock (Briar and Madison, 1992). Discharge is through leakage into streams and drains, upward leakage into Lake Helena, and the withdrawal of water for domestic and industrial usage from wells throughout the Helena Valley (Briar and Madison, 1992). Ground water flow directions are from the south, west, and north margins of the Helena Valley towards Lake Helena.

The hydraulic conductivity, hydraulic gradient, and ground water flow direction for the facility were determined using a combination of an on-site investigation and from analyses in USGS Report 92-4023 (Briar and Madison, 1992). The current permit application indicates a hydraulic conductivity (K) of 130 ft/day, a hydraulic gradient (I) of 0.0089 ft/ft, and a ground water flow direction of N13°E (Bryant Acres No. 3 Subdivision Homeowners Association, 2011).

The nearest surface water to the facility listed in the application materials (Form GW-1, Section L) is Tenmile Creek. Tenmile Creek is approximately 1,500 feet southeast of the subdivision and flows northeast, paralleling the direction of ground water flow in this area (N13°E). The nearest downgradient surface water from Outfall 001 is an intermittent stream that bisects the northeast

corner of the subdivision, and drains south to Tenmile Creek. This intermittent stream is approximately 7,000 feet from the drainfield. The distance from the discharge to the intermittent stream (7,000 feet) was used to determine the phosphorus break-through time for the discharge from the facility (DEQ, 2007a)

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

Table 3. Hydrogeologic Summary

Average depth to ground water	18 feet
General ground water flow direction	N13°E
Hydraulic conductivity	130 feet per day
Hydraulic gradient	0.0089 feet/feet
Nearest downgradient surface water	Ten Mile Creek (7,000 feet)

2.6 GROUND WATER MONITORING WELLS

There are 3 monitoring wells associated with this permit: MW1A, MW1B and MW2. These wells are plotted on **Figure 3**. Monitoring well construction details are provided below in **Table 4**. MW1A is located at the downgradient end of the mixing zone. Monitoring well MW1B is located at the downgradient end of the drainfield. MW2 is an upgradient monitoring well. Driller's logs for each monitoring well are attached as **Appendix A**.

Table 4. Monitoring Well Summary

Monitoring Well MW1A	
MBMG GWIC ID:	#242382
Location- latitude/longitude:	46.64386° latitude, -112.02511°longitude
Location- narrative:	500 feet down gradient from drainfield
Rationale:	Downgradient at end of mixing zone
Depth; screened interval:	Total depth of 29 feet, screened from 19-29 feet.
Notes:	Located in a homeowners backyard behind fence, locked cap, lat/long per 2011 Compliance Inspection Report, confirmed with 2019 inspection report
Monitoring Well MW1B	
MBMG GWIC ID:	#242381
Location- latitude/longitude:	46.64252° latitude, -112.02532°longitude
Location- narrative:	Middle edge of drainfield
Rationale:	Downgradient end of drainfield
Depth; screened interval:	Total depth is 34.5 feet, screened from 24.5 to 34.5 feet
Notes:	Locked cap, Lat long from 2011 Compliance Inspection Report and 2019 Inspection Report
Monitoring Well MW2	
MBMG GWIC ID:	#292456
Location- latitude/longitude:	46.642699° latitude, -112.03053° longitude
Location-narrative:	1000 feet side gradient
Rationale:	Ambient
Depth; screened interval:	Total depth 50 feet, screened from 30-50 feet
Notes:	Lat/Long from 11/25/19 Compliance Inspection Report

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

Water sampling results from MW2 are provided below in **Table 5**. Based on the 411 microsiemens per centimeter (µS/cm) specific conductance, the receiving water is Class I ground water. Data reported in the table is taken from 2018 sampling supplied application material.

Table 5. Ambient Water Quality Reported From Side Gradient Monitoring Well MW2

MW2 represents shallow ground water 1000 feet side gradient of Outfall 001						
Parameter	**Units**	**Reported DMR values**			**Reporting Limit**	**# of Samples**
		Minimum	**Maximum**	**Average**		
Chloride (as Cl)	mg/L	17	19	18	1	2
Total dissolved solids	mg/L	240	243	241.5	10	2
Escherichia coli bacteria	CFU/100mL	<1	<1	<1	1	2
Nitrogen, nitrate+nitrite (as N)	mg/L	1.08	1.22	1.15	0.1	2
Nitrogen, total Kjeldahl (as N)	mg/L	ND	ND	ND	0.5	2
Organic carbon	mg/L	0.9	0.8	0.85	0.5	2
pH	Standard units	7.4	7.4	7.4	0.1	1
Specific conductivity (@25°C)	µS/cm	411	411	411	1	2

*Total Nitrogen = Nitrate + Nitrite + Total Kjeldahl Nitrogen (as N), Period of record is September 12, 2018 to November 20, 2019

Total nitrogen was not reported; however it may be calculated as the sum of nitrate + nitrite (1.15 mg/L) and total Kjeldahl nitrogen (ND). **The calculated total nitrogen concentration in the receiving water is 1.15 mg/L.**

3.0 WATER QUALITY STANDARDS AND NONDEGRADATION

PART OF DEQ'S MISSION IS TO PROTECT, SUSTAIN, AND IMPROVE THE QUALITY OF STATE WATERS. WATER QUALITY STANDARDS PROVIDE THE BASIS FOR EFFLUENT LIMITS THAT DEQ APPLIES TO DISCHARGE PERMITS (SECTION 5). THESE STANDARDS INCLUDE THREE COMPONENTS: DESIGNATED USES, WATER QUALITY CRITERIA, AND NONDEGRADATION POLICY. 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 DESIGNATED USES

With a specific conductivity of 411µS/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

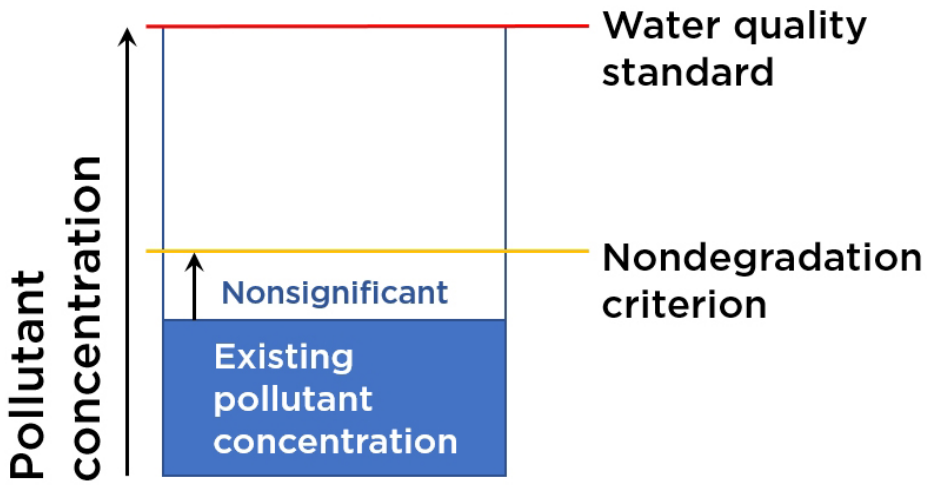
DEQ protects all the assigned beneficial uses by protecting the most sensitive. Drinking water is the most sensitive use of this receiving water.

3.2 Water Quality Criteria

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 Nondegradation

Montana's nondegradation policy is intended to preserve the existing condition of high-quality state waters. Any water whose existing condition is better than the water quality standards must be maintained in that high quality. Nondegradation policy allows discharges to cause only nonsignificant changes in water quality. Changes in water quality that are deemed significant require an authorization to degrade. An authorization to degrade is not an authorization to pollute; the water quality standard must not be exceeded.



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

3.4 Nonsignificance

When developing the initial permit (2007), 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 (described below) at the end of the mixing zone (**Section 4**). DEQ used these criteria and updated ground water quality data to establish effluent limits (discussed below in **Section 5**).

3.4.1 Ground Water Nonsignificance Criteria

For this discharge to ground water, the following nonsignificance criteria are relevant:

Nitrogen

Under Montana statute, ground water total nitrogen at or below 7.5 mg/L at the downgradient end of the mixing zone (see **Section 4**) is a nonsignificant change in water quality, so long as the discharge does not cause degradation of surface water. Evaluation of the effects to surface water are discussed below in **Section 3.4.2**. Using the nonsignificance criterion of 7.5 mg/L, DEQ established effluent limits that cause the discharge to comply with ground water nonsignificance/nondegradation criteria at the end of the mixing zone. This is discussed in detail in **Section 5.1**.

Phosphorus

A total phosphorus surface water breakthrough time of greater than 50 years is a nonsignificant change in water quality. The phosphorus criterion requires an analysis to determine a breakthrough time. Breakthrough occurs when the subsurface soils lose their capability to adsorb any more phosphorus, and it reaches surface water.

A phosphorus breakthrough analysis conducted by DEQ in 2007 (DEQ, 2007) estimated the phosphorus breakthrough to occur in 199 (*i.e.* >50) years (Casne and Associates 2011). Phosphorus breakthrough time of greater than 50 years is considered nonsignificant. The 2007 permit established an effluent limit in order to maintain the 50-year breakthrough. This 2007 effluent limitation is maintained within this proposed permit renewal.

Ground water discharges meeting these criteria are nonsignificant, so long as they do not cause degradation of surface waters (see **Section 3.4.2**).

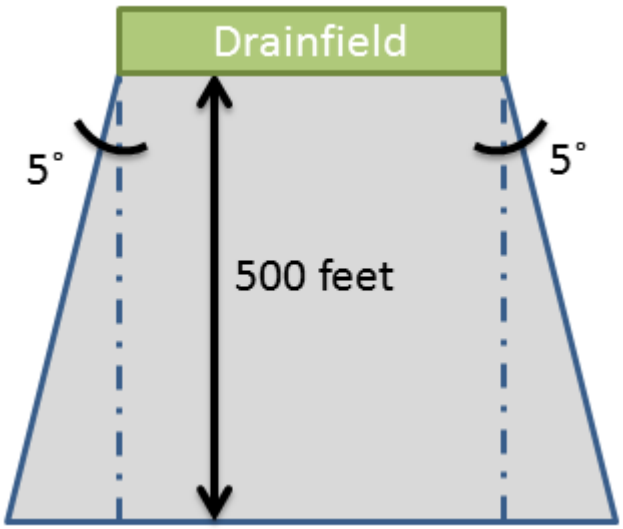
4.0 MIXING ZONE

DEQ authorizes a standard mixing zone for total nitrogen discharged from Outfall 001. 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. These values are drawn from the previous fact sheet and permit application.

Table 6. Standard Mixing Zone for Total Nitrogen Discharged from Outfall 001

Parameter	Units	Value
Receiving water nitrogen concentration	1.15	mg/L
Ground water flow direction	N13E	Bearing
Length of mixing zone	500	Feet
Thickness/depth of mixing zone	15	Feet
Upgradient width of mixing zone	550	Feet
Downgradient width of mixing zone	646	Feet
Cross-sectional area of mixing zone (A)	9690	Square feet
Hydraulic conductivity (K)	130	Feet per day
Hydraulic gradient (I)	0.0089	Feet per feet
Volume of ground water available for mixing (Q_{GW})	11,211	Cubic feet per day

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	**7.5 mg/L**
Total Phosphorus	-	-	**>50 year breakthrough**

This discharge permit includes numeric WQBELs that restrict the strength and volume of the discharge. The ground water nonsignificance criteria (**Section 3.4.1**) provide the basis for the limits. 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 7.5 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 7.5 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 1.15 mg/L (**Section 2**). DEQ calculates an effluent limit that protects receiving water quality and beneficial uses according to the following equation:

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

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 **Table6**, the result for C_{lmt} is 34. mg/L. This is the final WQBEL expressed as a concentration. The limit calculations are provided in detail in **Appendix II**. This WQBEL is less restrictive than the previously assigned DBEL of 24 mg/L TN. DEQ must use the most restrictive limit which is the previous DBEL.

5.2 TOTAL PHOSPHORUS EFFLUENT LIMIT

DEQ previously determined (2007) that phosphorous discharged to ground water would reach the surface water Ten Mile Creek in 185 years. A phosphorous breakthrough time of less than 50 years is considered significant. A breakthrough of greater than 50 years does not require a Phosphorus limit. The Total Phosphorous effluent limit in the previous permit will not be applied to this permit cycle.

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

Table 8.

Proposed Final Effluent Limits – Outfall 001		
Parameter	**Units**	**Effluent Limitations**
		Daily Maximum(1)
Nitrogen, Total (as N)	mg/Lday	24
Footnotes: Beneficial Uses: ARM 17.30.1006 (1) See definition in Part V of permit.		

5.3 SPECIAL CONDITIONS

The following special conditions will be included in the permit.

The Bryant No. 3 wastewater treatment system has not been meeting its effluent limits. Recent maintenance may improve the system performance. In order to assess the effectiveness of these changes the applicant will begin monthly effluent monitoring for the parameters in **Table 9** of this Fact Sheet.

The applicant will provide to DEQ a report addressing the performance of the treatment system and its response to operational adjustments made by the applicant. The report will be delivered according to the Compliance Schedule in **Table 11** of this Fact Sheet. If effluent limit exceedances continue this report must include DEQ approved plans for changes to the system that will bring the system into compliance, and an approved timetable for the installation of treatment changes.

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 flow measuring device must be installed and in operating condition prior to discharge. The effluent sample location (EFF-001) is located at the drainfield dose tank as shown in **Figure 4**. 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 in the metering vault between the drainfield dose tank and the drainfield as shown in **Figure 4**.

Table 9 – Effluent Monitoring Requirements

Effluent Monitoring and Reporting Requirements – Outfall 001, Bryant No. 3						
Analyte	**Monitor Location**	**Units**	**Sample Type(1)**	**Minimum Sample Frequency**	**Reporting Requirements(1)(2)**	**Report Freq**
Count of Daily Samples Collected During Reporting Period	EFF-001	-	-	Monthly	Count	Quarterly
Oil and Grease	EFF-001	mg/L	Grab	Monthly	Daily Maximum Quarterly Average	Quarterly
BOD5	EFF-001	mg/L	Grab	Monthly	Daily Maximum Quarterly Average	Quarterly
Flow Rate, Effluent(3)	FM-001	gpd	Contin-uous	Contin-uous	Daily Maximum Quarterly Average	Quarterly
Nitrogen, Nitrite+Nitrate (as N)	EFF-001	mg/L	Grab	Monthly	Daily Maximum Quarterly Average	Quarterly
Nitrogen, Total Ammonia (as N)	EFF-001	mg/L	Grab	Monthly	Daily Maximum Quarterly Average	Quarterly
Nitrogen, Total Kjeldahl (TKN)(as N)	EFF-001	mg/L	Grab	Monthly	Daily Maximum Quarterly Average	Quarterly
Nitrogen, Total (as N)(4)	EFF-001	mg/L	Calculate	Monthly	Daily Maximum Quarterly Average	Quarterly
Phosphorus, Total (as P)	EFF-001	mg/L	Grab (or Composite)	1/Quarter	Quarterly Average	Quarterly

Footnotes:
EFF-001: Description provided in **Section 6.1** and **Figure 4** of this Fact Sheet.
FM-001: Description provided in **Section 6.1** and **Figure 4** of this Fact Sheet.
If no discharge occurs through out 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.
(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) Requires recording device or totalizing meter, must be capable of recording daily effluent volume.
(4) Total Nitrogen is the sum of Nitrate + Nitrite and Total Kjeldahl Nitrogen.

6.2 GROUND WATER MONITORING

Ground water monitoring will remain unchanged in the new permitting cycle. As a 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 MW1A, and MW1B. 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. Sampling and reporting requirements shall commence upon the effective date of the permit.

Ground water monitoring and reporting requirements are summarized in **Table 10** below. All analytical methods must be in accordance with the Code of Federal Regulations, 40 CFR Part 136 for each monitored parameter.

Table 10 – Ground Water Monitoring Requirements

Ground Water Monitoring and Reporting Requirements – MW1A and MW1B, Bryant No. 3						
Parameter	**Monitoring Location(s)**	**Units**	**Sample Type(1)**	**Minimum Sampling Frequency**	**Reporting Requirements**	**Reporting Frequency**
Chloride (as Cl)	MW1A	mg/L	Grab	Quarterly	Quarterly Average	Quarterly
Nitrate + Nitrite (as N)	MW1A	mg/L	Grab	Quarterly	Daily Maximum and Quarterly Average	Quarterly
Total Ammonia (as N)	MW1A	mg/L	Grab	Quarterly	Daily Maximum and Quarterly Average	Quarterly
Total Kjeldahl Nitrogen (as N)	MW1A	mg/L	Grab	Quarterly	Daily Maximum and Quarterly Average	Quarterly
Total Nitrogen (as N)(3)	MW1A	mg/L	Calculated	Quarterly	Daily Maximum and Quarterly Average	Quarterly
Specific Conductivity @ 25°C	MW1A	µS/cm	Grab	Quarterly	Quarterly Average	Quarterly
Escherichia coli Bacteria	MW1A,	CFU/100mL	Grab	Quarterly	Daily Maximum and Quarterly Average(2)	Quarterly
Static Water Level (SWL)(4)	MW1A,	Feet below ground surface	Instantaneous	Quarterly	Quarterly Average	Quarterly
Escherichia coli Bacteria	MW1B	CFU/100mL	Grab	Quarterly	Daily Maximum and Quarterly Average(2)	Quarterly
Static Water Level (SWL)(4)	MW1B	Feet below ground surface	Instantaneous	Quarterly	Quarterly Average	Quarterly

Footnotes:
CFU = Colony Forming Units
uS = microsiemens per cm.
(1) See definitions in Part V of the permit.
(2) Report the geometric mean if more than one sampling event occurs during a given monitoring period.
(3) Total Nitrogen is the sum of the Nitrate + Nitrite and Total Kjeldahl Nitrogen parameters.
(4) Point of reference for SWL measurements shall be from ground surface and measured to within 1/100th of one foot.

COMPLIANCE SCHEDULE

The actions listed in **Table 11** below must be completed on or before the respective scheduled completion date. A report documenting each respective action must be received by DEQ on or before the scheduled reporting date. Completion of all actions or deliverables must be reported to DEQ in accordance with Part II.D and Part IV.G of the permit.

Table 11. Compliance Schedule

Compliance Schedule, Bryant No. 3			
Action	**Frequency**	**Scheduled Completion Date of Action(1)**	**Report Due Date(2)**
Applicant will submit a report documenting actions, plans and time tables for meeting effluent limits(3)	Single Event	Twelve months from the effective date of the permit.	Due on or before the 28th day of the month after the due date for this requirement.
Applicant will install or implement required changes to treatment system as agreed upon with DEQ.	Single Event	Twenty four months from the effective date of this permit.	Due on or before the 28th day of the month after the due date for this requirement.
Applicant will submit a report documenting the results of the required system modification(4)	Single Event	Thirty six months from the effective date of this permit.	Due on or before the 28th day of the month after the due date for this requirement.

Footnotes:
(1) The actions must be completed on or before the scheduled completion dates.
(2) The report must be received by DEQ on or before the scheduled report due date and must include all information as required.
(3) This report must detail any changes in operation and maintenance, any system optimization and/or any other steps taken by the facility towards meeting the final effluent limits of the permit.
(4) The written report documenting monitoring well installation must include final location, drilling methods used, borehole lithologic log, well construction details, and the depth to the top contact of the first ground water bearing zone for each respective 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 **April 22, 2020**. 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 MTX000182, 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

Site Name: BRYANT LAND DEVELOPMENT LLC
GWIC Id: 242382

Section 1: Well Owner(s)

Section 2: Location

Township	Range	Section	Quarter Sections
10N	03W	7	SE¼ NE¼

County	Geocode
LEWIS AND CLARK	

Latitude	Longitude	Geomethod	Datum
46.640497	-112.024832	TRS-SEC	NAD83

Ground Surface Altitude	Ground Surface Method	Datum	Date

Addition	Block	Lot
BRYANT NO. 3 SUBDIVISION		

Section 3: Proposed Use of Water
MONITORING (1)

Section 4: Type of Work
Drilling Method:
Status: NEW WELL

Section 5: Well Completion Date
Date well completed: Friday, October 19, 2007

Section 6: Well Construction Details
Borehole dimensions

From	To	Diameter
0	29	8

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
0	29	4				PVC

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
19	29	4		0.20	SCREEN-CONTINUOUS-PVC

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	19	3/8 BENTONITE	
19	29	10/20 SAND	

Section 7: Well Test Data

Total Depth: 29
Static Water Level:
Water Temperature:

** 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.*

Section 8: Remarks

Section 9: Well Log
Geologic Source
Unassigned
Lithology Data

There are no lithologic details assigned to this well.

Driller 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: DAN OKEEFE
Company: OKEEFE DRILLING CO
License No: MWC-43
Date Completed: 10/19/2007

Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Plot this site in Google Maps
View scanned well log (5/29/2008 9:07:22 AM)

Site Name: BRYANT LAND DIVISION LLC
GWIC Id: 242381

Section 1: Well Owner(s)

Section 2: Location

Township	Range	Section	Quarter Sections
10N	03W	7	SE¼ NE¼

County	Geocode
LEWIS AND CLARK	

Latitude	Longitude	Geomethod	Datum
46.640497	-112.024832	TRS-SEC	NAD83

Ground Surface Altitude	Ground Surface Method	Datum	Date

Addition	Block	Lot
BRYANT NO.3 SUBDIVISION		

Section 3: Proposed Use of Water
MONITORING (1)

Section 4: Type of Work
Drilling Method:
Status: NEW WELL

Section 5: Well Completion Date
Date well completed: Thursday, December 20, 2007

Section 6: Well Construction Details
Borehole dimensions

From	To	Diameter
0	34.5	8

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
0	34.5	4				PVC

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
24.5	34.5	4		0.20	SCREEN-CONTINUOUS-PVC

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	24.5	3/8 HOLE PLUG	
24.5	34.5	10/20 SAND	

Section 7: Well Test Data

Total Depth: 34.5
Static Water Level:
Water Temperature:

** 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.*

Section 8: Remarks

Section 9: Well Log
Geologic Source
Unassigned
Lithology Data

There are no lithologic details assigned to this well.

Driller 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: DAN OKEEFE
Company: OKEEFE DRILLING CO
License No: MWC-43
Date Completed: 12/20/2007

APPENDIX B – EFFLUENT LIMIT CALCULATIONS

The system consists of a recirculating sand filter (RSF) system which is a Level 2 method for nitrogen treatment.

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).

Equation 2:

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

Where:
C_{lmt} = effluent limitation concentration
C_{std} = water quality standard concentration = 7.5 mg/L
C_{gw} = ambient receiving ground water concentration = 1.15 mg/L
D = dilution ratio (Q_{gw} / Q_{eff}) = 11,211 / 2673

$C_{lmt} = 7.5 + (11{,}211/2{,}673)(7.5 - 1.15)$ **= 34 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:

5.6 lb/day
[(8.34*10-6)* 34 mg/L*20,000 gpd]
as based on the following equation:

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.