DEPARTMENT OF ENVIRONMENTAL QUALITY
MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM
Fact Sheet

Permittee:	Paleo Search, Inc.
Permit No.:	MT0025020
Receiving Water:	Hauser Lake
Facility Information:	
Name	Paleo Search Inc. Suction Dredge Project
Location	Two dredges docked on Hauser Lake ½ mile below Canyon Ferry Dam (Latitude 46.65327, Longitude 111.73405) Helena, MT
Facility Contact:	Greg Duncan, President 9 Fiddlers Green Clancy, MT 59634
Fee Information:	
Number of Outfalls	1
Outfall – Type	001 – Major Privately-Owned Treatment Works

I. Permit Status

Paleo Search, Inc. (Paleo Search, "permittee") acquired this permitted suction dredge operation from Paragon Mining, Inc. on October 24, 2014. The dredges have operated intermittently since 1973. The first Montana Pollutant Discharge Elimination System (MPDES) permit for the facility was issued by the Department of Environmental Quality (DEQ) on February 22, 1980. Subsequent renewals have been issued, and the existing permit was issued on November 1, 2009 and expired on October 31, 2014.

The permittee submitted an application and fee for renewal on October 20, 2014. The application was determined complete on October 31, 2014, and the 2009 permit remains effective until the renewed permit is issued.

II. Facility Information

A. Facility Description

Paleo Search owns two suction dredges docked on the west side of Hauser Lake about one-half mile below Canyon Ferry Dam. The permittee plans to work one dredge at a time for up to 8 hours a day, 6 days a week for 8 months each year. The permittee does not plan to operate the dredges during winter months or night time hours. The 2014 permit application stated that nothing has changed in the equipment or areas to be mined, see Table 1 for a summary.

Table 1: Dredge Design Summary

Parameter	Outfall 001, 8 inch dredge	Outfall 002, 16 inch dredge
Intake Size	8 inch	16 inch
Maximum Hourly Raw Material Process Rate	8 cubic yards per hour	25 cubic yards per hour
Maximum Annual Raw Material Process Rate(1)	13,349 cubic yards	41,714 cubic yards
Pump Capacity	600 gallon per minute 1.34 cfs	4500 gallon per minute 10.03 cfs
Dredge Length	30 feet	50 feet
Dredge Width	16 feet	25 feet

Footnotes:
(1) Calculated based upon operating at the maximum raw material process rate for 8 months a year, 6 days a week, and 8 hours a day.

The 8-inch dredge (intake size) is the primary dredge used for recovering gold and sapphires. Raw material (rocks, cobbles and gravel) and water are pumped from the lake bottom into the head box. From the head box, raw material falls onto a 1/8-inch minus

screen; raw material greater than 1/8-inch flows through the main sluice box directly to the lake. Gravel less than 1/8-inch flows from the head box to two side sluice boxes, one on either side of the main sluice box. Gold and sapphires are separated out by gravity on carpet in the three sluice boxes (see Attachment B). Outfall 001 in this permit is composed of the three discrete discharging structures located on the 8-inch dredge.

The 16-inch dredge (intake size) is used for removing one to four feet of overburden material, when necessary. Raw material and water are pumped from the lake bottom into the head box that contains a 2-inch minus screen. Cobbles and rocks greater than 2 inches fall into the dump chute to the lake bottom. Gravel and cobbles less than 2 inches flow, with water, from the head box into two side sluice boxes where gold and sapphires are separated out by gravity (see Attachment B). Outfall 002 in this permit is composed of the three (3) discrete discharging structures located on the 16-inch dredge.

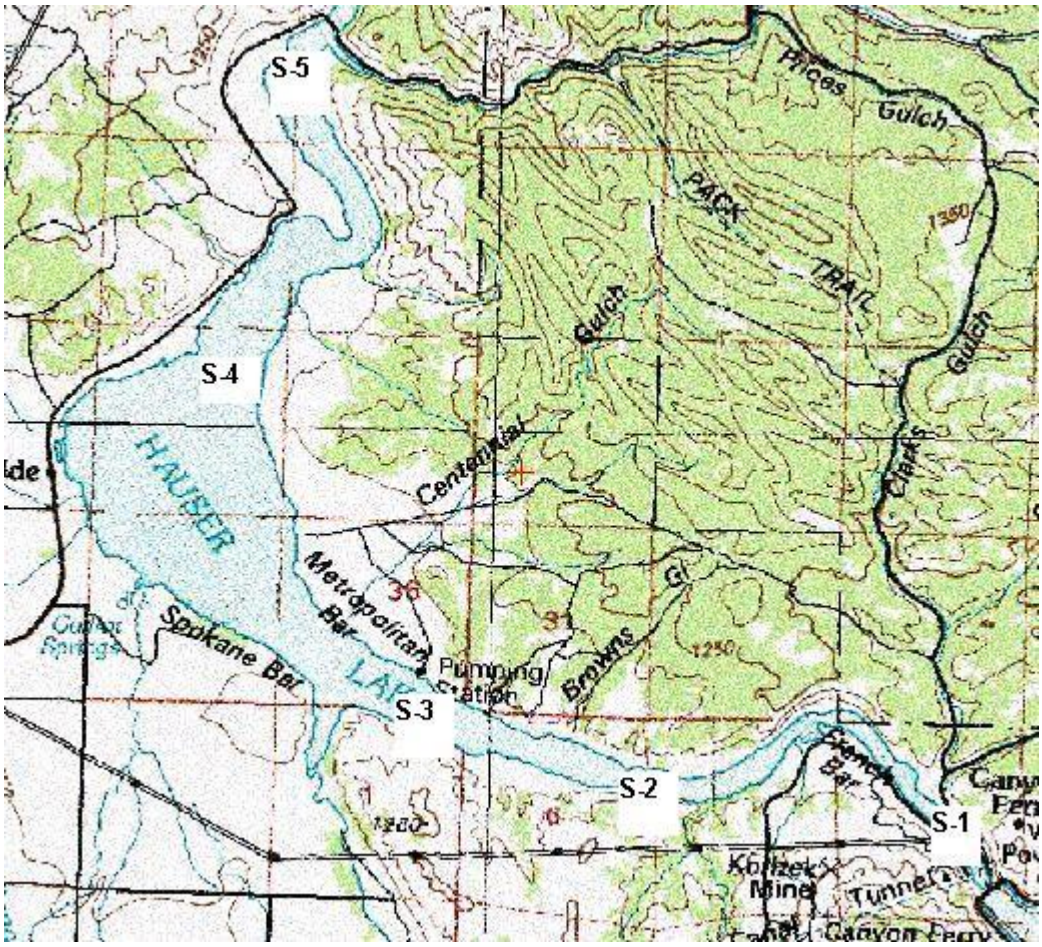
A 20-gallon gasoline tank is attached to the suction dredge pump on the 8-inch dredge. A smaller fuel tank is attached to the air compressor on the 8-inch dredge that provides supplied air to the diver. Fuel tanks are also present on the 16-inch dredge. No sanitary wastes will be discharged from the barges.

Five work sites described in Table 2, in which numbers correspond to the sites marked on Figure 1, are proposed for suction dredging in Hauser Lake during this five-year permit cycle:

Table 2: Suction Dredging Locations

Number	Location	Location Description	Dimensions (feet)	Size (acres)	Approximate Water Depth (feet)
S-1	Range 1W, Township 10N, Section 4	Lower French Bar - 20 feet from the bank on the west side of Hauser Lake across from Riverside Campground	150 x 1,800	6	16-18
S-2	Range 1W, Township 10N, Section 5 & 6	Mosquito Bar - 20 feet from the bank on the west side of Hauser Lake upstream from Brown's Gulch	150 x 2,500	9	16-30
S-3	Range 2W, Township 10N, Section 1; Range 2W, Township 11N, Section 36	Spokane Creek Bay - 20 feet from the bank on the west side of Hauser Lake 600 feet upstream from Spokane Creek Bay	150 x 2,250	8	16-23
S-4	Range 2W, Township 11N, Sections 23, 24, & 26	Metropolitan Bar – 10 to 20 feet from the bank on the east side of Hauser Lake from Devil's Elbow upstream to Metropolitan Bar	800 x 6,500	119	10-20
S-5	Range 2W, Township 11N, Section 13	Mouth of Trout Creek - 35 feet from the bank on the east side of Hauser Lake outside of Trout Creek Bay	125 x 650	2	30-50

Figure 1: Approximate Suction Dredging Locations



B Effluent Characteristics

Both effluent sampling and sediment sampling was conducted during the period of record (POR). Sediment sampling was required as a special condition of the 2009 permit to determine if pollutants would be reintroduced to the water column through the suction dredging process. The POR includes data from June 2010 through October 2012, the time which the 8-inch suction dredge was operational. The 16-inch dredge did not operate during the last permit cycle. Table 3 presents the effluent data collected during the POR. Table 4 summarizes the sediment data collected during the POR.

Table 3: Effluent Characteristics for Period of Record June 2010 through October 2012

Parameter	Sample Location	Units	2009 Permit Limit	Minimum Value	Maximum Value	Average Value	Number of Records
Operating Days per Month	N/A	Days per Month	(1)	2	14	7	7
Turbidity	Upstream	NTU	(1)	1.08	10.0	3.65	7
	Downstream	NTU	(1)	0.31	10.0	3.65	7
	Net	NTU	5	0.4	2.5	1.1	7
Flow Rate, Monthly Average	Effluent	Gal/min	(1)	300	300	300	6
Flow Rate, Monthly Max	Effluent	Gal/min	(1)	500	500	500	6
Oil and Grease, Visual Survey	Effluent	N=0;Y=1	N/A	0	0	0	6
Dissolved Oxygen	Effluent	mg/L	(1)	10.4	10.4	10.4	1
Total Suspended Solids	Effluent	mg/L	(1)	11	84	48.4	5
Raw Materials Processed	N/A	Ton/day	(1)	3.5	21	11.1	7
Oil and Grease	Effluent	mg/L	10	0	0	0	0
Whole Effluent Toxicity	Effluent	Pass=0;Fail=1	0	0	0	0	3

Footnotes:
(1) No effluent limit in previous permit, monitoring requirement only.

Table 4: Facility Sediment Sampling Results				
Parameter	Units	Sample #1	Sample #2	ML
Antimony(1)	mg/kg	ND	ND	0.5
Arsenic(1)	mg/kg	8.7	4.6	0.3
Beryllium(1)	mg/kg	0.2	0.3	0.2
Cadmium(1)	mg/kg	ND	ND	0.4
Chromium(1)	mg/kg	7.1	0.83	0.3
Copper(1)	mg/kg	7	12	1
Lead(1)	mg/kg	4.6	3.9	0.5
Mercury(1)	mg/kg	ND	ND	1
Nickel(1)	mg/kg	7.1	7.4	0.5
Selenium(1)	mg/kg	0.2	0.1	0.1
Silver(1)	mg/kg	ND	ND	0.5
Thallium(1)	mg/kg	0.1	0.1	0.1
Zinc(1)	mg/kg	28	27	1
4,4'-DDD	mg/kg	ND	ND	0.0017
4,4'-DDE	mg/kg	ND	ND	0.0017
4 4'-DDT	mg/kg	ND	ND	1
Aldrin	mg/kg	ND	ND	0.0017
alpha-BHC	mg/kg	ND	ND	0.0017
alpha-Chlordane	mg/kg	ND	ND	0.0017
beta-BHC	mg/kg	ND	ND	0.0017
Chlordane	mg/kg	ND	ND	0.0017
delta-BHC	mg/kg	ND	ND	0.0017
Dieldrin	mg/kg	ND	ND	0.0017
Endosulfan I	mg/kg	ND	ND	0.0017
Endosulfan II	mg/kg	ND	ND	0.0017
Endosulfan sulfate	mg/kg	ND	ND	0.0017
Endrin	mg/kg	ND	ND	0.0017
Endrin aldehyde	mg/kg	ND	ND	0.0017
Endrin ketone	mg/kg	ND	ND	0.0017
gamma-BHC (Lindane)	mg/kg	ND	ND	0.0017
gamma-Chlordane	mg/kg	ND	ND	0.0017
Heptachlor	mg/kg	ND	ND	0.0017
Heptachlor epoxide	mg/kg	ND	ND	0.0017
Methoxychlor	mg/kg	ND	ND	0.0017
Toxaphene	mg/kg	ND	ND	0.17
PCBs	mg/kg	ND	ND	0.017

Footnotes:
ND – Not detected at the reporting limit
(1) All metals are total recoverable

C. Compliance History

No effluent limit exceedances occurred during the POR. All violations issued during the POR were for missing discharge monitoring reports (DMRs), which were later submitted.

The facility has been inspected four times since the 2009 permit was issued. Inspections were conducted on January 18, 2011, November 7, 2012, August 4, 2015 and July 12, 2017. The 2011, 2015, and 2017 inspections found no instances of noncompliance, while the 2012 inspection found multiple violations including the failure to calibrate equipment, and failure to maintain records.

III. Technology-based Effluent Limits

A. Applicability

Effluent Limit Guidelines (ELGs) have been promulgated under Subchapter M – Gold Placer Mine Subcategory (40 CFR Part 440.140) for mines and dredges that produce gold or gold bearing ores from placer deposits and beneficiation processes which use gravity separation methods for recovering gold from placer deposits. These ELGs are not applicable to dredges that process less than 50,000 cubic yards of ore per year or to dredges located in open waters (open bays, marine waters or major rivers).

The dredging activities authorized in this permit take place entirely on open waters, and therefore are not subject to the Gold Placer Mine ELGs. Because these ELGs do not apply, best professional judgement (BPJ) has been used to develop technology-based effluent limits (TBELs) for this permit.

The most relevant ELGs for this activity are under Subpart M – Golder Placer Mine Subcategory discussed above. The limitations within the ELGs are based upon the use of sedimentation ponds, and measure the effectiveness of the control technology through monitoring total settleable solids of the effluent. The use of sedimentation ponds as a control technology is not appropriate for this source, as it operates on open water. The permittee has been required in past Section 310 permits to re-contour the lakebed to original conditions, prohibiting the using of any control technology which would capture sediment from the process. There are no other control technologies which could be considered reasonable for this industrial activity, and no numeric TBELs will be applied. TBELs will be based upon narrative best management practices (BMPs), which will limit pollution through operational restrictions and the implementation of management plans.

The following BMPs are required:

No chemical addition for the enhancement of gold, sapphires or mineral recovery is allowed in any operation covered under this permit.

Dredging of concentrated silt and clay must be avoided. The permittee must use reasonable care to avoid dredging silt and clay materials that would result in a significant increase in turbidity or other pollutants. Reasonable care includes moving the dredge to a new location or reducing the volume of effluent discharge by limiting the pumping rate of the suction dredge.

Follow the best management plan for fuel storage, handling and transportation which was developed during the 2009 permit cycle. Update the plan as necessary to minimize the risk of fuel leaks and spills.

B. Nondegradation Load Allocations

Sources that are in compliance with the conditions of their permit and do not exceed the limits established in the permit or determined from a permit previously issued by the Department are not considered new or increased sources.

The two suction dredges operated by Paleo Search are currently in compliance with the conditions of their permit and are not proposing to increase the volume or nature of discharge. Based on this analysis, the discharge does not constitute a new or increased source for the purposes of Montana Nondegradation requirements.

IV. Water Quality-based Effluent Limits

A. Scope and Authority

Permits are required to include water quality-based effluent limits (WQBELs) when technology-based effluent limits are not adequate to protect state water quality standards. Montana water quality standards require that no wastes may be discharged that can reasonably be expected to violate any state water quality standards. Montana water quality standards also define both water use classifications for all state waters and numeric and narrative standards that protect those designated uses.

B. Receiving Water

Hauser Lake is a 14-mile long impounded section of the Missouri River that was created when Hauser Dam was constructed in approximately 1910 on the north portion of the Missouri River. There is always some flow in Hauser Lake in order to regulate the flow of water in the Missouri River. The surface area of the lake is 3,800 acres, with a mean depth of 26 feet and a maximum depth of 70 feet. The average water retention time in the lake is 8 days (Upper Missouri River Reservoir Fisheries Management Plan 2010-2019, FWP Fisheries Division, February 2010).

The Missouri River at Hauser Lake is classified as B-1 according to Montana Water Use Classifications. B-1 waters are to be maintained suitable for drinking, culinary and food processing purposes, after conventional treatment; bathing, swimming, and recreation, growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply

Hauser Lake is located within the Missouri-Sun-Smith watershed as identified by United States Geological Survey (USGS) Hydrological Unit Code 10030101. The water body assessment unit is MT41I007_040. Hauser Lake is listed in the 2016 Final Water Quality Integrated Report as not fully supporting drinking water and aquatic life uses. Impairments include arsenic, DDT, endosulfan sulfate, endrin aldehyde, mercury, nitrate plus nitrite as N, dissolved oxygen and total phosphorus. No total maximum daily loads (TMDLs) have been completed for any of the impairments.

The estimated 7-day average flow of the receiving water which is expected to occur on average once in 10-years (7Q10) for the Missouri River 0.2 mile downstream from Hauser Dam is 1760 cubic feet per second (cfs) (USGS station 06065500). The annual average discharge rate from the 8-inch dredge, Outfall 001 is 0.67 cfs, which correlates to a 7Q10 dilution ratio of 2827:1. The 16-inch dredge did not discharge during the POR, and no historical average discharge values are available. The maximum design discharge rate from the 16-inch dredge is 10.0 cfs, which correlates to a 7Q10 dilution ratio of 176:1.

Ambient water quality data for Hauser Lake were obtained from the US EPA STORET Database and the USGS National Water Information System (NWIS) database. Monitoring data were primarily collected at a NorthWestern Energy monitoring site (MM-6) and USGS site (USGS-06058502), both located below Canyon Ferry Dam, approximately 0.5 miles upstream of the nearest dredging location. Ambient data was also collected from facility sampling conducted within Hauser Lake. Additional data for thallium concentrations were obtained from Montana DEQ monitoring sites M09MISSR04 and M09MISSR02 located upstream of Canyon Ferry Reservoir, approximately 45 and 60 miles upstream of the closest dredging location. The additional thallium data was used because facility sampling data do not meet an acceptable detection level to assess background concentrations. The monitoring data are summarized in in Table 5.

Table 5: Hauser Lake and Missouri River Ambient Water Quality Monitoring Data

Parameter(1)	Units	75th Percentile	Number of Samples	Monitoring Data Source	Monitoring Data Timeframe
Hardness(2)	mg/L	130	69	USGS-06058502, Facility Sampling	1980-1987, 2010-2011
Arsenic	mg/L	0.024	15	MM-6, Facility Sampling	2010-2011
Beryllium(3)	mg/L	<0.001	2	Facility Sampling	2010-2011
Cadmium(3)	mg/L	<0.0001	15	MM-6, Facility Sampling	2010-2011
Chromium(3)	mg/L	<0.001	2	Facility Sampling	2010-2011
Copper	mg/L	0.003	15	MM-6, Facility Sampling	2010-2011
Lead	mg/L	0.002	15	MM-6, Facility Sampling	2010-2011
Mercury(3)	mg/L	<0.00005	2	Facility Sampling	2010-2011
Nickel(3)	mg/L	<0.01	2	Facility Sampling	2010-2011
Selenium(3)	mg/L	<0.001	2	Facility Sampling	2010-2011
Thallium(3)	mg/L	<0.0002	2	M09MISSR02, M09MISSR04	2005
Zinc(3)	mg/L	<0.01	15	MM-6, Facility Sampling	2010 - 2011

Footnotes:
(1) All metals are total recoverable
(2) Hardness is the 25th percentile.
(3) Parameter not detected above the reporting limit. Reporting limit value used in place of the 75th percentile.

C. Mixing Zone

A mixing zone is an area where effluent mixes with the receiving water and certain water quality standards may be exceeded. Mixing zones must have the smallest practicable size, a minimum practicable effect on water uses, and definable boundaries. DEQ will determine the appropriateness of a mixing zone and will grant a mixing zone, deny the mixing zone, or grant an alternative or modified mixing zone.

No mixing zone will be granted that will impair beneficial uses.

Turbidity

The 2009 permit contains a 500-ft mixing zone for turbidity, which Paleo Search has requested to retain. Best Professional Judgment and nondegradation for turbidity are the reasons stated for determining the mixing zone in the June 1983 Statement of Basis. Mixing zones allowed under a permit issued prior to April 29, 1993 will remain in effect unless there is evidence that previously allowed mixing zones will impair beneficial uses. The 500-ft turbidity mixing zone was first granted in 1983 and does not impair existing beneficial uses. Therefore, the 500-foot mixing zone for turbidity will be granted in this permit.

Metals

The permittee has requested standard mixing zones based on chronic and human health criteria for all metals. Hauser Lake is an impounded portion of the Missouri River which has an average water retention time of 8 days. Unlike a typical lake where there would not be significant flow, water in Hauser Lake is always moving, therefore the facility is eligible for a standard mixing zone, and restrictions on mixing zones in a lake are not applicable. Paleo Search provided the necessary information for DEQ to conduct a water quality assessment addressing the factors listed in ARM 17.30.506. Upon reviewing the information provided by Paleo Search, DEQ has determined that the granting of standard mixing zones for recoverable metals will not threaten or impair existing beneficial uses. As discussed above, the discharge ratio for the mean annual facility discharge is 2827:1, and the mean annual facility discharge rate is 0.432 mgd (0.67 cfs). These values meet the requirements for the issuance of a standard mixing zone.

Full dilution with the 7Q10 of Hauser Lake (1,760 cfs) will be used to assess reasonable potential to exceed the chronic and human health standards for all metals. Based upon the information submitted by Paleo Search, DEQ has also determined that minimal initial dilution used will not threaten or impair existing beneficial uses. 2% dilution with the 7Q10 of Hauser Lake (35.2 cfs) will be used to assess reasonable potential to exceed acute standards for all metals.

E. Basis and Proposed Water Quality-Based Effluent Limits

MPDES permit limitations must control all pollutants which will cause, or have reasonable potential (RP) to cause or contribute to an excursion above any state water quality standard, including narrative criteria. The pollutants of concern evaluated for RP include pollutants which have limits in the current permit and pollutants determined to be present through sediment sampling. Table 6 identifies all pollutants of concern and the basis for their inclusion.

Table 6. Identification of Pollutants of Concern

Parameter[(1)]	Basis for POC Identification
Turbidity	Previous permit, known present
Oil and Grease	Previous permit, potentially present
Arsenic	Present in sediment
Beryllium	Present in sediment
Chromium	Present in sediment
Copper	Present in sediment
Lead	Present in sediment
Nickel	Present in sediment
Selenium	Present in sediment
Thallium	Present in sediment
Zinc	Present in sediment

Footnotes:
(1) All metals are total recoverable

DEQ uses a mass balance equation (see *Equation 1*) to determine RP and develop WQBELs, based on EPA's Technical Support Document for Water Quality-based Toxics Control, March 1991 (TSD), EPA/505/2-90-001.

$$C_r = \frac{Q_d C_d + Q_s C_s}{Q_d + Q_s} \qquad (\textit{Equation 1})$$

Where:

C_r = the resulting receiving water concentration (RWC)
Q_d = critical discharge rate (average daily flow)
Q_s = critical receiving water low-flow (available dilution of 7Q10)
C_d = critical effluent pollutant concentration (maximum discharge concentration x TSD multiplier)
C_s = critical ambient pollutant concentration (75^{th} percentile concentration)

1. Conventional Pollutants

Oil and Grease - The 2009 permit included a daily maximum limitation on oil and grease of 10 mg/L, to be visually monitored daily, with a sample collected if an oil film is observed. Montana regulations require state waters be free from substances attributable to industrial discharges that will result in a visible oil film, or concentrations of oil and grease at or in excess of 10 mg/L. The limit and monitoring requirements will be retained in the proposed permit.

2. Non-conventional Pollutants

Turbidity – The 2009 permit includes a limit of a five nephelometric turbidity unit (NTU) increase in turbidity, applied at the end of a 500 foot mixing zone. State regulations limit average turbidity to five NTUs over naturally occurring turbidity, for B-1 water. The previous permit contained the following effluent limit for turbidity: "At any point in the receiving stream 500 feet downstream (mixing zone length) of the dredge discharge point, the maximum allowable increase in turbidity over the natural receiving stream turbidity (measured 10 feet upstream of the discharge point) shall be five (5) NTUs". The limit and daily monitoring requirements will be retained in the proposed permit.

Sediment/Suspended Sediment - The following sediment standard applies to B-1 water: No increases are allowed above naturally occurring concentrations of sediment or suspended sediment, settleable solids, oil, or floating solids, which will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife.

Effluent data for total suspended solids (TSS) was collected during the POR, and ranged from 11 to 84 mg/L. There are no numeric water quality standards for TSS that could be used in evaluating water quality impacts. As such, no effluent limits or monitoring for

TSS will be included in the proposed permit. Compliance with the narrative limits for sediment impairment will be assessed through implementation of the turbidity limits and monitoring discussed above.

2. Toxic Pollutants

Total Recoverable Metals – Table 7 summarizes numeric metals water quality standards for Hauser Lake, based on DEQ-7 and the hardness-based metals standards calculations presented therein.

Table 7: Numeric Water Quality Standards for Metals

Parameter[(1)]	Aquatic Life Standards		Human Health Standards
	Acute (µg/L)	Chronic (µg/L)	Surface Water (µg/L)
Arsenic	340	150	10
Beryllium	N/A	N/A	4
Chromium	N/A	N/A	100
Copper[(2)]	17.9	11.7	1,300
Lead[(2)]	114	4.4	100
Mercury	1.7	0.91	0.05
Nickel[(2)]	586	65.1	100
Selenium	20	5	50
Thallium	N/A	N/A	0.24
Zinc[(2)]	150	150	2,000

Footnotes:
(1) All metals are total recoverable
(2) Hardness based limit calculated using 130 mg/L $CaCO_3$, the 25th percentile value for Hauser Lake.

Sediment sampling conducted by the permittee identified multiple metals in the raw material within the dredging locations which have the potential to be reintroduced to the receiving water through the suction dredging process. To calculate RP, the maximum sediment metals concentration was used with the average facility discharge and material process rates to calculate a maximum potential effluent concentration, as shown in *Equation 2* below:

$$C_r = \frac{\text{(Max Sediment Pollutant Concentration, mg/kg) x (Avg Daily Process Rate, kg/day)}}{\text{(Avg Daily Discharge Rate, L/day)}}$$

Where:

Average Daily Discharge Rate = 300 gpm = 1,635,297 L/day
Average Daily Process Rate = 21 tons/day = 19,051 kg/day
Maximum Sediment Pollutant Concentration is the maximum value for each pollutant listed in Table 4

The resulting maximum effluent concentrations calculated using *Equation 2* are summarized in Table 8.

Table 8: Calculated Maximum Effluent Concentrations

Parameter [(1)]	Maximum Sediment Concentration (mg/kg)	Calculated Maximum Effluent Concentration	
		(mg/L)	(µg/L)
Arsenic	8.7	0.101	101
Beryllium	0.3	0.003	3
Chromium	7.1	0.083	83
Copper	12	0.140	140
Lead	4.6	0.054	54
Nickel	7.4	0.083	83
Selenium	0.2	0.002	2
Thallium	0.1	0.001	1
Zinc	28	0.326	326

Footnotes:
(1) All metals are total recoverable

Table 9 summarizes the RP assessment for metals (see Equation 1). Parameters that exhibit RP are discussed below. See Attachment C for RP calculations.

Table 9: Reasonable Potential Analysis for Metals

Parameter[(1)]	Maximum Discharge Concentration mg/L	No. Samples	TSD Table 3-2 Multiplier	Projected Maximum Effluent Concentration C_d (mg/L)	75th Percentile Background Concentration C_s (mg/L)	C_r acute (mg/L)	C_r chronic/HH (mg/L)[(2)]	RP
Arsenic	0.101	2	3.79	0.38	0.024	0.03	0.24	Yes
Beryllium	0.003	2	3.79	0.11	<0.001	N/A	0.001	No
Chromium	0.083	2	3.79	0.31	0.001	N/A	0.001	No
Copper	0.140	2	3.79	0.53	0.003	0.013	0.003	No
Lead	0.054	2	3.79	0.20	0.002	0.01	0.002	No
Nickel	0.083	2	3.79	0.33	0.01	0.02	0.010	No
Selenium	0.002	2	3.79	0.008	0.001	0.001	0.001	No
Thallium	0.001	2	3.79	0.004	0.0002	N/A	0.0002	No
Zinc	0.326	2	3.79	1.24	0.01	0.03	0.01	No

Footnotes:
(1) All metals are total recoverable
(2) Calculated using 100% dilution with the 7Q10, as discussed in Section IV.D.

Arsenic – Ambient arsenic levels in Hauser Lake exceed the human health standard of 10 µg/L, with a 75th percentile background concentration of 24 µg/L. After considering full dilution of the effluent for arsenic human health standards, any contribution from the Paleo Search discharge to the receiving water is minimal. Paleo Search does not add or concentrate arsenic during the dredging process. Based on these factors, a limit based on the human health standards will not be implemented.

Whole Effluent Toxicity (WET) – State regulations require that state waters be free from substances which are harmful or toxic to human, animal, plant or aquatic life, and provides the basis for whole effluent toxicity (WET) requirements in MPDES permits. The following endpoints define acute and chronic toxicity as measured in a WET test:

- During an acute WET test acute toxicity occurs when 50 percent mortality is observed for any tested species at any effluent concentration (i.e., LC50 < 100% effluent)

- During a chronic WET test chronic toxicity occurs when the 25% inhibition concentration (IC25) for any tested species is less than or equal to the percent effluent represented by the effluent concentration in the receiving water after accounting for any allowable dilution.

If DEQ determines there is RP for a discharge to cause acute and/or chronic toxicity, the MPDES permit may be updated to included limits for WET based on one, or both, of the endpoints above.

The dilution ratio for the facility is 176:1. Therefore, since the dilution ratio is greater than 100:1, the appropriate WET test is for acute toxicity. Semi-annual acute WET testing using two species will be required of the facility starting the first full semi-annual period after the permit effective date.

Confirmation of acute toxicity in the effluent will trigger the standard toxicity identification/toxicity reduction (TIE/TRE) requirements of the permit. Standard WET language will be included in the permit and will describe the test methods, test conditions, endpoints, test acceptability criteria, reporting requirements, and accelerated testing-TIE/TRE requirements.

If the results for four consecutive semi-annual periods of testing indicate no acute toxicity, a reduction to acute testing on two species annually will become effective.

V. Proposed Effluent Limits

Table 11: Final Effluent Limits

Parameter	Units	Effluent Limitations (1)		
		Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit
Turbidity(2) (3)	NTU		5 NTU increase above naturally occurring turbidity	
Oil and Grease	mg/L	--	--	10

Footnotes:
(1) See definitions in the permit.
(2) Compliance with the turbidity limit shall be determined based upon the difference between the upstream turbidity value and the downstream turbidity value, collected at the downstream end of the 500 foot mixing zone during periods of discharge.
(3) If the turbidity limit is exceeded, Paleo Search must cease discharging and make operations changes to reduce turbidity and comply with the turbidity limit.

There shall be no discharge which causes visible oil sheen in the receiving stream.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

VI. Monitoring Requirements

All analytical procedures must comply with the specifications of 40 CFR Part 136 and the analyses must meet any Required Reporting Values (RRVs) listed in Circular DEQ-7 unless otherwise specified. Samples shall be collected, preserved and analyzed in accordance with approved procedures listed in 40 CFR 136.

A. Effluent Monitoring

1. Outfall 001 - 8-inch Suction Dredge

To obtain representative effluent samples, equal volumes of effluent must be obtained from the three discharge structures (see Attachment A) and combined before sample parameters are analyzed.

2. Outfall 002 - 16-inch Suction Dredge

To obtain representative effluent samples, equal volumes of effluent must be obtained from the three discharge structures (see Attachment B) and combined before sample parameters are analyzed.

3. Flow

The average daily flow of each suction dredge must be estimated using the manufacturer's pump capacity or pump curves for each dredge. The average daily flow, maximum flow and number of hours the pump operates each day must be recorded in the logbook.

B. Receiving stream (Hauser Lake) monitoring

1. Upstream receiving water

Upstream receiving water samples for turbidity must be obtained on the surface of Hauser Lake at the front (or side) of the barge away from divers' supplied air bubbles.

2. Downstream receiving water

The downstream turbidity sample shall be collected and analyzed as a composite of three equal volumes of the downstream receiving water. The samples must be obtained within 4 inches of the water surface of Hauser Lake, no more than 500 feet downstream from the barge, while the facility is discharging.

C. Estimating cubic yards of raw material (gravel, cobbles and rocks)

The diver operating the suction dredge intake must mark the starting point where dredging will occur each day. After completing suction dredging each day, the diver must estimate the length and width (in feet) of the area and estimate the average depth (in feet) of raw material dredged. The tonnage shall be estimated using a conversion factor of 1.4 tons/cubic yard (email from James Conner, DEQ Opencut Mining Program, June 1, 2009). Using these collected dimensions, calculate the total volume and tonnage using the equations below:

$$\text{Volume } (ft^3) = \text{Length (ft)} \times \text{Width (ft)} \times \text{Average Depth (ft)}$$

$$\text{Tonnage} = \frac{\text{Volume (ft3)} \times 1.4 \text{ tons/yd}}{27 \text{ ft}^3/\text{yd}}$$

Record the cubic yards and tons of raw material dredged each day in the logbook. Total the tons of raw material dredged each month and report on the DMR form.

Table 12: Monitoring and Reporting Requirements

Parameter	Monitoring Location	Units	Sample Type[1]	Minimum Sample Frequency	Reporting Metric	Required Reporting Value
Turbidity	Upstream	NTU	Grab	Daily	Daily Minimum	NA
Turbidity	Downstream	NTU	Composite[2]	Daily	Daily Maximum	NA
Net Turbidity[3]	Net Turbidity	NTU	Calculated	Daily	Maximum Weekly Average	NA
Flow	Effluent	mgd	Calculated	Daily	Maximum Daily and Monthly Average	NA
Oil and Grease[4]	Effluent	mg/L	Visual / Grab	Daily	Daily Maximum	NA
Total tons of raw material processed[5]	Intake	Tons/Day	Calculated	Daily	Maximum Weekly Average Monthly Average	0
Whole Effluent Toxicity Testing, acute	Effluent	% Effluent	Composite[6]	Semi-Annual	Pass/Fail	---

Footnotes: NA=Not applicable

(1) See definition section at end of permit for explanation of terms.
(2) A composite sample for downstream turbidity sampling shall consist of three equal volumes of the downstream receiving water.
(3) Net turbidity is calculated by subtracting the upstream turbidity value measured at the front of the barge from the turbidity value measured in the receiving stream at the downstream end of the 500-foot mixing zone [Turbidity at the end of the downstream 500-foot mixing zone (Downstream) - Turbidity in receiving water at the front of barge (Upstream) = Net turbidity].
(4) If a visual examination of the effluent indicates the presence of hydrocarbons, by sheen, odor or other sign, the permittee must stop operations, eliminate the source and is required to collect a sample for Oil and Grease and analyze it using EPA Method 1664A or equivalent.
(5) The total tons of raw material processed each day must be calculated using the method described in Section VI.C and recorded in the daily logbook. The total tons of raw material processed each month must be reported on the DMR.
(6) Conduct composite sampling for whole effluent toxicity testing as defined in Part V.8 of the permit.

D. Additional Reporting Requirements

The permittee must record the average daily flow, maximum flow and number of hours the dredge pump operates each day; monitoring results, records of any visual observations (especially for oil and grease), total cubic yards and tons of raw material processed each day, and a description of any changes in the operation in a logbook. The logbook must be made available to DEQ upon request.

VII. Nonsignificance Determination

DEQ has determined that the activity is not a new or increased source that resulted in a change of existing water quality on or after April 29, 1993. Paleo Search is not proposing any increases in flows or any additional sources of pollution. DEQ is therefore not required to make a nonsignificance determination.

VIII. Special Conditions/Compliance Schedule

A. The permittee shall develop, maintain and implement a Best Management Plan for fuel storage, handling, and transportation. The Plan must address spill responses and shall be updated as necessary to incorporate changes in fuel storage, handling, and transportation procedures. A copy of the plan must be located at the facility and the plan must be available to DEQ during inspections.

B. No chemical addition for the enhancement of gold, sapphires or mineral recovery is allowed in any operation covered under this permit.

C. Dredging of concentrated silt and clay shall be avoided. The permittee must use reasonable care to avoid dredging silt and clay materials that would result in a significant increase in turbidity or other pollutants. Reasonable care includes moving the dredge to a new location or reducing the volume of effluent discharge by limiting the pumping rate of the suction dredge.

IX. Public Participation

A. Public Notice

DEQ issued Public Notice No. MT-18-03 dated February 12, 2018. The public notice states that a tentative decision has been made to issue an MPDES permit to the Permittee and that a draft permit, fact sheet and environmental assessment (EA) have been prepared. Public comments are invited any time prior to the close of the business on March 14, 2018. Comments may be directed to:

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

Or

DEQWPBPublicComments@mt.gov

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

and issue a final decision within sixty days of the close of the public comment period or as soon as possible thereafter.

All persons, including the applicant, who believe any condition of a 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).

B. Notification of Interested Parties

Copies of the public notice were mailed to the discharger, state and federal agencies and interested persons who have expressed an interest in being notified of permit actions. A copy of the distribution list is available in the administrative record for this permit. In addition to mailing the public notice, a copy of the notice and applicable draft permit, fact sheet and EA were posted on DEQ's website for 30 days.

Any person interested in being placed on the mailing list for information regarding this MPDES permit should contact DEQ, reference this facility, and provide a name, address, and email address.

C. Public Hearing

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.

D. Permit Appeal

After the close of the public comment period DEQ will issue a final permit decision. A final permit decision means a final decision to issue, deny, modify, revoke and reissue, or, terminate a permit. A permit decision is effective 30 days after the date of issuance unless a later date is specified in the decision, a stay is granted, or the applicant files an appeal.

The Applicant may file an appeal within 30 days of DEQ's action to the following address:

Secretary, Board of Environmental Review
Department of Environmental Quality
1520 East Sixth Avenue
PO Box 200901
Helena, Montana 59620-0901

E. Additional Information

Requests for additional information or questions regarding this permit should be directed to the Water Protection Bureau at 406-444-3080.

X. Information Sources

CWAIC: Clean Water Act Information Center, Department of Environmental Quality, (http://deq.mt.gov/Water/WQPB/cwaic (accessed 2017)

DEQ 2016: *Montana 2016 Water Quality Integrated Report* (January 2017)

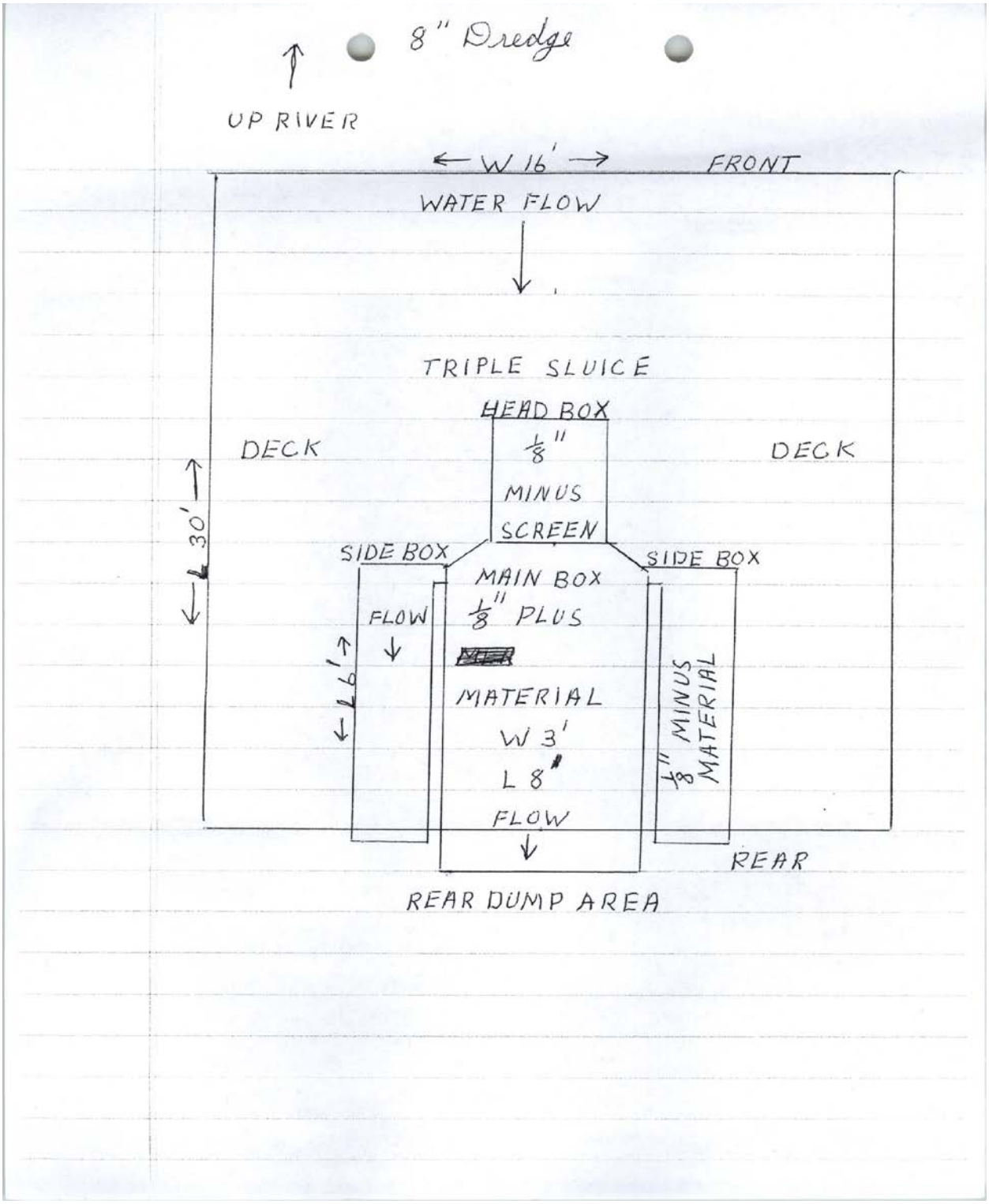
DEQ 2012: Department of Environmental Quality, Circular DEQ-7, Montana Numeric Water Quality Standards (October 2012)

EPA 1991: *Technical Support Document for Water Quality-based Toxics Control*, US Environmental Protection Agency (March 1991)

USGS 2015: *Statistical Summaries of Streamflow in Montana and Adjacent Areas, Water Years 1900 through 2009*, US Geological Survey Scientific Investigations Report 2015-Draft Manuscript (Electronic, 2015)

Fact Sheet prepared: January 2018

Attachment A
Outfall 001



Attachment B
Outfall 002