MYSTERY CREEK RESOURCES, INC.

NIXON FORK MINE

ENVIRONMENTAL ASSESSMENT

(AK-040-04-EA-022)

BUREAU OF LAND MANAGEMENT

ANCHORAGE FIELD OFFICE

ANCHORAGE, ALASKA

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Executive Summary
Nixon Fork Mine Environmental Assessment

The Nixon Fork Mine is a lode gold mine located 32 miles northeast of McGrath, AK, within Township 26 South, Ranges 21 and 22 East, Kateel River Meridian. It is located on federal unpatented mining claims and state mining claims. While mining has occurred in the vicinity for many years, the latest efforts began about 1990. Operations at Nixon Fork have been evaluated in two environmental assessments (1991, 1995), both resulting in a finding of no significant impact. Beginning in 1995, all federal and state permits were obtained. Mine adits were opened, an airstrip, tailings impound, mill, offices, housing, and a utility system were constructed, and mining and milling began. Production was suspended in 1999 with the bankruptcy of the parent holding company.

Mystery Creek Resources, Inc. (MCRI) has obtained a lease on the property. MCRI is in the process of evaluating the economic feasibility of operating the mine, and is proceeding to renew/obtain federal and state authorizations. If economically justified, the mine would be put into commercial production in late 2005 or early 2006. The expected life of the mine is four to six years from production through the first year of reclamation, with a current estimated resource of 150,000 ounces of gold. Mine life could be extended if exploration efforts identify additional resources. The mine would be operated 365 days per year with a crew of 40-45 housed on site. Access to the site is by air with an existing airstrip that would accommodate C-130 or Hercules size aircraft.

The proposed operation generally would be as was permitted from 1995-1999, with the following exceptions. The milling circuit would be modified to provide for a cyanide leach facility, and electrowinning treatment of leach products to produce a gold-silver dore' and a copper concentrate on site. This hydrometallurgical process allows for recovery and destruction of the cyanide. Cyanide solutions would be recycled in the system, and tailings would go through a cyanide destruction process. No free cyanide would be released to the environment in the milling process.

Existing tailings in the impoundment would be pumped to the mill for processing to recover residual gold. The reprocessed tailings and tailings from mined ore would be dry stacked at a filtered tailings disposal site (FTDS) constructed on a previously disturbed area. After the existing tailings are removed, the lined impoundment would be inspected and potentially raised to a higher elevation before being put back in to service as a zero discharge tailings pond.

Meteoric Water Modeling Procedure (MWMP) results of three sets of tailings found a few metals exceeding the most stringent standards. Analysis of existing pond tailings, development rock, and bench tests of newly mined ore samples found that the neutralization potential is higher than the acid generation potential, which reduces the risk of developing conditions that would leach metals from these materials in the future.

The action is subject to mandatory conditions of operation designed to protect environmental resources and values. The facility sits on 89.2 disturbed acres. An additional 38.2 to 88.2 acres would be disturbed, most of which were in the Plan of Operations (Plan) of the prior operator. The mine is small, underground, with little to no runoff, and with a non-acid producing rock dump and tailings pond. It would operate using a cyanide destruct process coupled with a no discharge tailings pond. Air emissions are limited by an Owner Requested Limit. Reclamation of disturbed areas would commence when an area was no longer needed for mining operations. The total site would be reclaimed at the conclusion of mining according to a Plan approved by BLM and the State of Alaska. A bond for the cost of reclamation, would be required and administered by BLM and/or the State, and posted by MCRI prior to beginning operations.

The proposed Plan would not result in a significant restriction of subsistence uses because no reduction in harvestable resources is expected, no reduction in the availability of resources resulting from changes in migration, location, or distribution of such resources is expected, and no significant alteration of access to subsistence resources would be created from the Proposed Action.

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Chapter 1
Introduction

Mystery Creek Resources, Inc. (MCRI) proposes to reopen the Nixon Fork Mine located on federal mining claims approximately 32 miles northeast of McGrath, Alaska. This environmental assessment (EA) for the Proposed Action is based upon a separate project document titled *Nixon Fork Mine Plan of Operations and Reclamation Plan* (MCRI, August 2005). That document contains a detailed description of the proposed project. The reclamation plan is a stand-alone document titled *Reclamation Plan and Cost Estimate, Nixon Fork Mine, September 2005.* The environmental consequences and impact minimizing measures described in this EA are based on the descriptions in the Plan of Operations and the reclamation document.

The area surrounding the present day Nixon Fork Mine was first staked with mining claims in 1917. During the next two years a few small ore bodies were developed. In 1919, the most promising claims were taken over by the Treadwell Yukon Company. In 1920, Treadwell built a ten-stamp mill and operated the claims until 1924. Shortly thereafter, seven claims at the head of Ruby Creek, including the stamp mill, passed into the hands of the Mespelt brothers who conducted small-scale operations into the early 1950s. Since then several other small, intermittent operations have occurred. In addition to hard rock mining, placer mining occurred in Ruby and Hidden creeks. Remains of the old stamp mill and several cabins remain on the property. Figures 1-1, 1-2, and 1-3 locate the mine site. Figure 1-4 shows the existing and proposed Nixon Fork Mine area road network, airstrips, exploration areas, and other improvements that have been made since the early 1900s.

Nevada Goldfields Inc. (NGI) placed the Nixon Fork Mine in operation in 1995. A Plan of Operations was submitted to The Bureau of Land Management (BLM) in February 1995, and an environmental assessment (EA) was completed. The plan was approved with stipulations. All state and federal permits were received by NGI prior to beginning construction in mid-1995.

Production activities at the Nixon Fork Mine began in the fall of 1995 and ceased in May of 1999 when Real Del Monte Mining Corporation (parent company of NGI) and its subsidiaries were voluntarily placed into bankruptcy. A total of approximately 122,400 tonnes* of ore were produced and processed by the Nixon Fork facility while in operation. After filing for bankruptcy in the U. S. Bankruptcy Court in Delaware, the property went into receivership in mid-1999. The trustee of the U.S. Bankruptcy Court subsequently relinquished rights to the mining leases held by NGI, and later legally abandoned ownership of the inventory, equipment, and fixtures at the site. The rights to the site and facilities were returned to the federal mining claimant Mespelt & Almasy Mining Company, LLC. (Almasy) by court action. A caretaker was retained by Almasy in December 1999 to protect the mine and equipment. The "lights at the mine were turned off" to await continuation of mining under a new operator.

MCRI leased the property from Almasy in early 2003. In the spring, MCRI submitted an annual Plan of Operation for 2003/2004 to BLM, the Alaska Department of Natural Resources (ADNR), and the Alaska Department of Environmental Conservation (ADEC) calling for a phased return to full production at the mine. An annual plan of operation for 2004/05 was also submitted to the agencies. The current phase (phase one), includes: the re-commissioning of surface facilities and underground equipment needed for reclamation activities in the camp area, conducting exploration-related activities designed to increase the economic reserves of the property, and a general clean up of the site. No production has occurred since 1999. Phase two would consist of reprocessing the tailings from the tailings pond to recover minerals missed in the initial milling by NGI, and resuming–underground mining with the ore being processed through the mill.

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* Note Tonnage and grade of ore and development rock throughout this report would be expressed in metric tons (tonnes) and grade of gold and silver in grams/tonne (g/t). Tonnes = 2204.06 lbs.

Photo 1: NIXON FORK MINE

Foreground	**North end of the airstrip, fuel dump, and road into the camp**
Center	**Main camp with Crystal portal, mill, office and housing**
Left Center	**Tailings impoundment**
Right Center	**Mystery Creek portal**

Nixon Fork mine is an existing mine with all facilities in place. Because of bankruptcy, the mine has not had an operator for the past five years. During that time, several of the permits expired. These permits must be renewed for the facility to operate. In addition, three changes are proposed for the mining process. These are explained in Chapter 2.

If the feasibility study, currently underway, is favorable and required authorizations are received, MCRI proposes to begin installation of the new facilities at the mine and production operations would begin in the winter of 2005-06.

1.1 Purpose and Need for the Proposed Action.

The laws of the United States encourage the balanced use of resources on public lands, including gold and other mineral development. Gold has a unique combination of properties that make it a vital component in many medical, industrial, and electrical applications. These properties include resistance to corrosion, electrical conductivity, ductility and malleability, infrared (heat) reflectivity and thermal conductivity. Gold is also a main stay of the world's financial system. Mining provides jobs in the local economy, as well as purchases of goods and services. This is particularly important in bush Alaska where the proposed action is located. Thus, the need for the Proposed Action is to allow MCRI to develop the Nixon Fork Mine in order to produce gold and make a reasonable profit.

1.2 Conformance With Land Use Plans

The project site is located within the Southwest Planning Area managed by the BLM Anchorage Field Office (AFO). The Southwest Management Framework Plan, (MFP) states in M-2 that BLM "will provide opportunity for the development of locatable minerals throughout the planning area". These lands are also addressed in ADNR's Kuskokwim Area Plan (May 1988) as Unit 6b (ADNR, 1988). The MFP remains in effect, and changes in the planning area since its publication have not materially impacted its conclusions or determinations. The MFP is incorporated herein by reference.

The State's Kuskokwim Area Plan identified minerals and wildlife as the primary surface uses for these lands and provided management policies and guidelines for subsistence resources. The project site is also covered by the Alaska Interagency Fire Management Plan (October 1998) and lies within the Tanana/Minchumina Planning Area. Any fires occurring in the project site would be managed according to that plan.

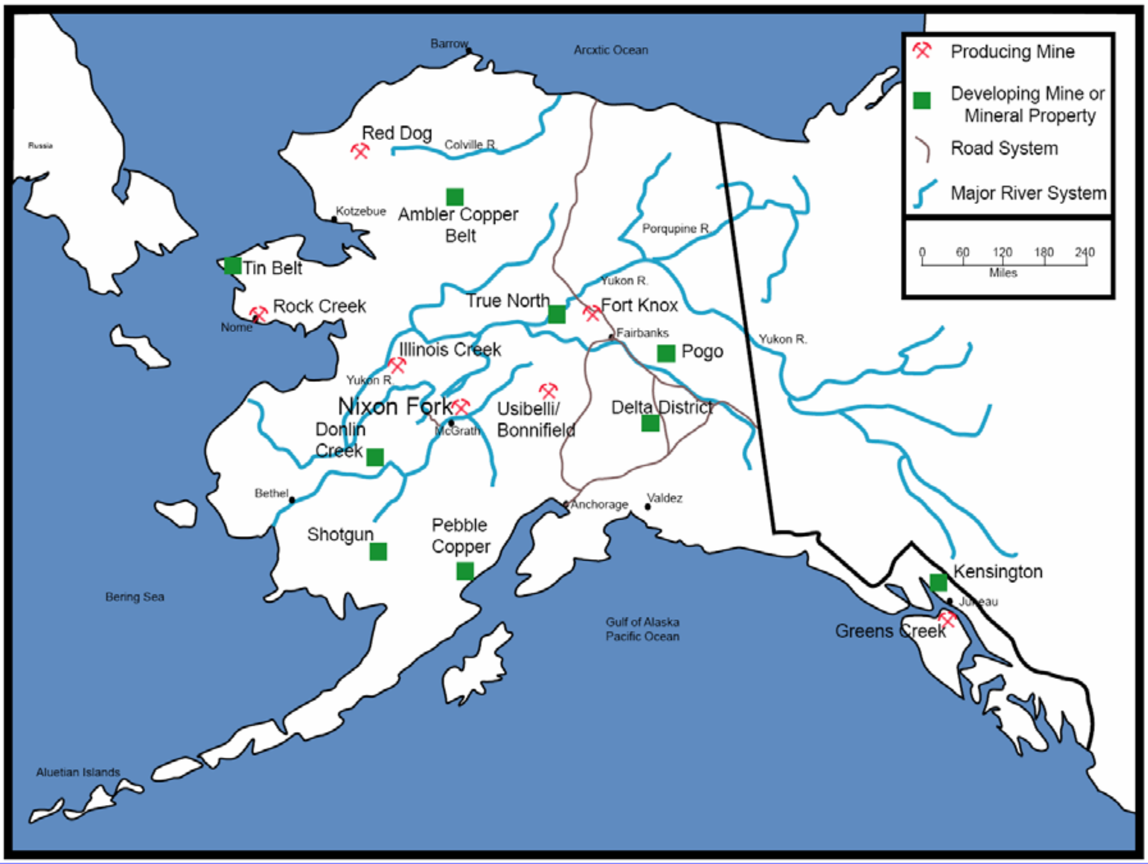
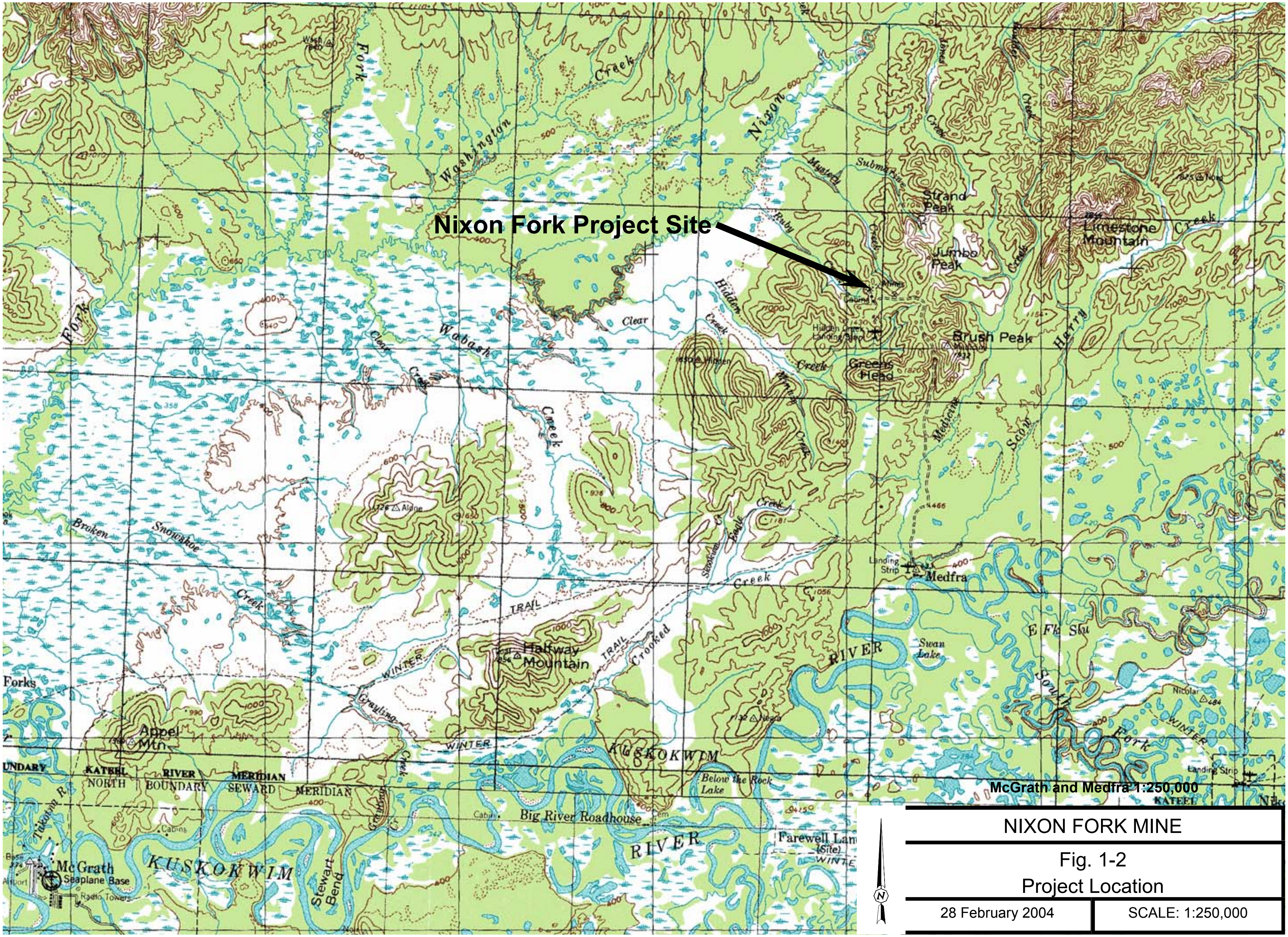


Figure 1-1. Nixon Fork General Location



NIXON FORK MINE

Fig. 1-2
Project Location

28 February 2004 | SCALE: 1:250,000

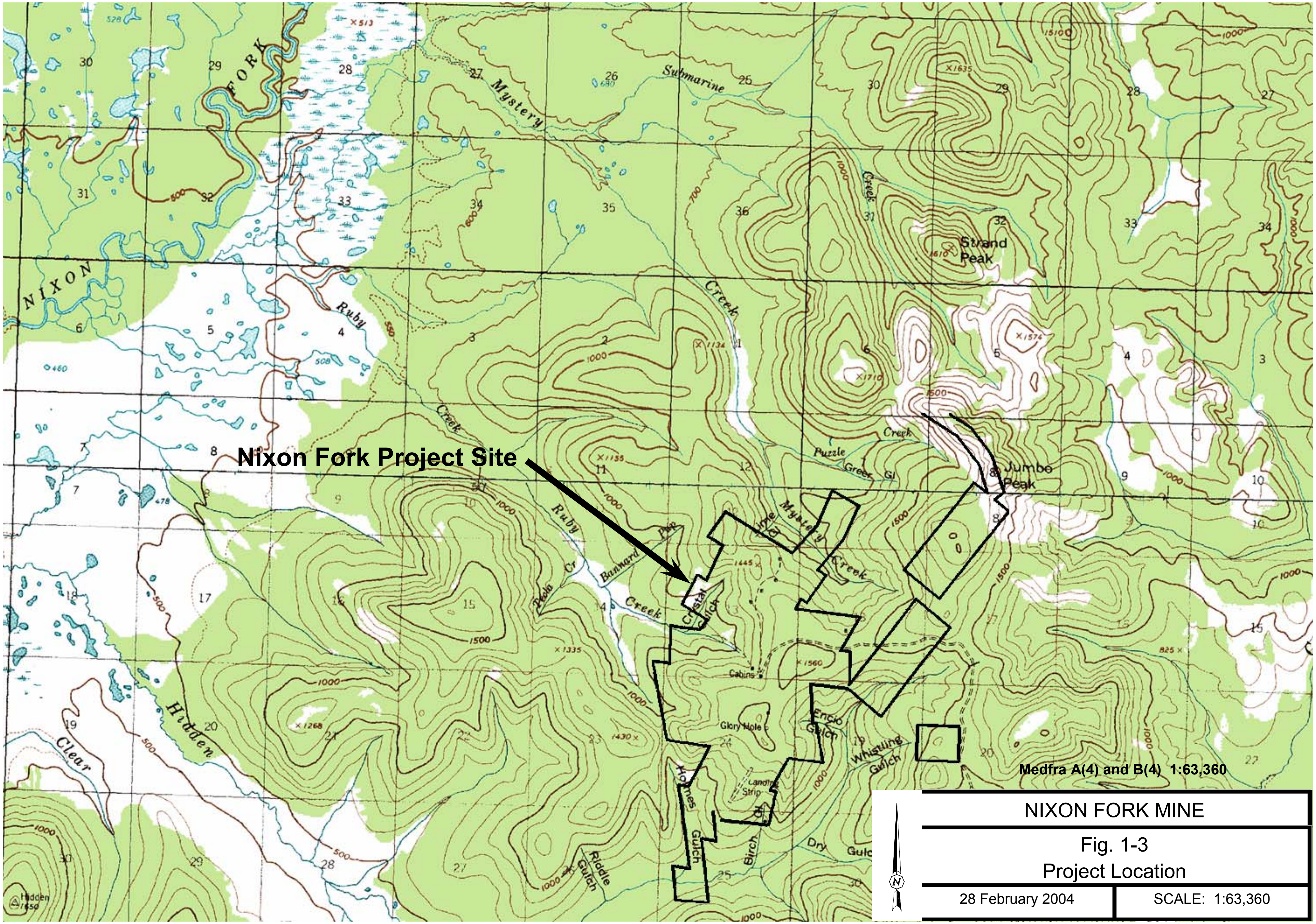

Nixon Fork Project Site
Medfra A(4) and B(4) 1:63,360
NIXON FORK MINE
Fig. 1-3
Project Location
28 February 2004
SCALE: 1:63,360

Figure 1-4

Existing Nixon Fork Mine Area Improvements

11 x 16 fold out

Chapter 2
Proposed Action and Alternatives

Three sections comprise this chapter. Section 2.1 presents the Proposed Action. Section 2.2 describes the No Action Alternative. Finally, Section 2.3 discusses other alternatives.

The proposed operation of the Nixon Fork Mine would be a continuation of production as described in the 1995 Plan of Operation and environmental assessment, and generally as permitted from 1995 through 1999 with the following exceptions:

1. Modifications to the milling circuit for better gravity recovery, and to provide for a hydrometallurgical treatment of tailings to produce a gold-silver dore′ and a copper concentrate on site;

2. Dredging and reprocessing of existing tailings;

3. Construction of a filtered tailings disposal site (FTDS) to accommodate reprocessed tailings and new tailings while the contents of the existing tailings pond are being reprocessed.

2.1 Proposed Action Project Description

2.1.1 Overview Description

The following is an overview of MCRI's proposed mining and milling activities. Detail is provided in Sections 2.1.2-2.1.24.

Project Life	Five years plus one year of reclamation, with an estimated resource of approximately 150,000 to 250,000 ounces.
Operating Period	365 days per year mining and milling.
Mining Method	Underground using various stoping methods.
Development Rock	An average of approximately 200 tonnes per day (tpd), approximately 50% of which would be stored underground.
Production Rate	Reprocessing of the tailings in the tailings pond would proceed at 350 tonnes per day until all tailings have been process.
	A mining rate of approximately 150 tpd producing approximately 10-15 tpd gold/silver/copper concentrates is proposed. The tailings would be hydrometallurgically treated on site to produce gold-silver dore′.
Milling Method	Reprocessing of the existing mill tailings in the pond would involve slurrying the tailings, pumping them to the mill building, dewatering and returning the water to the pond, adding sodium cyanide, leaching the tailings for 12 hours, filtering the tailings, killing the cyanide in the solids, and recovering the gold and silver from solution by electrowinning and dore' production.
	The actual processing of mined ore would involve crushing, grinding, gravity separation, and flotation followed by cyanide leaching of the entire flotation tails product for gold recovery. The cyanide solution would be reprocessed and reused in the system. A cyanide destruction process would be used on all tailings prior to disposal, whether the tailings are placed in the FTDS or the tailings pond to prevent free cyanide from being released to the environment. See Section 2.8 for details of the

	metallurgical process, including the use and destruction of cyanide.
Tailings Density	The density is 86.3 lbs of tailings per ft^3 of slurry (wet).
Filtered Tailings Disposal	Reprocessed tailings would be filtered and dry stacked for permanent disposal on the 13.5 acre FTDS at the high point of the old airstrip. See Fig. 1-4. Reprocessing of existing tailings would take approximately 12 months, when the pond is not frozen, to complete.
New Tailings Disposal	While the tailings pond is being emptied, and the liner inspected and repaired, tailings from newly milled ore would also be dry stacked at the FTDS. After the pond is reactivated, new tailings would be pumped to the tailings pond and deposited sub-aerial (summer), and sub-aqueous (winter).
Tailings Impoundment	The capacity of the existing 10.2 acre, artificially lined, 152,000-tonne, zero discharge facility may be, if resources justify, increased by 294,000 tonnes, for a total capacity of 446,000 tonnes. Raising the dam 24 ft from the existing elevation of 984 ft above sea level to 1008 ft. above sea level would provide this capacity.
Water Supply	MCRI is permitted by the State to withdraw 54,800 gallons per day (gpd) from Mystery Creek. Actual withdrawal is estimated at 10,000 gpd. (Much of the process water would be recycled from the tailings pond.)
Power Supply	Three 820 kW diesel generators – two in service and one as backup.
Transportation	Personnel, supplies, and fuel would be flown in using the existing 4200 ft airstrip. At the south end of the airstrip is a knob or hill. Removal of the knob would increase the safety of aircraft operations as well as extend the runway approximately 856 feet. Onsite travel is by pickup, four-wheel ATVs and snow machines.
Fuel Storage	Four 10,000-gallon diesel fuel bladders, and two 500-gallon gasoline tanks are at the airstrip. A 1,000-gallon diesel day tank is located at the camp, at the mill, and at the power plant. There is a 1,000-gallon and a 500-gallon diesel tank at the Crystal mine (Crystal) boiler, and a 500-gallon diesel tank at the Mystery mine (Mystery) boiler. There is also a 500-gallon used oil tank at the Crystal boiler. There are two 500-gallon mobile tanks - one diesel and one oil and grease - and two mobile 100-gallon diesel tanks.
Work Force	Approximately 40 to 45 personnel on site.
Housing	Year-round, 50-person singles camp.
Exploration	Approximately seven acres of surface disturbance are anticipated from surface exploration in 2006. From five to ten acres of surface exploration may occur in each succeeding year.

2.1.2 General Site Plan

The general site plan for the proposed project is shown on Fig. 1-4. Each of the major facilities is described later in this section.

2.1.3 Mine Life

The Nixon Fork project, as currently proposed, is an approximately 150 tpd underground mining, and milling operation. At that production rate, mine life from restart through one year of reclamation would be approximately six years. If additional resources in the vicinity are proven, mine life could be extended.

2.1.4 Access

Personnel, fuel, supplies and equipment would be flown in to the site. Concentrate and dore' would be flown out. The current airstrip is adequate for C-130 or Hercules size aircraft. The airstrip is approximately 4,200 ft long with a gravel surface runway approximately 85 ft wide. Total cleared length is 4600 ft. On each side is an additional cleared, obstruction-free zone for a total cleared width of approximately 250 ft. Aircraft operations are light with up to two fuel flights per day, and approximately five to ten aircraft flights per week to bring in supplies and personnel. Other miscellaneous operations are estimated at no more than two to three per week, e.g., mail planes, regulatory agency inspections, VIP visits, consultants visits, etc.

MCRI contemplates removing a knob (small hill) extending the south end of the runway approximately 856 ft to 5056 ft to allow more consistent safe operation of the facility during strong wind conditions. (See Photo 1.) If such improvements were made it would entail the excavation of approximately 124,000 yd^3 of rock from 3.5 acres, and the filling of an area covering 3 acres around the knob on the south end of the runway. See Fig. 1-4.

Since active exploration commenced in the mid-1980s, the existing approximately five-mile mine area road network has served as the spine from which access has been developed to the various drill, trench, and excavation areas. Transportation within the mine area is by the existing road network using pickups, four wheel ATVs and snow machines. Figure 1-4 shows that portion of the existing road network that would be used for the proposed mine development and operation, and for the ongoing exploration program.

The report, *Reclamation Plan and Cost Estimate, Nixon Fork Mine* (J.M. Beck and Associates, September 2005) discusses the road network and those portions that are scheduled for reclamation. It also presents the detailed plan for closure and reclamation of the entire site. The reclamation plan is adopted by reference and is a part of the proposed action.

BLM has authorized the closure of the site to public use due to mining operations; underground blasting and the presence of open, old abandon mine shafts. The boundary would be appropriately posted. Anyone establishing a need to cross the property would be allowed to do so under escort of an MCRI employee. Given the remote location and difficulty of surface transportation few, if any, crossing requests are expected. The airstrip would be available for emergency and official governmental agency aircraft operations.

2.1.5 Mining Method

Mineral resources are currently in several deposits. The southern most developed deposit (Crystal) consists of both oxide and sulfide ores. The northern most developed deposit (Mystery) consisted of mainly sulfide ore. South of the Crystal, and between the Crystal and Mystery deposits, several other mineralized deposits are known to exist. These would be the focus of further evaluation in 2005-2006.

The ore in the Crystal Mine occurs in skarn material formed in limestone. The quartz monzonite stock to the east of the ore bodies served as the "heat source" in the formation of these skarn ore bodies. In some, but not all cases, the quartz monzonite in immediate proximity to the altered limestone is altered and soft. The development of underground workings, wherever possible, would be developed in the more competent limestone material. Generally, mining of deposits would use shrink stoping, mechanized cut and fill, or sublevel stoping methods. In the mining process the ore would be drilled and blasted, loaded into 10 to 16

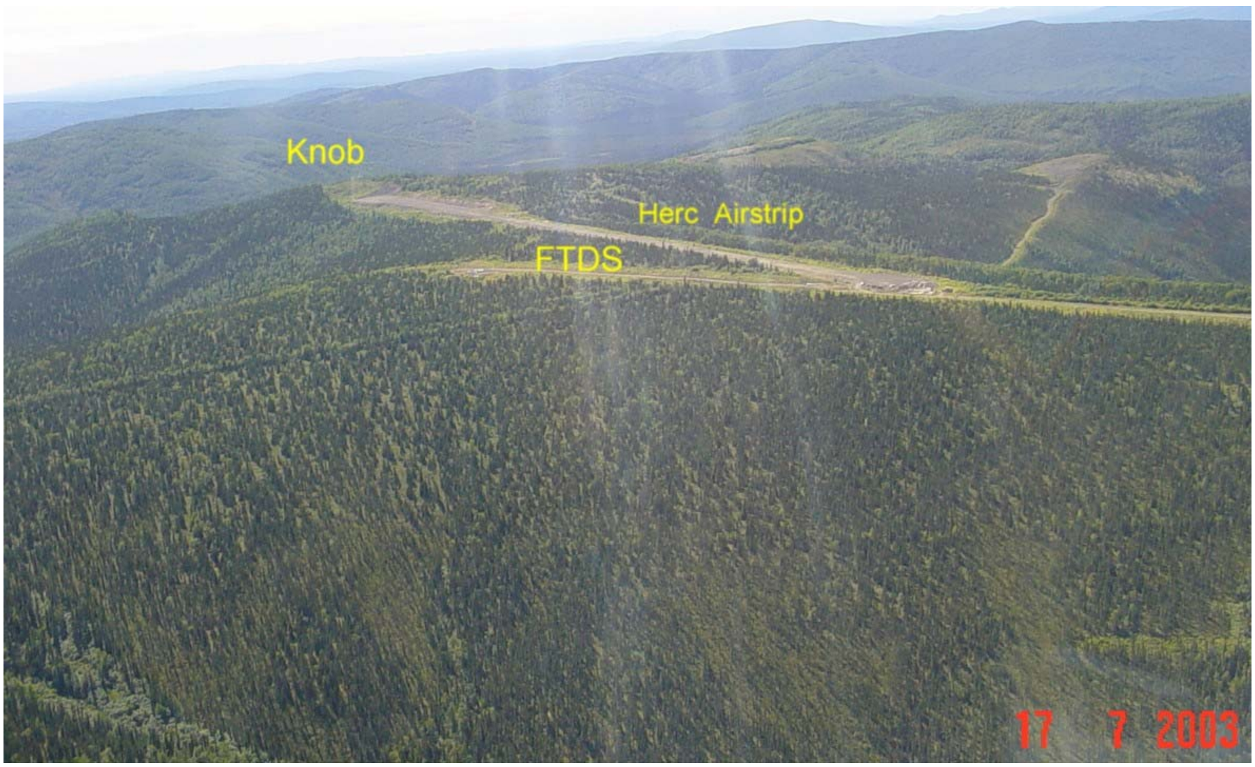


Photo 2: Knob On South End of Hercules Airstrip and Filtered Tailings Disposal Site

ton trucks with underground loaders, hauled to the surface, and transported to either the mill crusher or placed in an existing ore stockpile located adjacent to the mill. Development rock is covered in the next section.

The Crystal and Mystery deposits have been accessed by separate declines. The Crystal decline is the access to the underground workings. To date MCRI has focused all exploration activity on the Crystal decline, but believes further exploration at Mystery is warranted. MCRI currently has no defined plans to begin mining from the Mystery portal. However, in the future, exploration and, possibly, further development of the Mystery Mine area can be expected

2.1.6 Mine Development Rock

The mining process includes development and stope mining. All rock mined in the stopes would be hauled to the mill. The development rock would either be backfilled in the mine, or would be transported to the surface and disposed of in existing development rock dumps immediately southwest of the Crystal decline portal. The outlined Mystery development rock dump area shown in Figure 1.4 provides an adequate area for additional material if it is developed from the Mystery portal. Approximately 150,000 tons of development rock would be placed on the Crystal surface dump during the five-years of operations. Development rock would cover approximately 6.7 additional acres. No wetlands are involved with the Crystal development rock dump.

The main rock types mined at Nixon Fork are skarn (which comprises the ore and is milled), limestone, basalt, and quartz monzonite. The limestone does not generally contain sulfides. In rare instances limestone has been found which contains minute sulfide veins or disseminated sulfides never exceeding 2%. The basalt never contains sulfides.

The quartz monzonite may contain sulfides, but this too is rare (as demonstrated by tens of thousands of feet of core). In the areas where the monzonite contains sulfides it is in either veins or minute specks with the total sulfide content in these rocks from 2-5% on the average. Due to generally poor ground conditions for the monzonite near the limestone-monzonite contact, the majority of the development would be in the limestone. In over 2.5 miles of development at Nixon Fork, less than 4 percent of it has been in monzonite. Some of these areas have caved, and as such, all efforts would be made to avoid this sort of rock in the future.

For every stope or development round shot in the mine, an experienced staff geologist would map and visually inspect the rocks. Although not considered necessary (see the following paragraph), if monzonite or any other type of rock is encountered that appears to contain sulfides exceeding 5% the entire muck pile from that round would either be hauled to the mill and processed or backfilled in the mine. If the sulfide content is less than 5% the development rock would be hauled to the surface and placed in the development rock dump which is comprised mostly of limestone for the reason stated above.

SGS Lakefield Research Limited performed meteoric water mobility procedure (MWMP) on the two main types of development rock, limestone and quartz monzonite. Samples were collected at the mine in February 2004 (SGS, 2004). The MWMP influent pH was 5.75 and 5.50, respectively. The extraction pH was 7.46 and 7.12. This confirms the 1993 work by Hazen showing the neutralization potential is high for the rock at Nixon Fork. Hazen reported oxide tailings had an acid generating potential (AP) of <0.1 and a neutralization potential (NP) of 331. While the sulfide tailings result was not as dramatic, the corresponding data was 30.9 and 326. (1995 Environmental Assessment.)

The MWMP results presented in Table 2-1 show that the metal leaching potential of the develop rock is low. The metal concentrations in the MWMP leachate from these samples were detected at concentrations below the strictest potential criterion including the federal maximum contaminant levels (MCL) for drinking water, or were not detected (below detection limit). The exception is that the alkalinity result for the monzonite sample MWMP leachate was below the alkalinity minimum. The Weak Acid Dissociable (WAD) cyanide detection limit is elevated above the aquatic criterion, however, cyanide has reportedly not been used in the mill process at the mine in the past. For additional data on development rock, see *Nixon Fork Plan of Operations and Reclamation Plan*, Volume II, Appendix B (MCRI August 2005).

Table 2-1
Meteoric Water Modeling Procedure Results
Development Rock

Parameter	Units	Strictest Potential Regulatory Criterion		Limestone	Monzonite
Initial Moisture	%			<0.5	< 0.5
Final Moisture	%			0.9	0.9
Sample weight	g			5000	5000
Influent pH	s.u.			5.75	5.50
Extraction Time	hours			24	24
pH	s.u.	6.5/8.5(acceptable)ra	Aquatic	7.46	7.12
Alkalinity	mg/L as $CaCO_3$	20 (minimum)	Aquatic	24	**11**
Bicarbonate	mg/L as $CaCO_3$			24	11
Aluminum	mg/L	0.087 [a]	Aquatic	0.02	0.02
Antimony	mg/L	0.006	Drinking	< 0.006	< 0.006
Arsenic	mg/L	0.050	Drinking	< 0.005	< 0.005
Barium	mg/L	2	Drinking	0.002	0.002
Beryllium	mg/L	0.004	Drinking	< 0.004	< 0.004
Bismuth	mg/L			< 0.0003	< 0.0003
Boron	mg/L	0.75	Irrigation	0.07	< 0.01
Cadmium	mg/L	0.00015 [b]	Aquatic	< 0.0001	< 0.0001
Calcium	mg/L			12.8	3.36
Chloride	mg/L	230	Aquatic	9.1	<2
Chromium	mg/L	0.1 [c,b]	Drinking /	< 0.001	< 0.001
Cobalt	mg/L	0.05	Irrigation	< 0.0003	< 0.0003
Copper	mg/L	0.005 [b]	Aquatic	0.0013	0.0010
Cyanide WAD	mg/L			< 0.01	< 0.01
Fluoride	mg/L	1	Irrigation	0.06	0.06
Gallium	mg/L			< 0.02	< 0.02
Iron	mg/L	1	Aquatic	< 0.02	< 0.02
Lead	mg/L	0.0012 [b]	Aquatic	0.0003	0.0005
Lithium	mg/L	2.5	Irrigation	< 0.005	< 0.005
Magnesium	mg/L			6.53	0.72
Manganese	mg/L	0.2	Irrigation	0.002	0.014
Mercury	ppm	0.00077	Aquatic	< 0.0001	< 0.0001
Molybdenum	mg/L	0.01	Irrigation	0.0017	0.0007
Nickel	mg/L	0.029 [b]	Aquatic	0.002	0.004
Nitrate	mg/L-N	10	Drinking	9.77	0.66
Nitrate + Nitrite	mg/L-N	10	Drinking	9.77	0.66
Nitrite	mg/L-N	1	Drinking	<0.6	< 0.6
Phosphorous	mg/L			< 0.01	< 0.01
Potassium	mg/L			0.83	0.57
Scandium	mg/L			< 0.01	< 0.01
Selenium	mg/L	0.0046 [d]	Aquatic	< 0.004	< 0.004
Silver	mg/L	0.001 [b]	Aquatic	< 0.001	< 0.001
Sodium	mg/L			7.73	0.41
Solids (Total Dissolved)	mg/L			100	<30
Strontium	mg/L			0.138	0.021
Sulphate	mg/L	250	Drinking	<5	<5
Thallium	mg/L	0.002	Drinking	< 0.0002	< 0.0002
Tin	mg/L			< 0.001	< 0.001
Titanium	mg/L			< 0.005	< 0.005
Vanadium	mg/L	0.1	Irrigation	< 0.002	< 0.002
Zinc	mg/L	0.065 [b]	Aquatic	< 0.01	< 0.01

Notes:
[a] Criterion expressed as total recoverable concentration.
[b] Aquatic criterion is hardness dependent. A hardness of 50 mg/L as $CaCO_3$ is assumed.
[c] Drinking water criterion for total chromium is 0.1 mg/L. Aquatic chronic criteria for Cr(III) and Cr(VI) are 0.042 and 0.011 mg/L, respectively.
[d] Selenium criteria is based on the speciation of selenium.
Shaded cells exceed strictest regulatory criterion.

The nitrate level at 9.77 mg/l is close to the drinking water criteria of 10. Blasting would be managed to reduce the amount of unused blasting materials during each blast. This should reduce the amount of nitrate in the development rock.

The comprehensive monitoring plan would include additional sampling with MWMP and ABA analysis of rock placed in the development rock dump. If the development rock monitoring results indicate the AP/NP ratio is unacceptable, corrective action would be developed and proposed to ADEC. Considering the above AP/NP rations this is not expected to occur.

Groundwater monitoring at the development rock disposal site would be difficult using traditional monitoring wells since the water table is likely at a depth below grade of 770 feet (235 meters) within the underlying bedrock. However, MCRI would monitor storm water runoff and would evaluate the feasibility and effectiveness of installing a monitoring network to capture and sample pore water in the unsaturated zone near the edges of the development rock disposal area. This would be included in the comprehensive monitoring plan.

2.1.7 Mill Site

The mill site is located adjacent to the Crystal portal, and currently consists of three buildings: the ore-processing mill with main power generators, a workshop/warehouse complex that includes maintenance facilities, and the project office with the assay lab (Fig. 1-4). The site also includes an ore stockpile area, fuel storage and fueling area, a lay down area, and several small portable buildings housing parts, equipment and supplies.

2.1.8 Mill Process

2.1.8.1 General

MCRI proposes to mine the tailings currently contained in the tailings impoundment, and ore from underground. The existing tailings would be mined and milled with the resultant tailings (reprocessed tailings) filtered to remove moisture and placed in a filtered tailings disposal area (FTDS or dry stack). The existing tailings can only be mined when the pond is not frozen and all tailings cannot be processed the first summer. Underground ore would be mined and processed year round at 150 tpd with the resulting tailings also placed in the filtered tailings area until the tailings pond is emptied, inspected, and repaired. Underground mining is proposed to begin in the winter of 2005-06. Mining and processing of the existing tailings would begin the following spring, and would continue each spring until the pond is empty. After all the existing tailings are processed and the pond inspected, MCRI proposes to mine ore from underground with the resultant tailings placed in the tailings pond as slurry.

MCRI would be using a similar mill process and much of the same equipment used by NGI. However, a cyanide leach and electrowinning circuit would be added to the mill process to improve gold recovery. MCRI proposes to use the sulfur dioxide and air process for cyanide destruction since the sulfur dioxide can be supplied and transported as a solid in the form of sodium meta-bisulfite ($Na_2S_2O_5$) or sodium sulfite (Na_2SO_3). This process is utilized in over 40 mines around the world for free and Weak Acid Dissociable (WADS) cyanide destruction. The equation for the reaction is:

$$SO_2 + O_2 + H_2O + CN^- = OCN^- + SO4^{-2} + 2H$$

Upon completion of the leaching process the leached tailings would be filtered and washed on a filter unit to recover the cyanide solution. The filtered tailings would then be treated with sulfur dioxide solution in an agitation tank to reduce the WAD cyanide to regulatory limits. The likely ADEC permit limit for WAD CN in the filtered tailings and tailings deposited into the tailings impoundment would be 10 mg/kg as a monthly average and a maximum concentration of 25 mg/kg WAD CN. (State comment letter dated 2/17/05). The material would then be dried to no more that 17% moisture (daily maximum – 15% monthly average on a drum filter unit.

In addition to the oxidation of cyanide, metals previously complexed with the cyanide, such as copper, nickel, and zinc are precipitated as metal-hydroxide compounds. Iron cyanide removal is affected through precipitation with copper, nickel or zinc as metal complexes of the general form $M_2Fe(CN)_6$, where M represents the previously mentioned metals.

The solids would be sampled on a routine basis for WAD cyanide and compliance with regulations. Typical results with the sulfur dioxide process are shown below (Ingles and Scott 1987).

Treatment Results SO_2 Process		
Parameter	Untreated (mg/l)	Treated (mg/l)
Total Cyanide	450	0.1 to 2.0
Copper	35	1 to 10
Iron	1.5	<0.5
Zinc	66	0.5 to 2.0

Two buildings are proposed to be added to the mill site. Initially, because of air requirements, the generator sets would be located on the south end of the Crystal rock dump in cargo containers. If future air permit modifications allow, the containers may be moved to the mill site, or a 30 ft by 80 ft collapsible frame (or similar) building may be added on the west side of the mill to accommodate the new generators and compressor facilities. On the east side a 30 ft by 145 ft collapsible frame building would house the cyanide leaching circuit. Both buildings would be located on concrete slabs, and would be detached from the mill building.

The design of the cyanide "tank house" includes a concrete stem wall capable of containing the content of 1.5 times the quantity of slurry held in any one cyanide leach tank. The tanks would transfer "bottom to top" in a manner to prevent draining of more than one tank at a time in the event leakage were to occur in a tank. In addition, the lower drain of each tank would be valved to permit isolation in case of a leak. Construction drawings of buildings and equipment to be used in the cyanide process would be submitted to ADEC for review prior to construction.

The new structures would block the vehicular traffic pattern around the mill. MCRI would construct a short section of road along the west side of the development rock dump. This section would connect the office with the existing road network. While some cut and fill would be required this would occur on the previously disturbed development rock dump.

2.1.8.2 Existing Tailings

The tailings in the existing pond are the results of previous mining and mill processing. Samples of the existing tailings were collected and MWMP lab tests were performed to evaluate baseline conditions prior to reprocessing the tailings as discussed below. (See Table 2-2, Samples 1-1 through 2-3). In Table 2-2 the MWMP results show that the strictest criteria for some parameters are exceeded in analyzed samples of existing, reprocessed and new ore tailings. However, the potential for leaching of these compounds are low for the reasons referenced in 2.1.8.3. A more detailed discussion is found in MCRI 2005, Vol. II, Appendix C**.** As a general rule these criteria would not apply to the tailings pond or to the FTDS since there would be no discharge to waters of the U.S. Stipulations, if any, would be determined by ADEC in the waste water permit (L. Boles personnel communications). The tailings have a low potential for acid generation with an NP to AP) ratio of 213. (See Table 2-3.)

2.1.8.3 Reprocessed Tailing

Rather than bury a valuable resource, MCRI proposes to reprocess the tailings that are in the tailings pond to recover gold and silver contained in that material. The reprocessing is proposed to begin in late spring 2006. These tailings, which would be recovered at the rate of up to 350 tonnes per day, would be pumped to the mill as a dense slurry of 45% solids. At the mill this slurry would be dewatered to 80% solids and the excess water returned to the pond. Some fines may also be returned to the pond.

Table 2-2
Meteoric Water Mobility Procedure
Development Rock

Parameter	Units	Strictest Potential Regulatory Criterion		Limestone	Monzonite
Initial Moisture	%			<0.5	< 0.5
Final Moisture	%			0.9	0.9
Sample weight	g			5000	5000
Influent pH	s.u.			5.75	5.50
Extraction Time	hours			24	24
pH	s.u.	6.5 to 8.5	Aquatic	7.46	7.12
Alkalinity	mg/L as $CaCO_3$	20 (minimum)	Aquatic	24	**11**
Bicarbonate	mg/L as $CaCO_3$			24	11
Aluminum	mg/L	0.087 [a]	Aquatic	0.02	0.02
Antimony	mg/L	0.006	Drinking	< 0.006	< 0.006
Arsenic	mg/L	0.050	Drinking	< 0.005	< 0.005
Barium	mg/L	2	Drinking	0.002	0.002
Beryllium	mg/L	0.004	Drinking	< 0.004	< 0.004
Bismuth	mg/L			< 0.0003	< 0.0003
Boron	mg/L	0.75	Irrigation	0.07	< 0.01
Cadmium	mg/L	0.00015 [b]	Aquatic	< 0.0001	< 0.0001
Calcium	mg/L			12.8	3.36
Chloride	mg/L	230	Aquatic	9.1	<2
Chromium	mg/L	0.1 [c,b]	Drinking /	< 0.001	< 0.001
Cobalt	mg/L	0.05	Irrigation	< 0.0003	< 0.0003
Copper	mg/L	0.005 [b]	Aquatic	0.0013	0.0010
Cyanide WAD	mg/L			< 0.01	< 0.01
Fluoride	mg/L	1	Irrigation	0.06	0.06
Gallium	mg/L			< 0.02	< 0.02
Iron	mg/L	1	Aquatic	< 0.02	< 0.02
Lead	mg/L	0.0012 [b]	Aquatic	0.0003	0.0005
Lithium	mg/L	2.5	Irrigation	< 0.005	< 0.005
Magnesium	mg/L			6.53	0.72
Manganese	mg/L	0.2	Irrigation	0.002	0.014
Mercury	ppm	0.00077	Aquatic	< 0.0001	< 0.0001
Molybdenum	mg/L	0.01	Irrigation	0.0017	0.0007
Nickel	mg/L	0.029 [b]	Aquatic	0.002	0.004
Nitrate	mg/L-N	10	Drinking	9.77	0.66
Nitrate + Nitrite	mg/L-N	10	Drinking	9.77	0.66
Nitrite	mg/L-N	1	Drinking	<0.6	< 0.6
Phosphorous	mg/L			< 0.01	< 0.01
Potassium	mg/L			0.83	0.57
Scandium	mg/L			< 0.01	< 0.01
Selenium	mg/L	0.0046 [d]	Aquatic	< 0.004	< 0.004
Silver	mg/L	0.001 [b]	Aquatic	< 0.001	< 0.001
Sodium	mg/L			7.73	0.41
Solids (Total Dissolved)	mg/L			100	<30
Strontium	mg/L			0.138	0.021
Sulphate	mg/L	250	Drinking	<5	<5
Thallium	mg/L	0.002	Drinking	< 0.0002	< 0.0002
Tin	mg/L			< 0.001	< 0.001
Titanium	mg/L			< 0.005	< 0.005
Vanadium	mg/L	0.1	Irrigation	< 0.002	< 0.002
Zinc	mg/L	0.065 [b]	Aquatic	< 0.01	< 0.01

Notes:

[a] Criterion expressed as total recoverable concentration.

[b] Aquatic criterion is hardness dependent. A hardness of 50 mg/L as $CaCO_3$ is assumed.

[c] Drinking water criterion for total chromium is 0.1 mg/L. Aquatic chronic criteria for Cr(III) and Cr(VI) are 0.042 and 0.011 mg/L, respectively.

[d] Selenium criteria is based on the speciation of selenium.

Shaded cells exceed strictest regulatory criterion.

Table 2-3
Acid Base Accounting Procedure Results

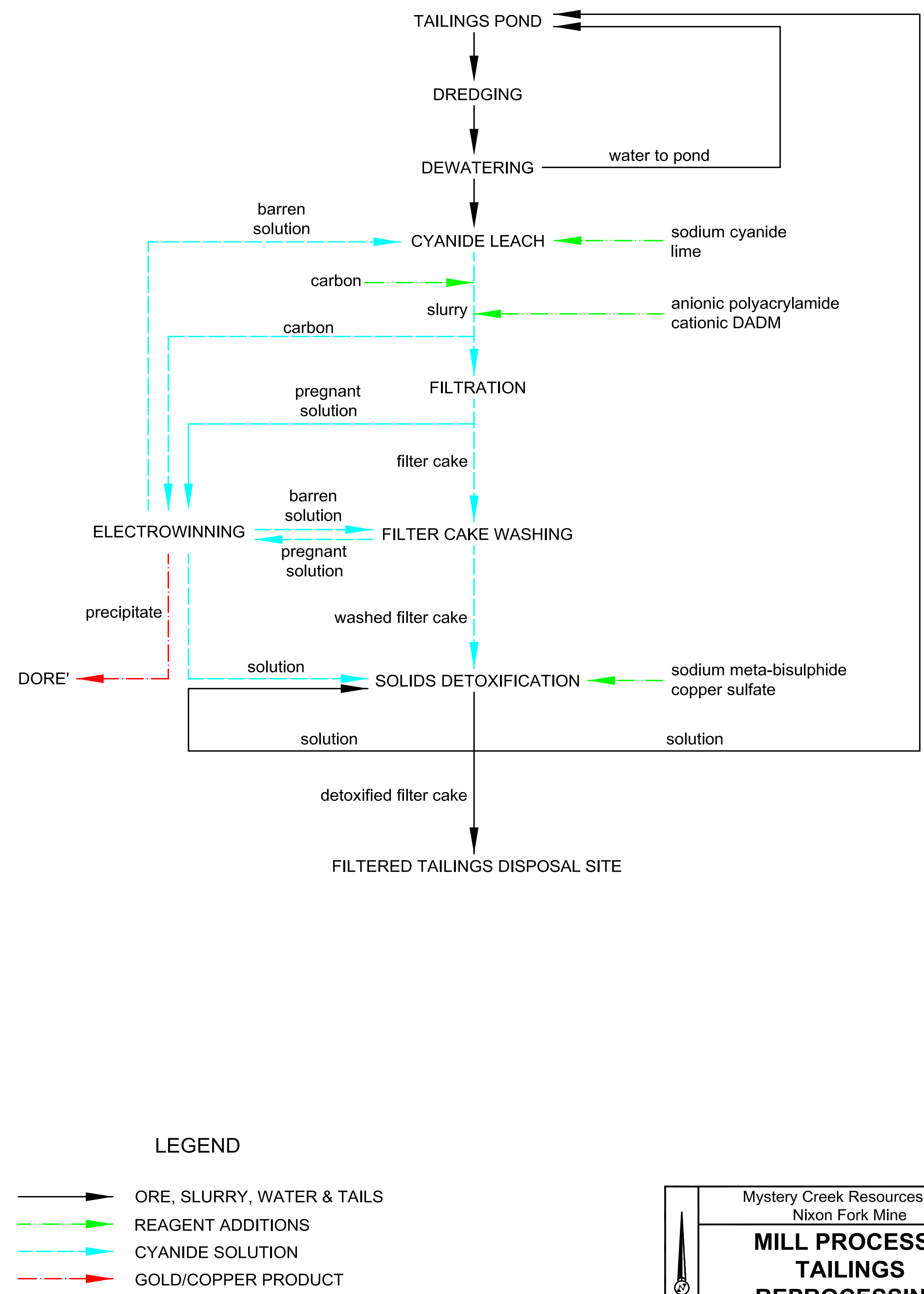
Parameter	Units	Pre-Processed Tailings [a] (Existing Tailings)	Re-Processed Tailings (Sample T-31)	New Mined Ore Tailings (Sample #3)
Paste pH	s.u.	8.59	9.70	8.1
S-total	wt. %	0.52	0.37	5.43
$S^{=}$	wt. %	0.07	0.34	4.02
SO_4	wt. % S	0.43	0.03	1.41
NP	t $CaCO_3$/1000 t	415	310	294
AP	t $CaCO_3$/1000 t	2.1	10.6	126
NNP	t $CaCO_3$/1000 t	413	299	168
NPR (NP/AP)		213	29.1	2.34

Notes:
NP - Neutralization Potential
AP - Acid Potential (calculated from sulfide sulfur)
NNP - Net Neutralization Potential (NNP) (calculated as NP-AP)
NPR - Neutralization Potential Ratio
[a] Average of 6 samples, tests conducted prior to re-processing.

The dewatered tailings would be mixed with recycled, barren sodium cyanide solution, and agitated in five leach tanks for 12 to 14 hours. The leached ore would then be transferred by pump to a filter were the pregnant solution contained in the slurry would be filtered out and washed with barren solution for gold recovery. The filtered tailings would then be treated with sodium dioxide solution in an agitation tank to reduce the WAD cyanide to regulatory limits, then again filtered to no more than 17% moisture (daily maximum – 15% monthly average) for deposit in the FTDS.

The pregnant solution would then be piped into the electrowinning circuit where gold would be precipitated out by electrowinning. The electrowinning precipitate is then filtered and melted to form a dore' metal for sale. The stripped solution from the electrowinning circuit would be recycled to a tank, and refortified with sodium cyanide and sodium hydroxide for reuse. See Fig. 2-1 for a diagram of the mill process for the existing tailings. The filtered tailings would be dry stacked near the south end of the runway (Fig. 2-4) as discussed in Section 2.1.10.

Table 2-2 presents the MWMP results for the reprocessed tailings (sample T-31) that would go into the filtered tailings disposal site. T-31 is a composite sample taken from 8 locations and is not a composite of 1-1 through 2-3. While some of the results exceed the strictest potential water quality standards, the potential for generating leachate is limited because the low permeability of the placed tailings, estimated at 10^{-6} cm/sec, would reduce the potential for recharge to the tailings, and, in addition, the neutralization potential ratio (29.1) is sufficiently high to limit the acid generation potential which limits the metal leaching potential of moisture that may accumulate in the tailings. See Table 2-3 and Section 2.1.10 for a complete discussion of the tailings. See also MCRI 2005, Vol. II. Additional sampling would be done during operation for both MWMP and ABA.



Mystery Creek Resources, Inc.
Nixon Fork Mine

MILL PROCESS - TAILINGS REPROCESSING

Scale: N.T.S. | Figure 2-1

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Figure 2–1_EA.dwg

2.1.8.4 New Mined Ore

Three samples of ore expected to represent that to be encountered in future mining were taken in late 2003 and early 2004 for use in metallurgical testing. The criteria used for the selection of the sample sites were mineralogy, alteration, wall rock, and metal (gold) grade. The Nixon Fork Exploration Manager selected the locations of these holes. Data from past production, drill records and underground mapping were used to help select the sites.

The first two samples were selectively taken by drilling and blasting wall rock or back (roof rock) in the proximity of the selected sample sites. Broken rock was then sampled in an orderly manner to obtain a representative sample of the rock broken. The last sample was taken by channel sampling the entire back (roof rock) in an open ore stope. This third sample was the most representative of the three samples as it was not selective, and included all of the various rock types and grades in the stope on that level. In the case of Sample 1, approximately 550 pounds of sample were taken. Similarly for Sample 2, approximately 550 pounds of sample were taken. In the case of Sample 3, approximately 150 pounds were taken. In each case the samples were bagged and not processed in any manner at the site, and represent the size of the blasted material sampled. All samples were shipped to Phillips Enterprises laboratory in Golden, Colorado for metallurgical testing.

The metallurgical process to be used for the mined ore in the Nixon Fork mill would consist of some of the existing crushing, grinding, gravity separation, and flotation circuits with some mechanical modifications. In addition, MCRI plans to leach the tailings and produce a gold/silver dore'.

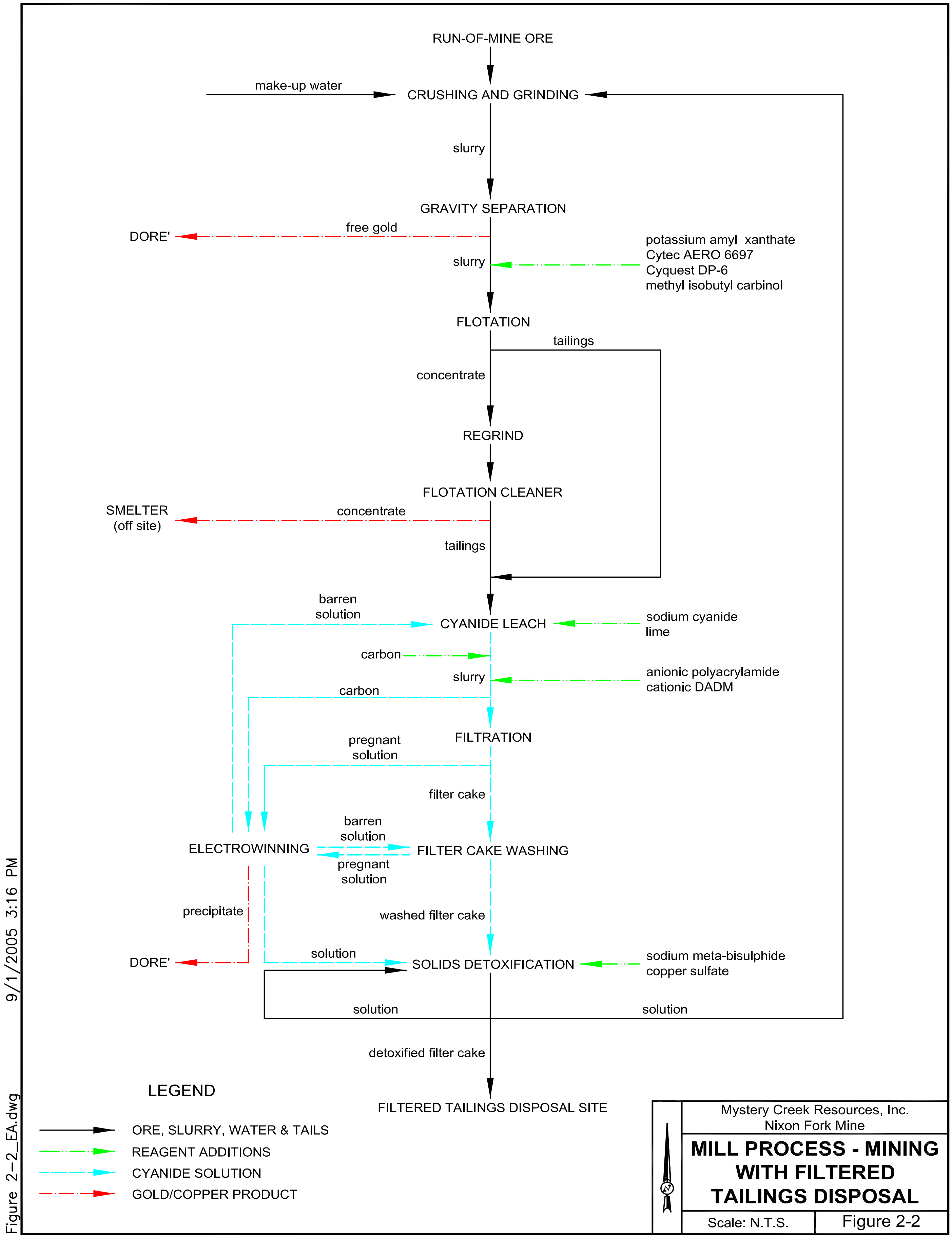
Specifically, ore from the mine would be crushed in a stationary jaw and secondary crusher, and then ground into a slurry in two ball mills. The reduced product would pass through a gravity separation process where free gold and heavy minerals are removed from the slurry. The gravity concentrate would either become a portion of the dore' or would become a portion of the dore' slag which would be returned to the grinding circuit for reprocessing. The remaining slurry, consisting of mineral sulfides containing gold, silver, and copper, would go to a flotation process where an initial sulfide concentrate containing gold/silver/copper would be produced (the flotation concentrate). The residual product (tailings) from the flotation process is primarily limestone, marble and garnet with very minor amounts of sulfide minerals (pyrite and chalcopyrite) that would report to the cyanide leach circuit.

The flotation concentrates, consisting generally of chalcopyrite (45%) and pyrite (20-25%) with minor amounts of pyrhotite (5-13%), magnetite (<5%), clinoamphibole (<5%), marcasite (<3%), quartz (3-10%) and arsenopyrite (<2%) would be reground in a regrind mill.

The solids from the regrind circuit would then be routed to the cleaner flotation circuit, conditioned and refloated to prepare a clean copper concentrate for sale. This concentrate would be filtered and bagged for shipment to smelters.

The gold and silver remaining in the tailings would be recovered by cyanide leaching followed by filtration. The "gold pregnant" solution would report to a conventional electrowinning circuit. The gold-silver precipitate as well as the gold and silver recovered in the gravity circuits would be shipped as a dore'. The recovered sodium or calcium cyanide solution recovered in the electrowinning process would then be recycled in the flotation tailings leach process. Excess cyanide solution would report to the cyanide destruction circuit. The filter cake from the filtration step would also be rinsed, in the same manner as the previously discussed reprocessed tailings, where residual cyanide solution would be destroyed. Table 2-2, reports WAD CN reduced to 0.019 mg/L. Following filtration in the cyanide destruction circuit, the hydrometallurgical tailings slurry residue would be reduced to a moist solid (approximately 15% moisture) and deposited in the FTDS. These tailings, with a neutralization ratio of 2.34, are non-acid producing as shown in Table 2-3. The new mined ore tailings, when deposited in the FTDS, would be on top of, or sandwiched between the reprocessed tailings that have a neutralization ratio of 29.1. See MCRI 2005, Vol. II, Appendix C WAD Cyanide Results. See Fig. 2.2 Mill Process – Mining With Filtered Tailings Disposal.

Filter cake produced after the tailings pond has been emptied and reactivated would be reslurried with make up water at the mill and deposited in the tailings pond. The MWMP results are contained in Table 2-2. As with the reprocessed tailings, sampling would be done during operation for both MWMP and ABA, and is included in the monitoring plan. The original monitoring wells at the toe of the dam have been


RUN-OF-MINE ORE
make-up water
CRUSHING AND GRINDING
slurry
GRAVITY SEPARATION
free gold
DORE'
slurry
potassium amyl xanthate
Cytec AERO 6697
Cyquest DP-6
methyl isobutyl carbinol
FLOTATION
tailings
concentrate
REGRIND
FLOTATION CLEANER
SMELTER
(off site)
concentrate
tailings
barren
solution
CYANIDE LEACH
sodium cyanide
lime
carbon
slurry
anionic polyacrylamide
cationic DADM
carbon
FILTRATION
pregnant
solution
filter cake
ELECTROWINNING
barren
solution
FILTER CAKE WASHING
pregnant
solution
precipitate
washed filter cake
DORE'
solution
SOLIDS DETOXIFICATION
sodium meta-bisulphide
copper sulfate
solution
solution
detoxified filter cake
FILTERED TAILINGS DISPOSAL SITE
LEGEND
ORE, SLURRY, WATER & TAILS
REAGENT ADDITIONS
CYANIDE SOLUTION
GOLD/COPPER PRODUCT
Mystery Creek Resources, Inc.
Nixon Fork Mine
MILL PROCESS - MINING
WITH FILTERED
TAILINGS DISPOSAL
Scale: N.T.S.
Figure 2-2
Figure 2-2_EA.dwg
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replaced and would be monitored. However, these wells monitor perched water on bedrock and may detect water on a seasonal basis only. The water table exists in bedrock at a depth of approximately 500 ft below the dam.

It is noted again that the process uses a zero discharge tailings pond and the tailings are non-acid producing. See Fig. 2-3 Mill Process – Mining with Tailings Pond Disposal. Also see Section 2.1.10.

2.1.9 Reagents

Chemicals and reagents required for project operation would be purchased from vendors in Anchorage or the Lower 48 States and would be flown in. Hazardous materials would be transported in conformance with U.S. Department of Transportation regulations (46 CFR Subchapter D, 46 CFR Parts 148 and 151, and 49 CFR Parts 173, 176, and 178). These regulations cover package construction, maximum package size, package marking, proper handling, and proper storage.

The following reagents, or their equivalent substitutes with similar chemistry, would be used in the mill process. These chemicals in their original form are considered for the most part to be relatively inert and non-hazardous and biodegrade to non-hazardous inorganic and organic chemical compositions. A hazardous materials handling plan (HMHP) would be developed before the system is placed in operation.

Reagent	Quantity (lbs/day) Tailings Re-treatment (350 tpd)	Quantity (lbs/day) Mining (150 tpd)
Potassium Amyl Xanthate	0	40-50
Sodium Meta -biSulphide ($Na_2S\ 9H_2O$)	575-775	280-375
Anionic Polyacrylamide (flocculant)	14-19	10-15
Cationic DADM (flocculant)	0	10-15
Cytec AERO 6697	0	12-15
Cyquest DP-6 (anionic Polymer)	0	11-15
Methyl Isobutyl Carbinol (MIBC)	0	8-15
Sodium Cyanide	865	300-480
Lime	2900	1400
Copper Sulfate	40	20
NaOH	3	2

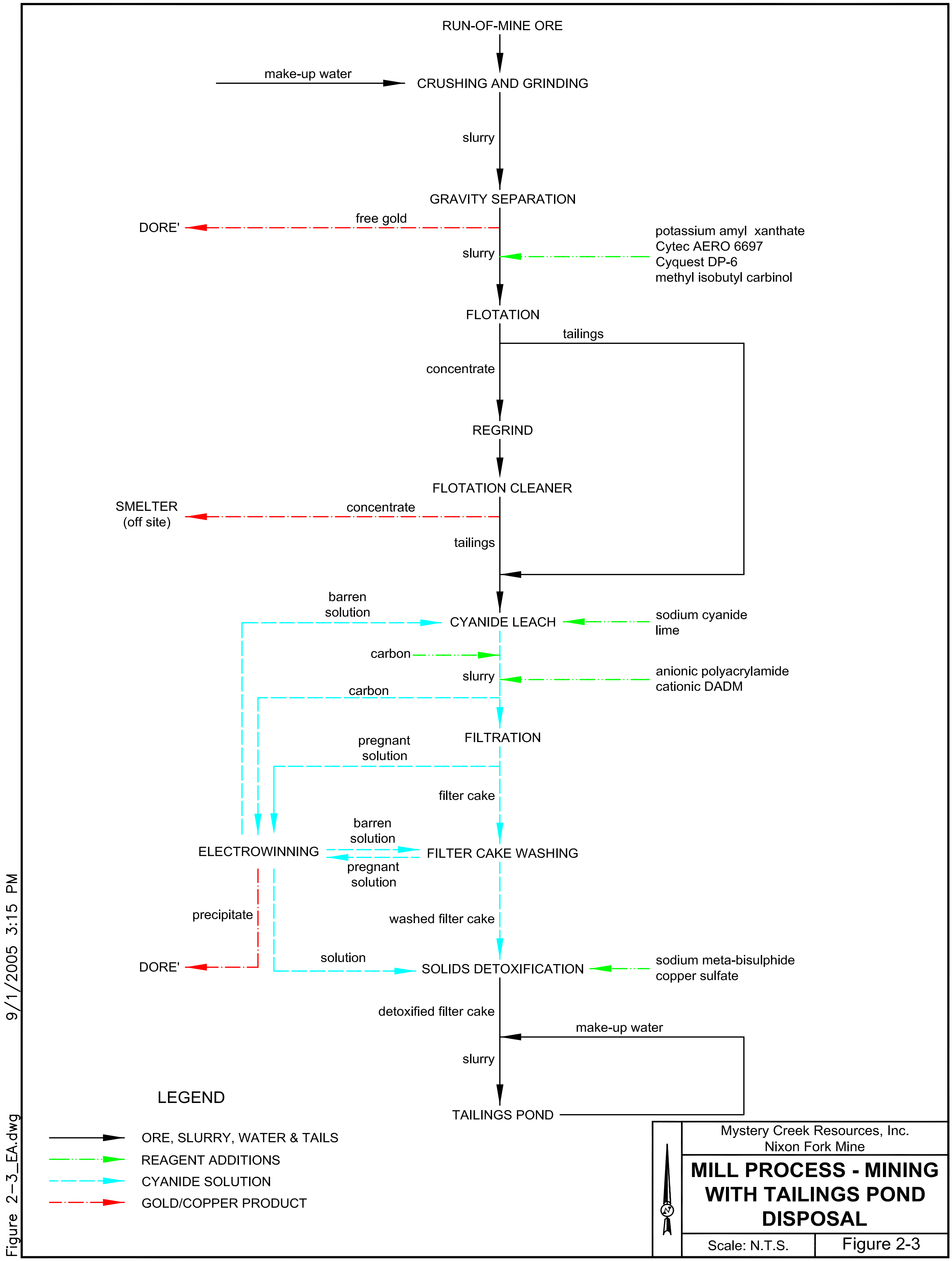
2.1.10 Tailings Disposal

Tailings disposal would occur in one of two places as a result of three different processes. These are discussed below.

2.1.10.1 Reprocessed Filtered Tailings

The existing 116,000 tonnes (128,000 tons) of tailings in the Nixon Fork tailings pond would be hydraulically removed from the tailings pond and reprocessed through the Nixon Fork mill. This would take approximately twelve months spread over time that the pond is not frozen.

Operating from a sump near the center of the tailings pond, the tailings would be loosened using a hydraulic jet to undercut the solids, causing them to collapse into the sump forming high-density slurry. The jet and low-pressure pump would be mounted on a floating platform in the deeper portion of the tailings pond. As an alternative, a low ground pressure vehicle, rather than a floating platform, may be used to keep the surrey as dense as possible. The solids left on the liner out of reach of the floating jet and pump would be washed into the sump with water using hoses similar to fire hoses. The slurry would be pumped with a low-pressure pump through a hose to the edge of the tailings pond.



Mystery Creek Resources, Inc.
Nixon Fork Mine

MILL PROCESS - MINING WITH TAILINGS POND DISPOSAL

Scale: N.T.S.

Figure 2-3

The slurry would then be transported by high-pressure pump and pipe to the mill for reprocessing. The stationary high-pressure pump would be permanently fixed on shore adjacent to the tailings pond on a slab that drains back into the pond. Tailings or water potentially spilled in this area during pump repairs would be hosed back into the pond.

A new surface pipeline would be installed extending from the stationary high-pressure pump to the mill building. The pipe would be installed adjacent to the existing pipelines in the existing 20-ft wide corridor that was cut through the trees when the existing pipes were installed. The new pipe would be anchored to the ground with cables and rebar. Spillage from a possible rupture of the line carrying tailings from the pond to the mill house would flow downhill to the area of the tailings pond. During tailings dredging, a culvert of the same cross-sectional area as the tailings pond diversion ditch would be placed in the diversion ditch where the tailings pipe crosses the ditch. The culvert would extend 25 feet to each side of the tailings pipe. The culvert would be buried, and the surface above the culvert would be sloped towards the tailings pond. A berm would be constructed perpendicular to the ditch near each end of the culvert to divert any potential tailings spill back into the tailings pond. Upon completion of tailings dredging, the culvert would be removed and the ditch restored to its original condition.

No rubber-tired or tracked equipment would be operated on the liner. Upon completion of the tailings reprocessing, the remaining water in the tailings pond would be sampled, treated if and as necessary, and land applied through a sprinkler system after securing the proper permit from ADEC. Excess pond water has been successfully land applied using a sprinkler system on two prior occasions after approval by ADEC. No additional treatment of the pond water was necessary. The liner would be inspected for damage and repaired if and as needed. Upon completion of repairs, the impoundment would again be used for slurried tailings disposal as originally permitted.

In the final stages of the mill process, the tailings would be dried to at least 85 percent solids, a consistency that does not bleed water. Drying would be accomplished with the use of a filter to be installed in one of the new buildings. The dried tailings would be hauled by truck 4,000 feet along existing roads extending from the mill to the FTDS. Due to the short ten-minute load-haul time and the presence of up to 17 percent water content (daily maximum – 15% monthly average) in the tailings paste, the tailings would not generate dust during transportation. The haul roads would be sprayed with water to suppress road dust when necessary.

The FTDS would be located on top of the low hill east of the airstrip. (See Photo 1, Section 2.1.4, and Fig. 2-4 Filtered Tailings Disposal Site Plan). This location was selected because it is accessible, minimizes haulage time, and, is for the most part, previously disturbed ground. The area is a topographic high reducing potential run on from precipitation. The site is 2,100 feet from the nearest limestone contact, 1,800 ft from the headwaters of Ruby Creek, and 2,500 ft from the headwaters of Mystery Creek. In addition the area is underlain by shallow, massive, and relatively impermeable bedrock (quartz monzonite) that extends to the regional water table that is greater than 800 ft below the FTDS elevation.

The FTDS has been trenched to determine soil type and depth. Approximately four feet of coarse-grained unconsolidated sediments consisting of sand, gravel, and silt underlies the repository site. These unconsolidated sediments consist of 80 percent sand, 17 percent gravel, and 3 percent fines near the contact with the bedrock, which occurs at a depth of approximately 4 feet. (MCRI 2005, Vol. II)

The FTDS would be constructed by stripping the top four feet of unconsolidated sediments (overburden) and stockpiling it in a berm around the perimeter of the tailings repository, thus creating a large ditch around the perimeter of the repository (Fig. 2-5 Filtered Tailings Disposal Site Excavation Plan).

Precipitation that falls on the tailings repository would be collected in the perimeter ditch and flow to a percolation pond at the low point of the ditch (Fig. 2-6 Filtered Tailings Disposal Site Drainage Plan.). The percolation pond would be 50 by 220 ft, and is sized to hold the 10 year 24 hour storm event as required by ADEC. The comprehensive monitoring plan would provide for sampling and analysis of liquids in the percolation pond.

Tailings would be deposited by end-dumping, beginning at the southeast end of the repository. A dozer would push the dried tailings to their final location and shape the pile. The loose tailings would be spread

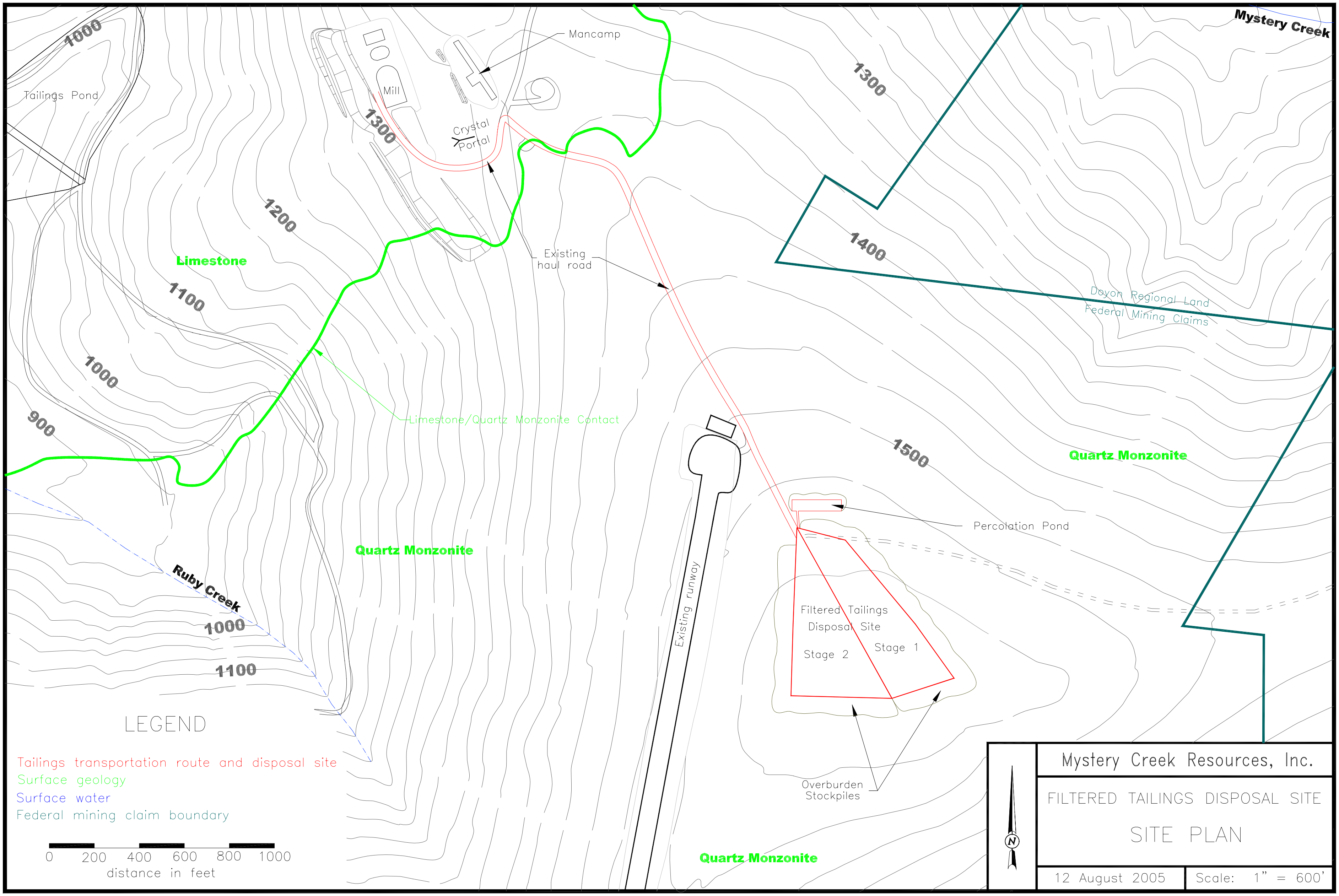


Figure 2.4: FILTERED TAILINGS DISPOSAL SITE PLAN

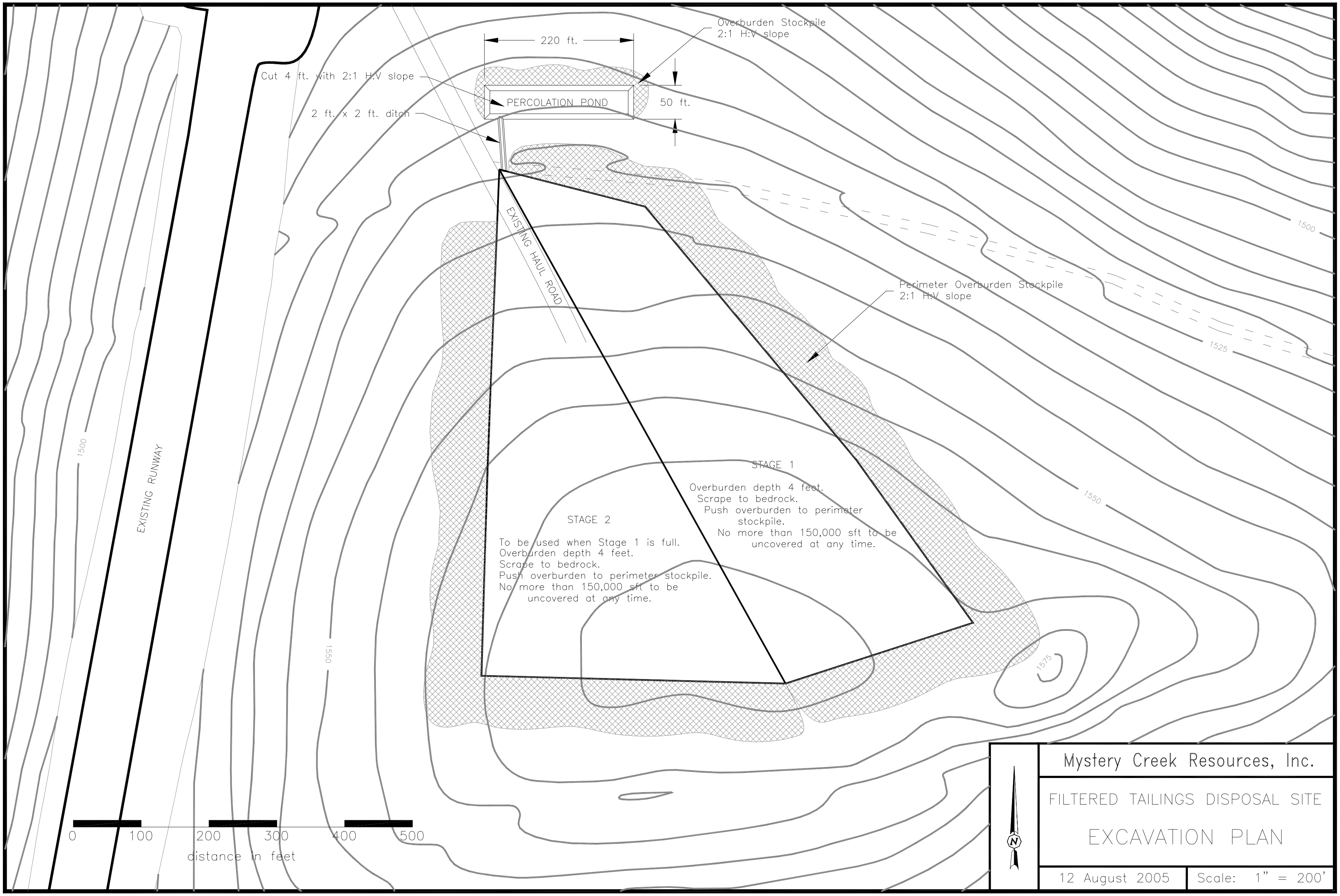


Figure 2.5: FILTERED TAILINGS DISPOSAL SITE EXCAVATION PLAN

Figure 2.6: FILTERED TAILINGS DISPOSAL SITE DRAINAGE PLAN

until the thickness is generally less than 1-foot in thickness before being compacted and shaped with the bulldozer or front-loader until a firm base is achieved. Compaction would be determined by observing the tire or track penetration in the tailings during the shaping and compaction process. The surface of each layer must be firm before accepting additional tailings.

The edges of the tailings pile would be sloped to blend in with the existing topography and would not exceed a 4:1 H:V slope. The laboratory testing for geotechnical engineering properties (Golder letter dated September 7, 2004, Volume II Appendix D) indicates that the dry tailings can stand a 4:1 slope with an adequate factor of safety to demonstrate long-term stability. The tests indicate compacted dry stack tailings with moisture content of 17 percent or less would have a friction angle of 35 degrees. The anticipated moisture content range is 12 to 14 percent, but it should not exceed 15 percent. A conservative moisture content of 16 % was used to evaluate the geotechnical stability of the tailings. The monitoring plan would include the collection of FTDS samples daily with moisture content determined, recorded, and reviewed daily by appropriate mine personnel. The monthly average goal would be less than 15 %, with maximum daily moisture content of 17%. The monitoring plan would also include MWMP and ABA analysis of the tailings.

The pile height would not exceed 30 feet. As the repository is filled and shaped, the previously excavated overburden would be pushed back on top of the tailings, maintaining a cover for tails and a bed for revegetation. It is anticipated that reclamation by soil cover would be done concurrently with tailings disposal during the months of May through October. During the winter months, tailings would be placed and shaped before they freeze. The overburden would be placed on the tailings during the following summer. Upon completion, the filtered tailings disposal site slopes would not exceed 4:1 H:V, and the top would slope with a three percent grade to ensure that precipitation does not pond on top of the site (Fig. 2-7 Filtered Tailings Disposal Site Reclamation Plan).

2.1.10.2 Precipitation and Pore Water

The tailings permeability after placement is estimated to be in the range of 10^{-6} cm/sec (Golder letter dated September 7, 2004, MCRI 2005,Vol II, Appendix D). Precipitation would runoff the in place tailings, into the perimeter ditch, and be directed to the percolation pond. Concurrent reclamation using the overburden excavated from the site and natural revegetation would further control runoff and erosion.

“Field capacity" is a soils property that specifies the maximum amount of water a soil can retain in its pores. It is dependent on compaction and particle size. The field capacity of Nixon Fork tailings is estimated to be 17.4 percent moisture content (Golder letter dated December 1, 2004, MCRI 2005,Vol II, Appendix D). The tailings would be filtered to less than 15 percent moisture content (17% daily maximum-15 % monthly average). Thus the tailings would not bleed pore water unless precipitation is allowed to percolate through the tailings. Maintaining a sloping surface would ensure that precipitation does not pond on, or percolate through the tailings pile. (Fig. 2-7.)

Potential seepage water quality due to precipitation or pore water from the compacted tailings can be characterized by the Nixon Fork Tailings MWMP results, Table 3-2. While some of the results exceed the strictest potential water quality standards, the potential for generating leachate is limited because the low permeability of the placed tailings, estimated at 10^{-6} cm/sec, would reduce the potential for recharge to the tailings, and, in addition, the neutralization potential ratio (29.1) is sufficiently high to limit the acid generation potential, which also limits the metal leaching potential of moisture that may accumulate in the tailings. (See Table 2-3). (Also see Golder letter dated October 15, 2004, MCRI 2005,Vol II, Appendix C.)

Precipitation runoff or seepage that collects in the percolation pond would be monitored in accordance with the Storm Water Pollution Prevention Plan.

Figure 2.7: FILTERED TAILINGS DISPOSAL SITE CLOSURE PLAN

2.1.10.3 Milled Ore Tailings

The tailings pond would be emptied of tailings as explained in the above, inspected and repaired as necessary. This process would extend through the first two to three years of new ore mining and milling. The FTDS is sized to hold new ore tailings up to 160,000 tonnes. Once repairs to the pond's impervious, low-density polyethylene liner are completed new tailings would be sent to the pond. Tailings would move by gravity through an insulated, heat-traced, 3-in surface pipe from the mill to the zero-discharge tailings impoundment. Water displaced by the settled solids would form a pond covering the tailings. Water would be recycled by pump to the mill on a year-round basis.

The base of the existing tailings impoundment dam was built to support a dam structure approximately 70 feet high with a crest at 995 feet above sea level. The dam, as presently constructed, has thermistors installed at the base of the dam. The existing dam crest is only 984 feet above sea level and the disturbed area including dam and pond is 10.2 acres. A lift of approximately 24 feet (to a total height of 1,008 feet above sea level) may be constructed at some future date, if reserves justify, to provide an additional tailings capacity of approximately 294,000 tonnes (approximately five years of tailings). Raising the dam from the from the planned 995 feet to 1008 feet would require additional fill at the toe of the dam. The disturbed area would increase 11.6 acres for a total of 21.8 acres. See Fig. 2-8. Modifications to the dam would require plan approval and permits from ADNR's Dam Safety Section and ADEC before construction.

2.1.11 Water Supply

The ground water around the mine, and the surface waters in Mystery and Ruby creeks, in their natural condition, are, generally, of drinking water quality, and, largely, meet other various water quality standards. In the surface waters arsenic slightly exceed the current standard of 0.050 mg/L. In January 2006 this standard would be lowered to 0.010.

Water for milling processes would be supplied from the tailings pond water. Water used underground would be supplied from underground sumps. Water for domestic purposes would be supplied from the infiltration gallery only. The domestic water is treated before distribution to meet the State's requirements.

Ground water also, generally meets drinking water standards. Arsenic content meets the current standard but would exceed the 2006 standard of 0.010 mg/L.

The water from the infiltration gallery would be pumped from Mystery Creek through a buried, insulated, 3-in high density polyethylene (HDPE) pipe to a 20,000-gal insulated, heated storage tank located just east of the Crystal Portal and the camp. From the storage tank water would flow by gravity feed directly to the camp, mill, and mine. The mine is permitted by the State of Alaska to withdraw up to 54,800 gpd from Mystery Creek. Domestic water use would be some 10,000 gpd (50 person x 200 gpd) much of which would go to the septic system. See Section 2.1.13 for water balance.

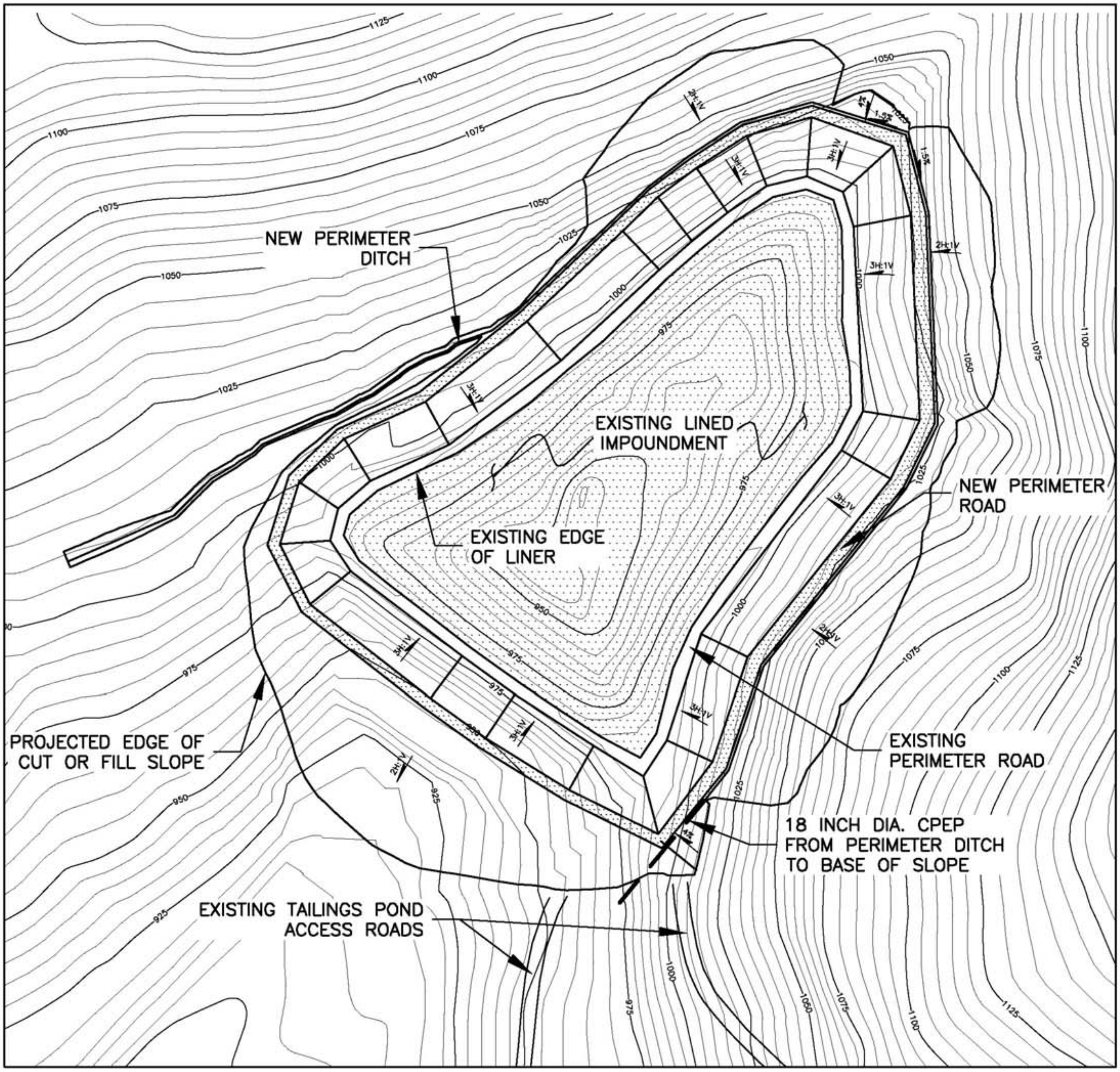
Chapter 3, Table 3-3 details the surface water quality data for both Mystery and Ruby creeks. Table 3-4 presents similar data for the ground water around the mine. This data is present purely as baseline or background information as there are no discharges to either surface or ground water. Detailed data may be found in MCRI 2005,Vol II, Appendix E and F.

2.1.12 Wastewater Disposal

Four types of wastewater would be generated: 1) mine water, 2) mill process wastewater, 3) shop and laboratory wastewater, and 4) domestic sewage and gray water from the camp and mill site. See Section 2.1.13 for water balance and 2.1.12.1 Mine Water.

2.1.12.1 Mine Water

The underground sumps would provide water to be used underground by the rock drills, to suppress dust, and for washing rock faces after blasting. Water from these activities would seep into the ground. Excess water would flow down the workings to a sump. No mill process water would be used underground.



NOTES

1. AS-BUILT SURVEY PROVIDED BY MYSTERY CREEK RESOURCES, INC.

PROJECT
MYSTERY CREEK RESOURCES, INC.
NIXON FORK TAILINGS DAM
NEAR McGRATH, ALASKA

TITLE
PROPOSED DAM UPGRADE WITH 1008 FT CREST ELEVATION

Golder Associates
Anchorage, Alaska

PROJECT No. 033-5632x003			FILE No. NEWDAM.DWG	
DESIGN			SCALE AS SHOWN	REV. 0
CADD	SLA	12/15/04	**Figure 2-8**	
CHECK				
REVIEW				

2.1.12.2 Mill Process Water

All process water leaving the mill would be (1) contained in the tailings slurry piped to the tailings impoundment for settlement, (2) transported to the FTDS as pore water in the filtered tailings, (3) shipped off-site as pore water in the flotation concentrate filter cake, or (4) returned from the mill to the tailings pond for storage and reuse. The tailings would be ground to approximately 80-100 percent 200 mesh (74 micron) or smaller, thus removing pore water is not feasible. Process water not trapped in the tailings within the impoundment would be recycled to the mill.

To maintain operational efficiencies in the operation of the tailings pond, it would be necessary to make a Land Application of water stored within the tailings pond beginning in June 2006. This application would be conducted under permit with the Alaska DEC and occur at the rate of 108,000 gallons per day for two to three weeks dependent upon accumulated water in the pond. This LAD would occur in May or June of 2006-2008 and the fall of 2009 and 2010. See Section 2.13 (Water Balance) for details.

2.1.12.3 Shop and Laboratory Wastewater

Shop wastewater would result from washing and servicing mobile equipment. It would be processed through an oil/water separator with the water then combined with the mill process wastewater and tailings for disposal in the tailings impoundment. Oil residue from the separator would be collected and burned in the incinerator.

The analytical and metallurgical laboratory processes would use sodium fluoride, and hydrochloric, sulfuric, and nitric acid. Less than twenty-five gallons of each would be used annually. Disposal into a lined zero discharge tailings pond would be appropriate according to ADEC. (Boles, pers. comm., May 2004.) ADEC would require that the acids and bases be neutralized prior to disposal into the no-discharge facility and that the pH of the solution being disposed of to be between 6 and 9 (email May 7, 2005 from ADNR's Steve McGroarty).

The laboratory wastewater would be characterized for Resource Conservation and Recovery Act (RCRA) purposes prior to disposal. Depending on the results of the characterization, the resulting wastewater would be combined with the mill process wastewater and tailings for disposal in the tailings impoundment, or otherwise disposal of as required by regulation.

2.1.12.4 Domestic Sewage

Domestic sewage from the camp and mill site would be sent through insulated, heat-traced, gravity piping to septic tanks that drain through similar piping to an existing septic absorption field approved by ADEC. Underground workers would use honey buckets or chemical toilets that would be trucked to the surface and processed through the mill site septic system.

2.1.13 Water Balance

Water is consumed at Nixon Fork in several areas: underground mining, milling run-of-mine ore, reprocessing of existing tailings, domestic usage, and miscellaneous usage such as dust control. The sources of water used are the Mystery Creek Infiltration Gallery, water currently in the existing tailings pond, and existing mine water.

It is estimated underground mining would require approximately 12,000 gallons per day when mining operations are underway. It is anticipated that all of this water can be obtained underground and returned to underground sumps in the mine. Milling of run-of-mine ore and existing tailings would require the majority of water consumed. This is discussed in more detail below. Man-camp usage is estimated at 10,000 gallons per day when the full 50-man camp is occupied. This water would come from the Mystery Creek Infiltration Gallery. Miscellaneous usage is estimated to vary from a few hundred to 2000 gallons per day during the summer months and would come from the infiltration gallery or tailings pond.

A series of water balances have been calculated based upon the assumption that mining and processing of newly mined ore would begin in December 2005 and continue through December 2010. In this scenario, the milling of the existing tailings would begin in June 2006 continuing until the end of October 2006. This process recommences in mid-May 2007 and ends at the end of October 2007.

From November 2007 through the end of 2010 only 150 tonnes per day of newly mined ore is processed with the exception of approximately six weeks in the early summer of 2008 when the balance of existing tailings will be reprocessed at 350 tonnes per day. The water balance calculations have assumed all tailings will be deposited on the FTDS through the end of 2008 with tailings developed in 2009 and 2010 being deposited in the then empty existing tailings pond. The tailings pond is assumed to contain two million gallons of water as of December 1, 2005 with an ending balance of 870,000 gallons as of December 31, 2010.

A series of figures (Fig. 2-9 through 2-16 on the following pages) have been developed to show the average daily water flow in gallons per day for each component of the operation. These figures are related to the milling scenarios outlined above with the time periods indicated below. A detailed daily water balance calculation for the entire five-year milling process may be found in MCRI 2005, Vol II, Appendix G.

Period	**Figure**
December 1, 2005 - May 31, 2006	3-9
June 1 – October 31, 2006	3-10
Nov. 1 2006 - May 15, 2007	3-11
May 16, 2007 - October 31, 2007	3-12
November 1 - December 31, 2007	3-13
Full Year 2008	3-14
Full Year 2009	3-15
Full Year 2010	3-16

As stated in Section 2.1.12.2 above, a land application of water from the tailings pond would occur each year to allow efficient operation of the tailings reclaim process, inspection and repair of the pond liner after the existing tailings have been removed for reprocessing, and operation of the pond when it is being used as a conventional tailings pond. This would occur primarily in May-June of 2006-2008 at the rate of 108,000 gallons per day (approximately 75 gallons per minute) for 12 to 21 days in late May of each year. In 2009 and 2010 this LAD would occur at the same rate for 17 to 21 days in the early fall. The gallons of water applied each year are shown below. Note the gallons per day given in Figures 2-10, 2-12, 2-14-16 are calculated on the basis of distribution over a 5-6 month period covered by the schedule rather than a 2-3 week period when land application would actually occur.

Year	**Days Applied**	**Total Gallons Applied**
2006	12	1,296,000
2007	21	2,268,000
2008	13	1,404,000
2009	21	2,268,000
2010	17	1,836,000

2.1.14 Power Supply

Three 820 kW permanent diesel-electric generators would produce power required by all project facilities. Two operating generators would meet power needs. The third 820 kW generator would be maintained as a spare.

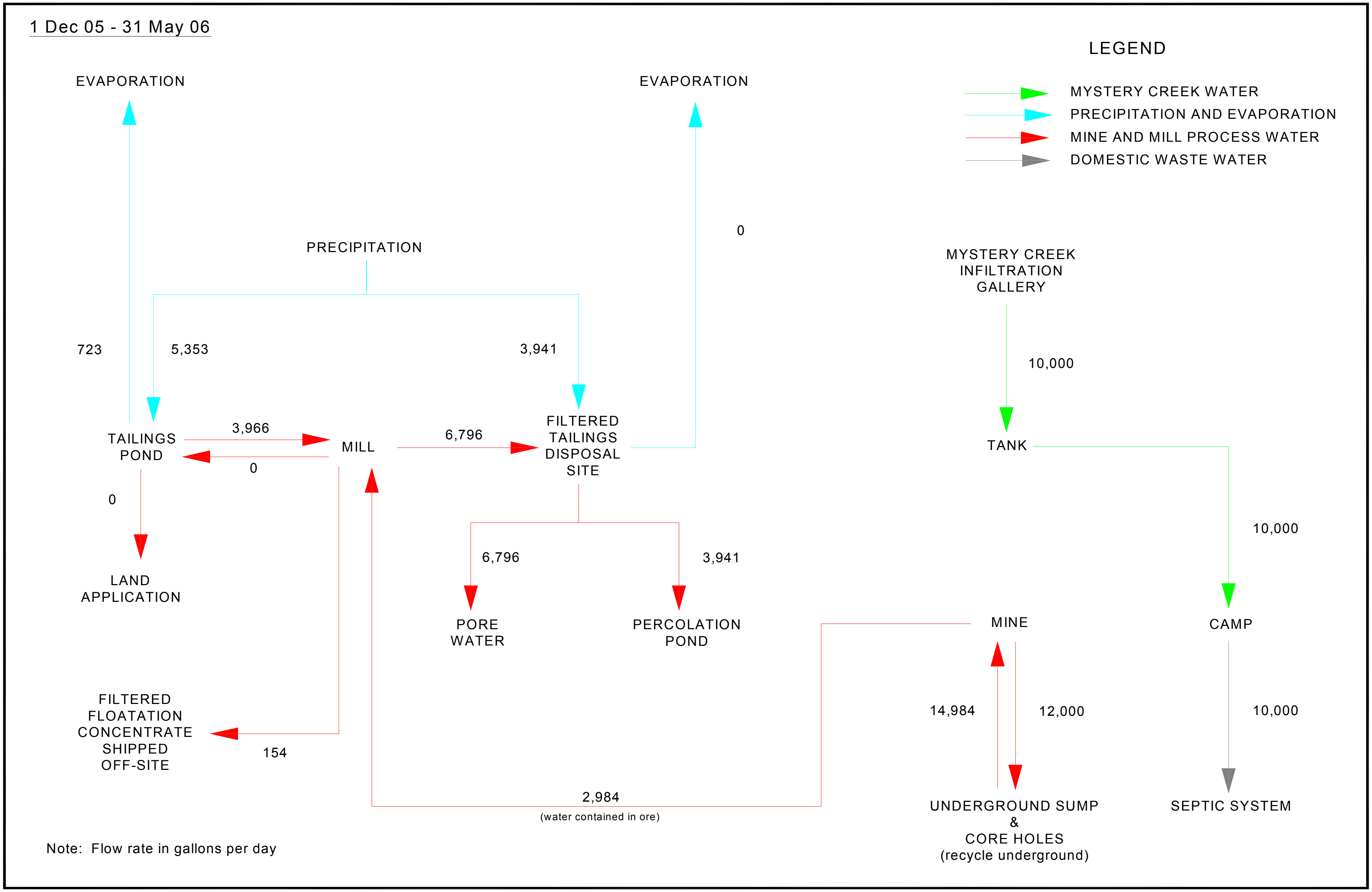


Figure 2-9: Water Balance: Mined Ore With Filtered Tailings Disposal
Dec. 2005 – May 2006

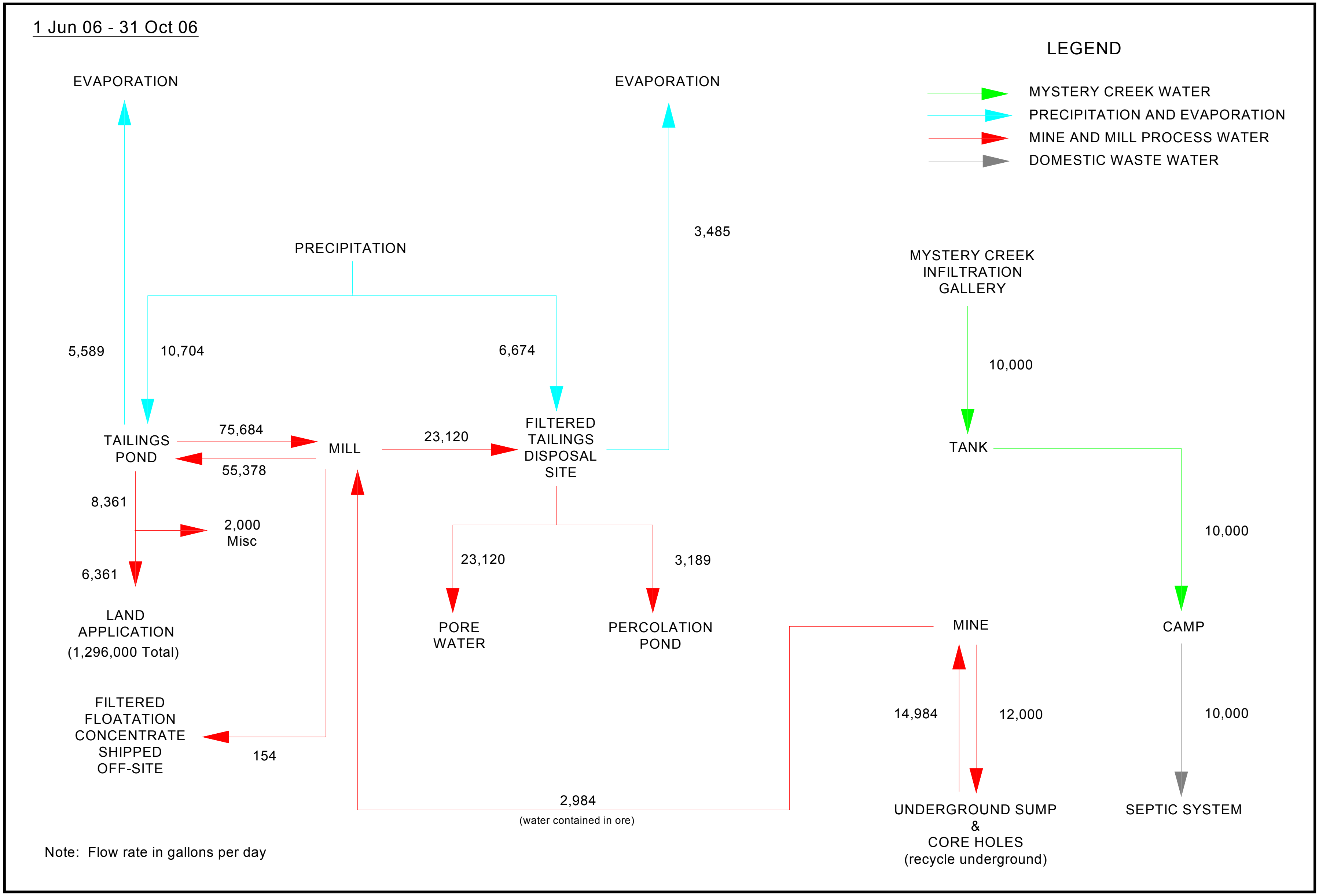


Figure 2-10: Water Balance: Mined Ore and Tailings Processing With Filtered Tailings Disposal
June 2006 – Oct. 2006

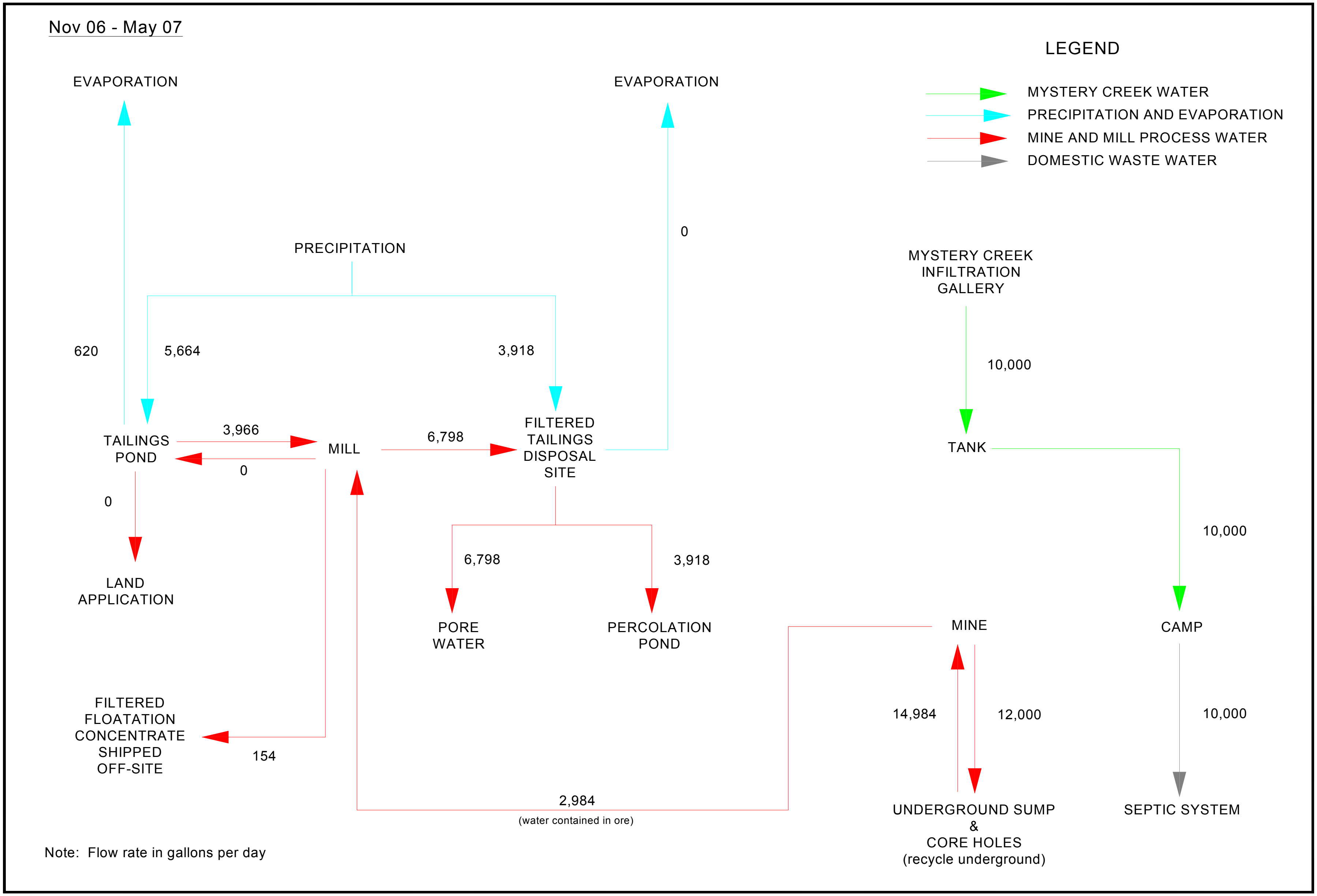


Figure 2-11: Water Balance: Mined Ore With Filtered Tailings Disposal
Nov. 2006 – May 15, 2007

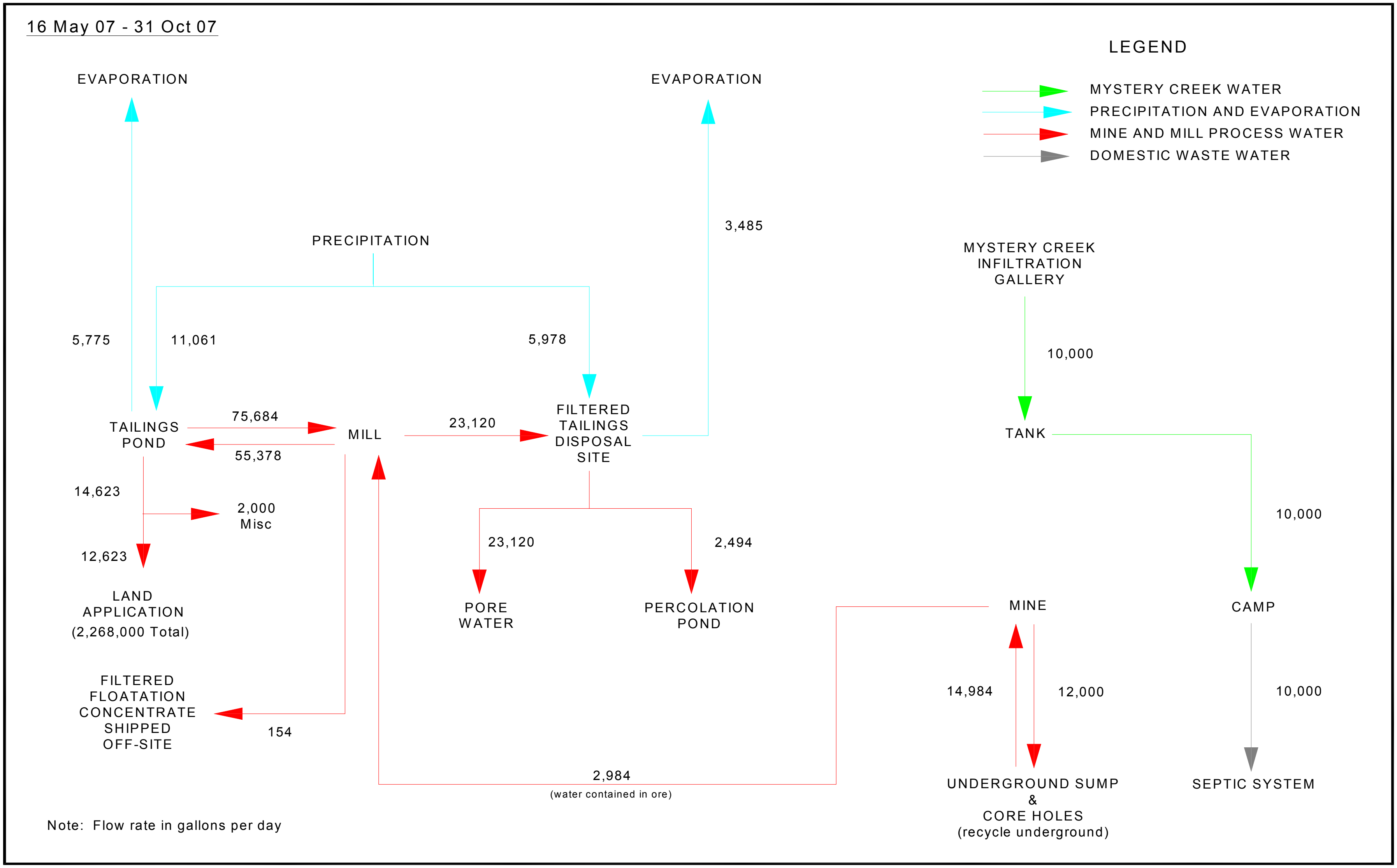


Figure 2-12: Water Balance: Mined Ore and Reprocessed Tailings With Filtered Tailings Disposal May 16, 2007 – Oct. 2007

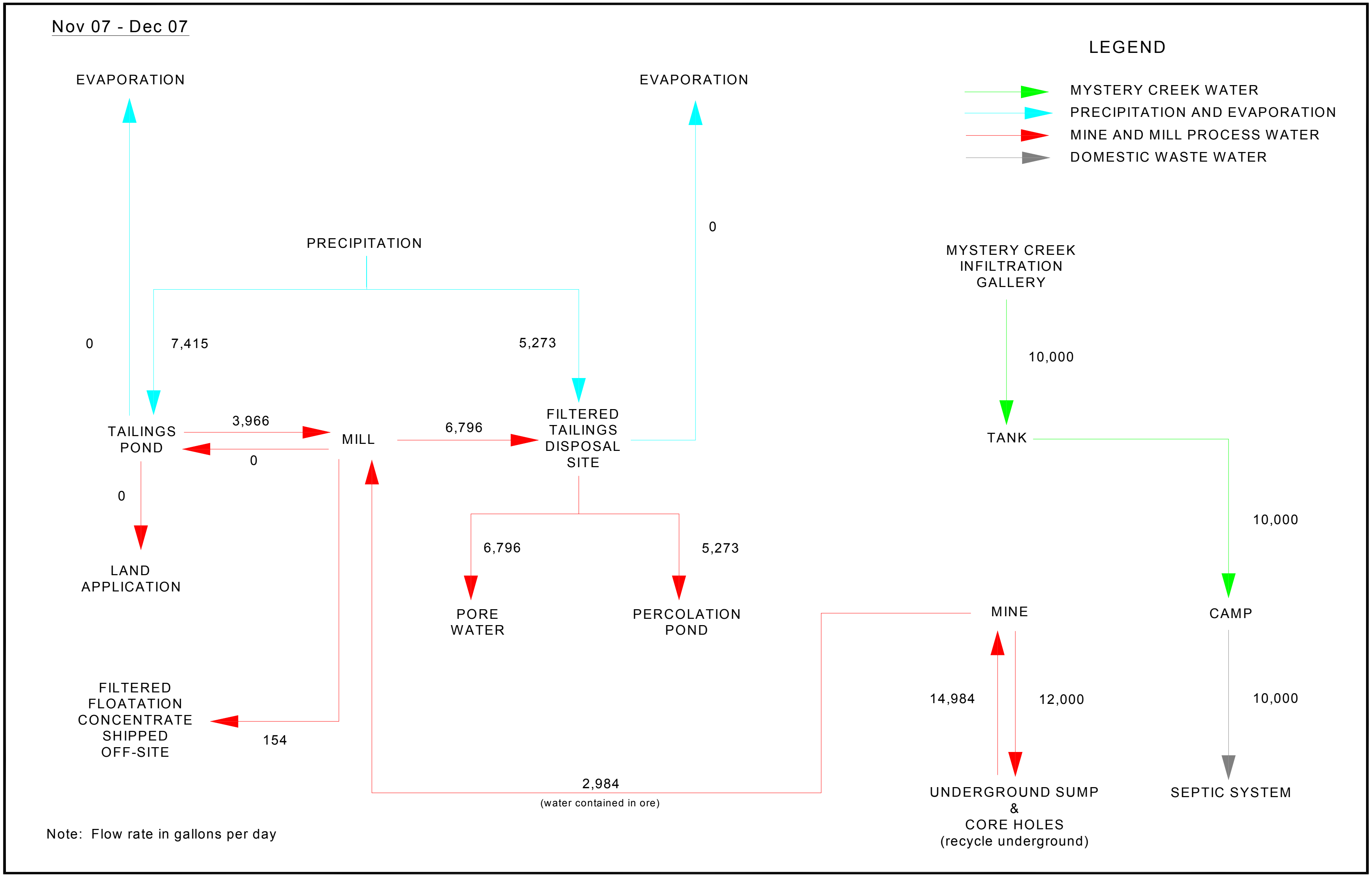


Figure 2-13: Water Balance: Mined Ore With Filtered Tailings Disposal
Nov. 2007 – Dec. 2007

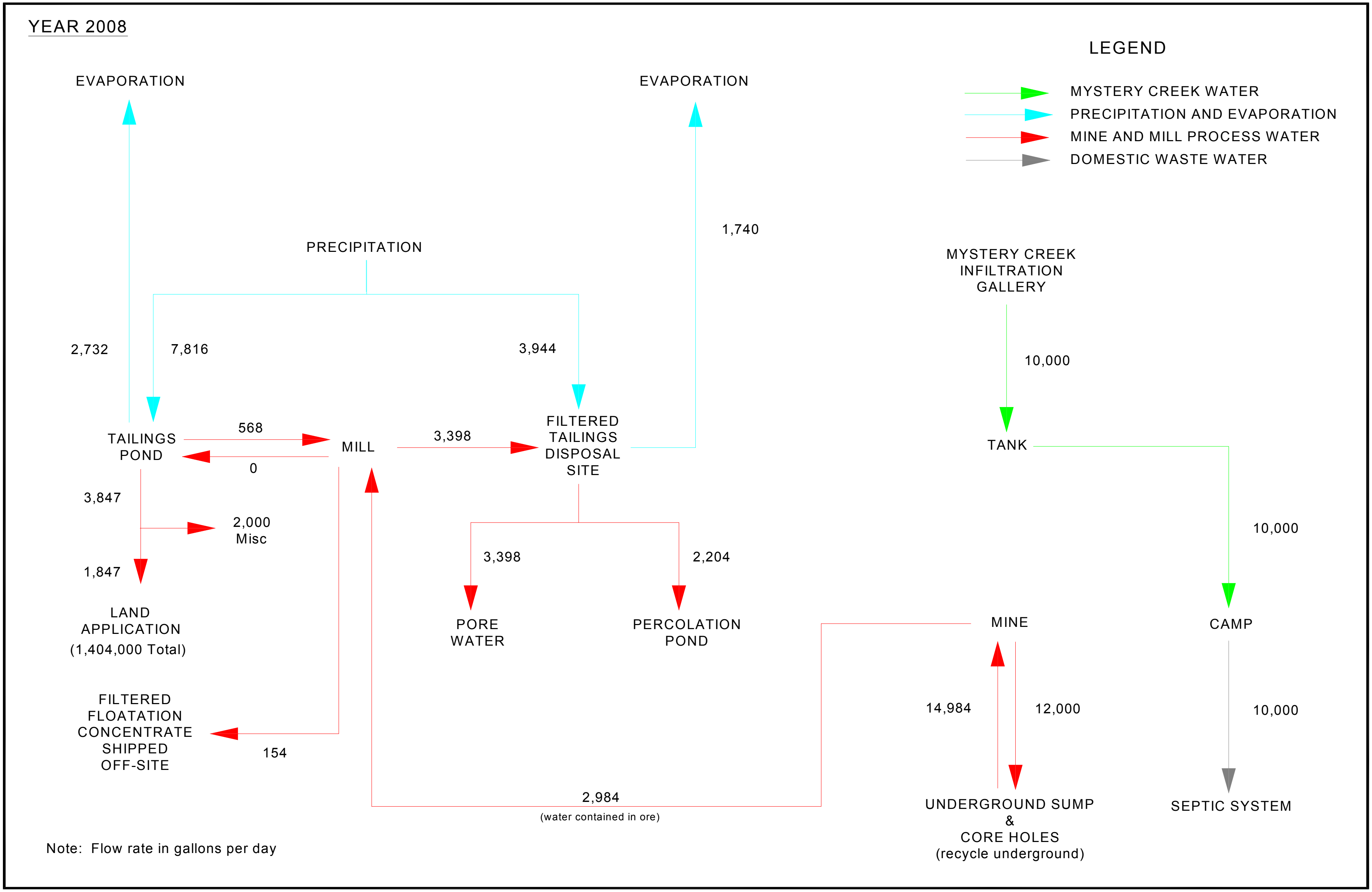


Figure 2-14: Water Balance: Mined Ore With Filtered Tailings Disposal 2008

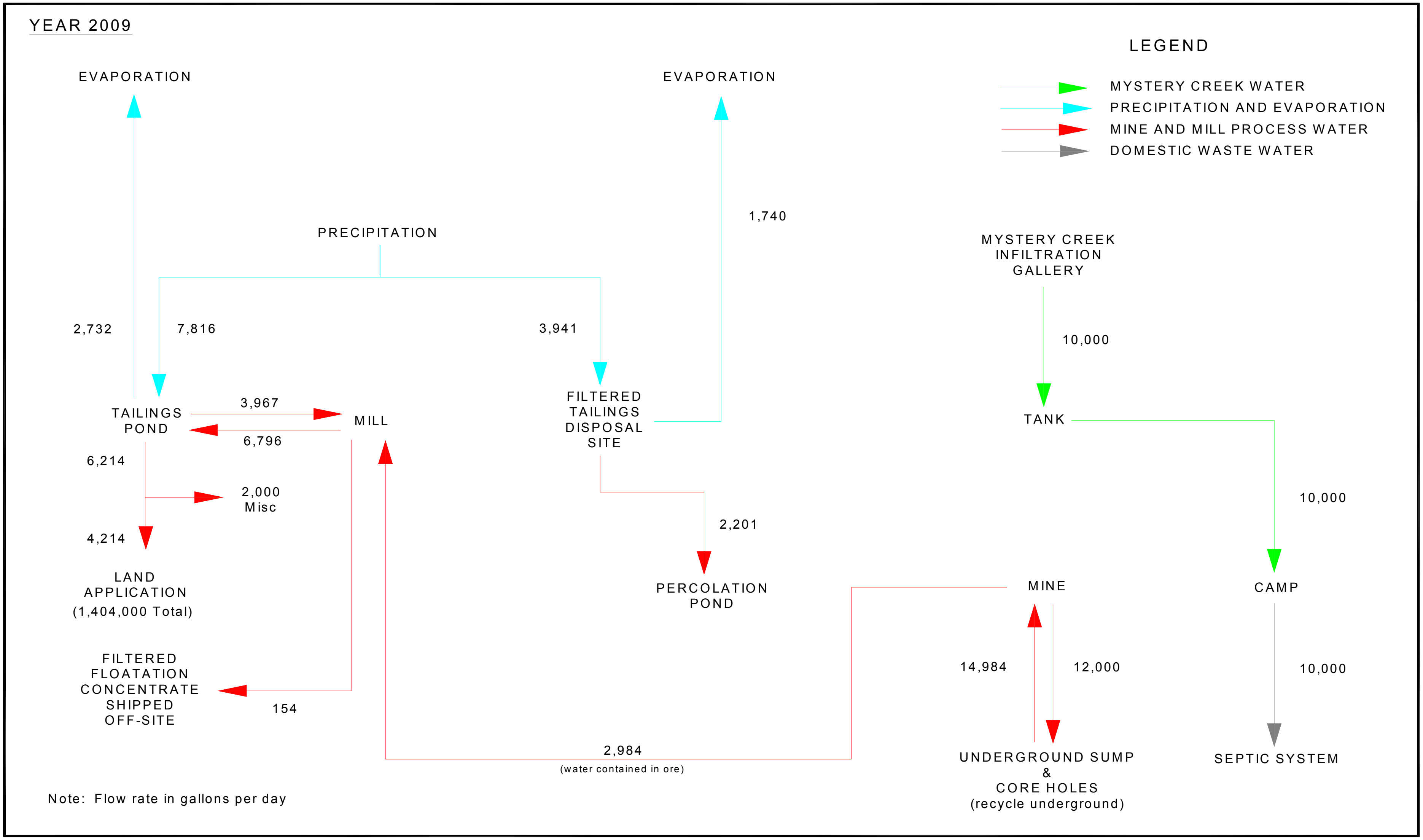


Figure 2-15: Water Balance: Mined Ore With Tailings Pond Disposal 2009

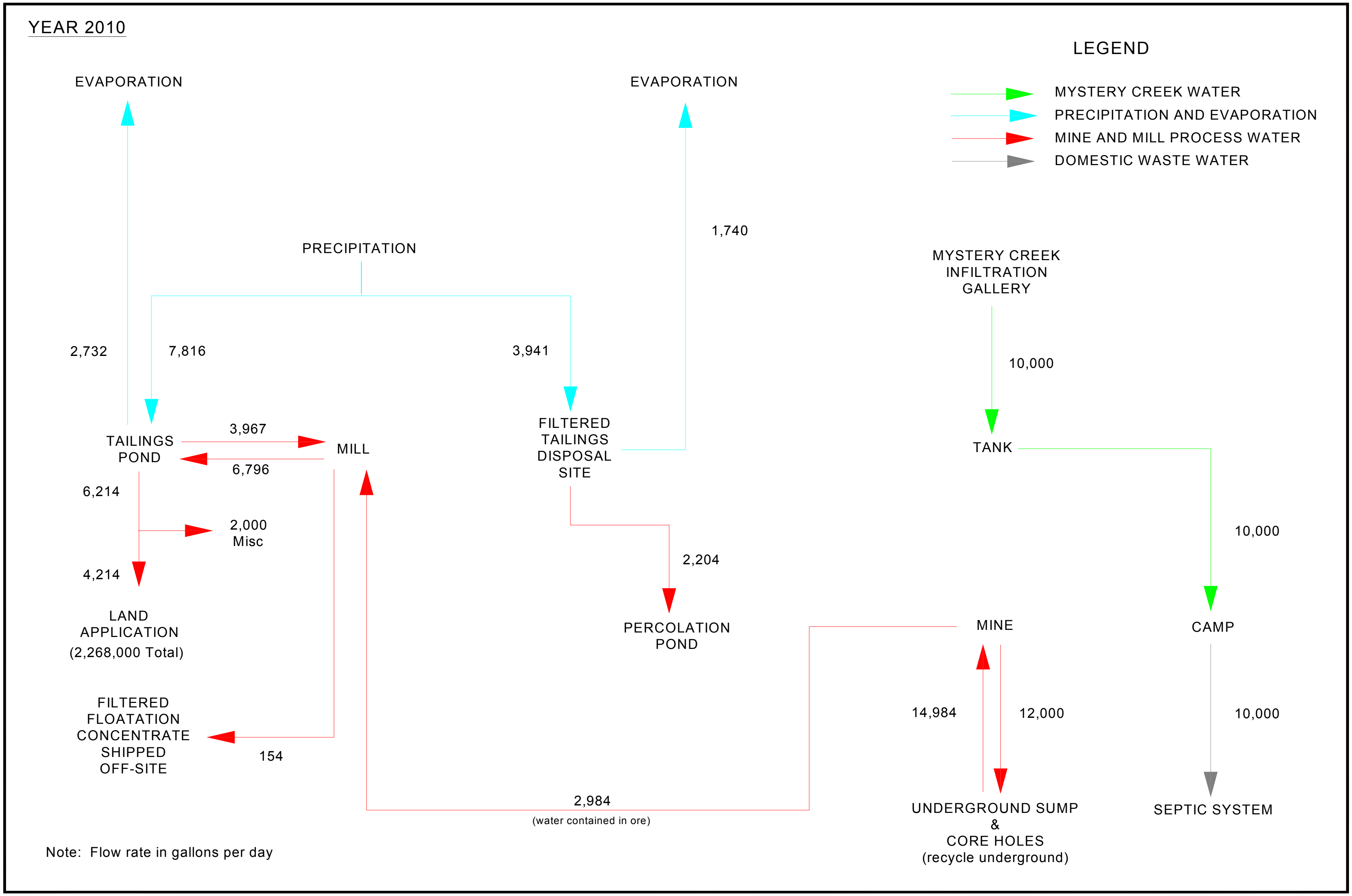


Figure 2-16: Water Balance: Mined Ore With Tailings Pond Disposal 2010

Based on the emission source inventory, the mine project would be classified as a PSD (prevention of significant deterioration) major stationary source under 18 AAC 50.300(c)(1) if permitted to operate with no restrictions on air emissions. The major source of emissions would be these generators. However, as allowed by 18 AAC, MCRI requested a limit on fuel used (Owner Requested Limits or ORL) to avoid classification as a major source. Specifically, MCRI requested an ORL of 1,075,000 gallons of fuel per 12-month period for the generators. This would limit the potential for air emission to less than 250 tons per year for each applicable criteria pollutant. The Air Quality Control Construction Permit (AQ837CPT01 – Project X-226) has been issued by ADEC.

The power plant would be located at the south end of the Crystal development rock dump area in four conexs as required by the ADEC Air Permit. Each generator unit would be connected to a common 1,000 gallon fuel day tank at the power plant site which, in turn, would be fed by a double wall buried fuel line (1½ inch pipe within a 3 pipe) from the fuel bladders at the airstrip. In addition, in the winter the exhaust or waste heat from each generator would be transferred in a buried double walled pipe to the Crystal raise, mill, and shop buildings to provide heat for those facilities. During the summer the waste heat would be dissipated at the power plant site with fan cooled radiators. Power would be transmitted via a buried cable to the Crystal raise and mill.

The power plant site and location of the power cable, fuel and waste heat lines are shown in Figure 1.4.

2.1.15 Fuel Supply

Fuel would be flown into the site by DC-6 or similar aircraft with a freight tank of approximately 3,000 gallons. The fuel would be transferred by pump or gravity through a four-inch hose to three existing bladders each holding approximately 10,000 gallons. The bladders are located within dikes with a 120-percent capacity of the bladder. Fuel would be transferred by gravity flow from the bladders 2,000 to 3,000 ft via a 1.5-inch pipe within a 3-inch outer pipe to the main camp. The pipeline would be upgraded to meet current standards in the summer of 2005. Currently there are three 10,000-gallon diesel fuel bladders at the airstrip, two 500 and a 1,000-gallon diesel tanks at the mill. A 1000-gallon day tank is located at the camp, and at the power plant site. There is one 500 gallon steel tank at the Mystery boiler, and one 500-gallon and one 1,000-gallon tank at the Crystal boiler. There are also two 500 gallon used oil tanks at the boilers, and two 500-gallon gasoline tanks at the airstrip. There would be a 1000-gallon tank on a trailer, and a 500-gallon tank on wheels.

MCRI is also evaluating the need to reinstall the fourth existing 10,000-gallon fuel bladder at the existing fuel depot. This bladder would provide additional reserve fuel for periods when weather prevents aircraft fuel delivery. The spill prevention plan would be updated prior to installation of this bladder. This would require repair of an existing containment dike from which the bladder was removed in the summer of 2003.

2.1.16 Borrow Source

The primary borrow source would be an argillite deposit approximately 0.6 mile south of the tailings impoundment (Fig. 1-4). This is the site of the original borrow source which has been reclaimed. The site would be reopened and approximately 150,000-bank yd^3 of borrow or fill material would be used to raise the tailings dam if that structure is modified in the future. The area of the re-opened material site would be approximately 3.4 acres.

Sand would be required for maintenance of the road network. This borrow source, approximately ¾ of a mile south of the tailings pond, would increase approximately 0.2 of an acre over the life of the Plan of Operation. The expansion would occur upslope where there are no wetlands.

2.1.17 Explosives

The explosives used for underground blasting would be ammonium nitrate/fuel oil (ANFO) and high explosives. Separate magazines would be used for storage of explosives, and for storage of detonators. All storage facilities would comply, with the requirements of the Mine Safety and Health Administration.

2.1.18 Solid Waste Disposal

Non-tailings solid wastes, such as inorganic, non-burnable solid wastes, would be disposed of in the existing solid waste disposal site permitted by ADEC. The site is located west of the south end of the airstrip (Fig. 1-4). The ADEC permit (# SWG0302000) allows up to 50 cubic yards per year of burnable organics and a like volume of non-burnable inorganic material. This site has the capacity to hold approximately 1000 yd^3, or approximately a ten-year life.

Kitchen and other spoilable waste would be stored inside the dining hall building or in bear-proof containers prior to disposal. All combustible and spoilable wastes would be incinerated (daily, weather permitting) and reduced to ash residual before disposal in the solid waste site. The incinerator would comply with state air quality control regulations at 18 AAC 50. With only ash and non-combustibles in the landfill it is highly unlikely that wildlife would be attracted to the landfill. As an added precaution, the ADEC permit requires that "If necessary, erect and maintain a fence or other devices to keep bears and other scavenging animals out of the refuse."

No hazardous or other prohibited wastes (e.g., batteries, used oil) would be placed in the solid waste site.

2.1.19 Hazardous Materials

Existing used oil, grease, and hazardous materials left at the site by NGI are not the responsibility of MCRI. The xanthates were removed in the summer of 2004 by the owner of the claims (Almasy) under an agreement with BLM. Used oil, which could be burned, was used as heating fuel by MCRI in the winter of 2004-5. Other used petroleum products and any remaining hazardous materials left by NGI were removed by BLM in the summer of 2005 or would be used by MCRI.

2.1.19.1 New Materials

All new materials containing oil and/or hazardous substance would be transported, stored, used, and disposed of by MCRI or its agents in strict compliance with federal and state regulations. MCRI has prepared and would maintain a Spill Preventions Control and Countermeasures Plan (SPCCP) (January 2004). All hazardous wastes generated on site, including solid wastes such as batteries, would be temporarily stored in accordance with an hazardous material handling plan (HMHP) that complies with 40 CFR 260-273, and is approved by BLM. These materials would be disposed of in accord with federal and state requirements, including being transported offsite to a permitted hazardous waste treatment and disposal facility. Used oil from heavy equipment, generators, etc., would be used to produce heat for the shop or burned as fuel in the solid waste incinerator. Approximately 3,000 gallons of used oil would be needed to heat the shop during the winter (six months). The facility would create approximately 2,300 gallons per year. Approximately 1,150 gallons (21 barrel equivalent) of used oil would be accumulated during the summer (six months) for winter heating. No more than 6 months accumulation of used oil would be on site at any one time. No more than two month's accumulation of used grease would be on site at any one time.

2.1.19.2 Hazardous Chemicals

All materials brought on-site by MCRI that contain oil or hazardous substances would be transported, stored, and used by MCRI or its agents in strict compliance with federal and state regulations.

2.1.19.3 Oil and CERCLA Hazardous Substances Containing Solid Wastes

All solid waste generated on site by MCRI or its agents which contains regulated quantities of oil and/or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substances would be temporarily accumulated using demonstrated best management practices such as by providing spill containment, fire prevention, etc. Any solid waste that is listed as, or exhibits the characteristics of, a hazardous waste would be managed in accordance with 40 CFR 260-279. MCRI would minimize hazardous waste generation to the extent possible by conducting on-site energy recovery of used-oil and off-site recycling of other wastes such as lead-acid batteries. All remaining oil and/or CERCLA hazardous substance containing wastes would be properly disposed of off-site. Regulated solid waste would be removed from the site on a regular basis in accord with the hazardous materials handling plan.

2.1.19.4 Program Management

MCRI would have an employee on-site at all times that is properly trained in the handling of hazardous materials. MCRI is responsible to ensure that all aspects of management of oil and hazardous substance containing materials and wastes, and emergency spill response, are properly functioning in accord with the HMHP. See Section 2.1.9.

2.1.20 Wildlife Protection

Employees transported to the mine site, or individuals otherwise on site, would not be permitted to have firearms, and would not be permitted to hunt, trap, or fish in the area surrounding the mine. Company firearms would be available only for defense of life and property (DLP). Hunting would not be permitted by anyone in the immediate vicinity of the project facilities for public safety reasons. Feeding of animals by workers would be strictly prohibited. Storage of all food items would be in bear-proof containers or facilities at all times. Employees would receive education about the personal dangers involved in such feeding, and the fact that the animals often end up being shot when they lose their fear of people and become dangerous. Problem bears would be brought to the attention of ADF&G for potential disposal unless DLP situations are involved.

Wildlife observations of brown bear, black bear, moose, caribou, wolves and any other species of interest would be recorded by date, species, number, and specific location on the site, and submitted to BLM annually. This would also include any animal destroyed for DLP or incidentally destroyed by mine facilities/activities. A wildlife monitoring plan for the tailings pond would be developed. Wildlife mortalities associated with the tailings facility or FTDS would be reported to ADNR. Semiannual reports would be required detailing observation counts and carcasses found, with preservation and lab analysis of a representative number of specimens. Should monitoring identify continuing wildlife impacts, fencing, and/or netting of the tailings pond or other action might have to be taken.

2.1.21 Surface Disturbance

Table 2-4 lists the acreage of existing (89.2 acres) and proposed (88.2 acres) surface disturbance for each project component and related facilities. Fifty acres of the estimated 88.2 acres to be disturbed is based on an estimate of 10 acres of surface exploration per year that may or may not occur. Surface exploration is concurrently reclaimed. The proposed additional 38.2 acres of disturbance would be caused by the deposition of development rock, expansion of the existing tailings facility, excavation of borrow materials for the tailings dam and road maintenance, removal of the airstrip knob, and construction of the FTDS. Less than one-quarter acre would be re-disturbed for borrow materials for roads under this Plan of Operation. Approximately 150,000 yd^3 of borrow material may be used to raise the tailings dam structure. This would disturb approximately 3.4 acres of reclaimed land. Less than 12 acres of disturbance would occur during expansion of the tailings impoundment. The contiguous federal claims around the mine total approximately 1670 acres. The total mine disturbance, existing and proposed, attributed to the mine is approximately 175 acres. With concurrent reclamation, including exploration sites and the FTDS, and the airstrip stabilized and left for emergency use, less than 83 acres would require reclamation at the end of mine life.

All disturbed areas are, or would be stabilized to prevent erosion and reclaimed. Reclamation for all areas to be disturbed, as shown in Table 2.4, would be bonded as approved by ADNR and BLM. BLM would administer the bond in cooperation with the State of Alaska.

2.1.22 Clearing and Stockpiling

Areas to be covered by development rock or fill material, whenever possible, would be cleared and the growth material stockpiled for closure reclamation. For re-disturbed borrow sources or construction of the tailings facilities and extension of the airstrip, all trees, brush, and other vegetation removed would be put into windrows at the edge of the cleared areas. Topsoil and overburden then would be removed and stockpiled at an immediately adjacent site for use during reclamation. Because revegetation in the project

Table 2-4

Existing and Proposed Surface Disturbance by Area-Component

Area	Description	Disturbance in Acres			
		Existing[a]	Proposed	Reclaim Preclose	Total At Close
A	Mystery Portal Development Rock Dump	2.9	0	0	2.9
B	Water Infiltration Gallery	0.1	0	0	0.1
C	Mystery Vent Raise/Boiler Area	0.5	0	0	0.5
D	Utility Corridor-Naturally Reclaimed	N/A	N/A	N/A	N/A
E	Main Camp Site	1.9	0	0	1.9
F	Mill Site	2.1	0	0	2.1
G	Tailings Impoundment & Dam	10.2	11.6	0	21.8
H	Tailings and Water Reclaim Line	0[b]	0.4	0	0.4
I	Crystal Portal Development Rock Dump[c]	5.3	6.7	0	12.0
J	Crystal Vent Raise/Boiler Area	0.5	0	0	0.5
K	Explosive Magazine	0.5	0	0	0.5
L	Old Airstrip (1990)	6.7	0	0	6.7
M	Fuel Depot	0.6	0	0	0.6
N	Power Plant Site[d]	0	0	0	0
O	Filtered Tailings Disposal Site	4.1[e]	9.4[f]	13.5	0
P	Historic Placer Site-Not MCRI Disturbance	N/A	N/A	N/A	N/A
Q	Borrow Area - Sand Pit	0.9	0.2	0	1.1
R	Borrow Area - Tailing Dam Lift	0	3.4	0	3.4
S	Historic Stamp Mill Not MCRI Disturbed	N/A	N/A	N/A	N/A
T	Hercules Airstrip (1995)	26.9	6.5[g]	0	33.4
U	Quarry	4.6	0	0	4.6
V	Landfill	0.3	0	0.2	0.1
W	Old Camp Site (Exploration)	0.8	0	0.8	0
X	Site Roads	13.3	0	0	13.3
Y	Exploration[i]	7.0	50.0[j]	47.0[j]	10.0
	Totals	**89.2**	**88.20**	**61.5**	**115.9**

[a] Summer 2005

[b] Existing reclaimed area to be re-disturbed by installation of the reprocessed tailings low-pressure line.

[c] Includes power plant site on south end of area, road, and utility corridor for power and coolant to mill.

[d] Power plant site area included in I.

[e] Existing grease barrel storage site.

[f] Includes percolation pond and overburden stockpiles less existing disturbance of 4.1 acres.

[h] Site roads are shown on the area map but not labeled.

[g] Proposed airstrip extension (knob removal)

[I] Exploration sites are not shown on the area map.

[j] Up to 10 acres per year with concurrent reclamation.

area usually occurs naturally and relatively fast, stabilization of stockpiles likely would occur quickly. It is anticipated that approximately 88.2 acres would require clearing during the five-year permit period. Fifty acres of the new disturbance would occur with surface exploration that would be reclaimed the following year. At closure approximately 58.7 acres of the new disturbance would have been reclaimed.

2.1.23 Employment

When the project is at full production it would employ approximately 40-45 people on site. Working 365 days per year, mining and milling would occur continuously. Workers would live in the existing 50-bed singles camp located just north of the Crystal Portal and east of the mill site.

2.1.24 Exploration

When the project is at full production it would employ approximately 40-45 people on site. Working 365 days per year, mining and milling would occur continuously. Workers would live in the existing 50-bed singles camp located just north of the Crystal Portal and east of the mill site.

2.1.24 Exploration

Exploration activities would consist of surface exploration drilling, trenching, soil sampling, and underground definition drilling. Annually, MCRI would develop a surface exploration map and submit it to BLM. Up to 10 acres of surface disturbance may be anticipated from surface exploration in any given year. The disturbance would include access roads, drill pads and trails, and trenches. The estimated surface disturbance is calculated as follows:

- Roads are assumed to be 14-15 ft (4.5 meters) in width with an additional 6-7 ft (2 meters) for spoil.
- Trenches are assumed to be as much as 13-14 ft (4 meters) wide with an additional 8-9 ft (2.5 meters) for spoil.
- New drill sites are assumed to be 50 ft (15 meters) by 50 ft (15 meters) square to accommodate a diamond drill rig.
- Trials (used to access to drill sites) are assumed to be 13-14 ft (4 meters) wide.

Existing roads would be used insofar as possible. If new roads are needed for access to the drill sites, surplus overburden would be stockpiled along the road so it would be available for reclamation. Trails to drill sites, and the drill sites, where possible, would be constructed by clearing the trees and leaving the vegetative mat and soil in place to minimize erosion.

All trenches, drill pads and trails would be reclaimed in the same year as created or in the following spring. Drill fluids would be contained in a metal tank. Drill polymers would be used that are environmentally safe. Diapers and/or drip pans would be used beneath the drill engine to catch any oil or fuel drips. At drill pads, bore holes would be plugged when drilling is complete, and all drilling equipment and supplies would be removed. All drill holes would be plugged with a bentonite hole plug, a benseal mud, or equivalent slurry, for a minimum of 10 feet within the top 20 feet of the drill hole in competent material. The remainder of the hole would be backfilled to the surface with drill cuttings. If water is encountered in any drill hole, a minimum of 7 feet of bentonite holeplug, a benseal mud, or equivalent slurry shall be placed immediately above the static water level in the drill hole. If artesian conditions are encountered, the operator would contact the Division of Mining, Land & Water (Steve McGroarty – 907-451-2795) or the Department of Environmental Conservation (Luke Boles – 907-451-2142) to indicate how the hole was plugged. Trenches (drill pads and trails as applicable) would be regraded to original ground, scarified as needed, and capped with the overburden stockpiled during construction. The entire area would be fertilized as recommended by ADNR's Plant Materials Center.

No surface disturbance would occur from underground exploratory drilling.

2.2 Alternative #1 - No Action Alternative

Under the No Action Alternative all mining activity at the site would cease. The mine would remain closed. Since the prior operator (responsible party) went bankrupt, little or no reclamation of the site would occur without the use of the State's bond pool, federal funds, or action taken by Almasy. All existing facilities would remain in place subject to deterioration by the elements. The portals would remain open to entry. The old abandoned mine shafts would, also, remain open and unmarked. The tailings pond diversion ditches would remain in disrepair and the tailings pond would continue to accumulate snow melt and rain water.

Basically, the site would remain as it was before MCRI entered the site. There are three exceptions. MCRI has performed specific equipment and facilities maintenance work and site cleanup as approved in the 2003, 2004, and 2005 Plan of Operation. Almasy had the xanthates, left by NGI, removed in the summer of 2004. Finally, BLM has contracted for the removal of the "hazardous materials", primarily used oil and grease, also left at the site by the previous operator. This is to be completed in the summer of 2005 (Beck, pers. comm.).

If the No Action Alternative occurred because MCRI decided not to pursue the project, mineral exploration might continue by others in anticipation of future project development. In any eventuality, since the mine and its facilities have been in place approximately ten years, this alternative may be used as a baseline for comparison with the proposed reopening of the mine and the changes proposed.

2. 3 Alternative #2 – Modified Components

A mining operation is made up of several different components. Under alternative #2 the same basic mining activities and practices as the Proposed Action would be followed with the following differences in two components.

Tailings reprocessing. Tailings from the pond would not be reprocessed. The cyanide leach system would not be installed and Nixon Fork would continue to send the concentrates to a smelter outside of Alaska and not produce a doré on site

Removal of knob at airstrip. The knob at the south of the runway would be left in place.

Chapter 3

Affected Environment

3.1 Critical Elements

Table 3-1 shows where the 15 critical elements may be found in this chapter.

Table 3-1
EA Critical Elements Tracking, Affected Environment

Critical Element	EA Section	Critical Element	EA Section
Air Quality	3.12	Subsistence	3.15
ACEC	3.22	T&E Species	3.11
Cultural Resources	3.16	Wastes Hazardous/Solid	3.20
Environmental Justice	3.22	Water Quality, Surface and Ground	3.7
Farm Lands, Prime or Unique	3.22	Wetlands/Riparian Zones	3.8
Floodplains	3.19	Wild and Scenic Rivers	3.22
Invasive Non Native Species	3.22	Wilderness	3.22
Native American Religious Concerns	3.22		

3.2 Topography

The Nixon Fork of the Takotna River heads in the Mystery Mountains and Von Frank Mountain, and flows about 75 miles in a southwesterly direction to join the main Takotna River at its river mile 15 (Brown, 1983). The Nixon Fork mining claims are located atop the southern end of a range of generally rounded, unglaciated hills in the headwaters of Mystery, Ruby and Hidden creeks, which flow northwestward into the Nixon Fork (Figs.1-2 and 1-3). The elevation of most hilltops varies between 1,100 and 1,800 ft. The highest point within five miles of the claims is Jumbo Peak to the east at 1,925 ft.

3.3 Geology

In the vicinity of the lode deposits the country rock consists of early Paleozoic platform carbonates and Cretaceous sandstone and shale, which have been intruded by a stock of late Cretaceous granitic rocks (quartz monzonite). The carbonate rocks, however, are the most important host for gold mineralization.

Mineralization in the two lodes consists largely of irregularly shaped, gold and copper enriched, oxidized and/or retrograded sulfide rich-calcic skarn bodies, peripheral to and northwest of the quartz monzonite contact.

The skarn (calcium, iron and magnesium silicates) occurring between the marble and quartz monzonite hosts sulfide mineralization consisting of dominantly pyrite, chalcopyrite, with minor pyrrhotite and other sulphides, as well as oxidized equivalents consisting of iron and copper oxides, silicates, and carbonates. The ore intervals in the Mystery deposit are composed of 8% oxide ore, 69% sulfide ore, with 23% mixed oxide and sulfide. The Crystal deposit is composed of 15% oxide ore, 75% sulfide ore, with 10% mixed oxide and sulfide ore. In addition to gold and silver, the mineralization contains approximately 1.2 % copper. As discussed in Section 2.1.6, the acid producing potential of the rock is low and the neutralization potential is high.

3.4 Soils

The soils in the project vicinity have evolved under the influence of the cold climate found at this high latitude. The dominant soils are Typic Cryorthods that are well drained, without permafrost, and found on hilly to steep slopes. The soils of the valley bottoms and long low foot slopes are Histic Pergelic Cryaquepts. These are poorly drained soils with permafrost (Rieger, et. al., 1979).

The soils most affected by project development would be the in place residual soils weathered from the limestone, argillite, quartz monzonite and skarn bedrock. Typically on the surface a 6- to 8-in. humus layer overlays 12 to 24 in. of light to dark brown dry loess. Total depth to bedrock generally varies from outcrops to 10 ft. The only permafrost involved in the proposed project is the frozen soil and bedrock that underlies the tailings pond.

3.5 Vegetation

Much of the mine area was denuded of its vegetation in the early 1920s to supply fuel for the stamp mill. Today, most of this area has returned naturally to a healthy upland hardwood spruce-birch and aspen forest covering the hills in the mine area. This is a typical interior Alaska forest composed of various ratios of white spruce, black spruce, quaking aspen, balsam poplar (cottonwood) and paper birch (Viereck and Little, 1972). White spruce predominates on the higher, more well drained slopes, while black spruce is common in the lower, wetter areas such as creek bottoms. Willow and alder occur in the creek bottoms, with alder also found along disturbed areas such as old roads. The under story consists of spongy moss and low brush on the cool, moist slopes, with grass on the dry slopes (Selkregg, 1975).

Five general plant community cover types occur in the project site; these types include (1) open needleleaf forest, (2) open mixed forest, (3) closed tall scrub, (4) open low scrub, and (5) barren/sparsely vegetated areas[a]. General descriptions of each plant community cover type are included below (HDR Alaska, Inc 2004).

1. Open Needleleaf Forest

   Open needleleaf forest is the most common plant community cover type mapped in the project site. This cover type occurs along the eastern and western margins of the airstrip, along most areas surrounding the historical airstrip, north and south of the Ruby Creek sand borrow pit, along the low valley bottom southwest of the settlement pond, and is most abundant in the northernmost portion of the project site surrounding Mystery Creek and the extending north through a large area of undeveloped lands. Topographically, open needleleaf forests occur across most landform positions, including hilltops, ridgelines, hillsides, wide valley bottoms, and across broad flat areas.

   General characteristics of open needleleaf forests include an upper tree canopy dominated by black spruce with an understory comprised of an assortment of dwarf birch, Labrador tea, bunchberry, low-bush cranberry, crowberry, northern commandra, bog blueberry, Leatherleaf, cloudberry, woodland horsetail, Barclay's willow, and bluejoint grass. Several of the sites investigated also had a second (and sometimes third) dominate tree canopy species comprised of paper birch (and/or white spruce) along with dominant black spruce.

2. Open Mixed Forest

   Open mixed broadleaf-needleleaf forests are common throughout much of the project site. They occur along the southern end of the airstrip, throughout the western and southern margins of the gravel quarry and landfill, northwest and southeast of the Ruby Creek sand borrow pit, across most of the area surrounding the tailings pond, and extend to cover much of the area from the drill site and camp buildings northeast to Mystery Creek. Topographically, this plant community occurs along hilltops, ridgelines, and hillsides, typically along slightly steeper slopes than open needleleaf forest communities do.

[a] The barren/sparsely vegetated area classification is not included in The Alaska Vegetation Classification (Viereck et al. 1992).

General characteristics of mixed broadleaf-needleleaf forests include an upper tree canopy dominated by a combination of paper birch, quaking aspen, white spruce, or black spruce with a varying understory comprised of an assortment of barclay's willow high-bush cranberry, prickly rose, low-bush cranberry, bunchberry, northern commandra, tall fireweed, field horsetail, and bluejoint grass.

3. Closed Tall Scrub

   Few areas of closed tall scrub thicket occur in the project site. This cover type generally occurs along the riparian floodplains of Ruby and Mystery Creeks, forming stream banks and binding alluvial soils deposited by high flows associated with the creeks.

   Common plant species in this community type include Barclay's willow, Pacific willow felt-leaf willow, and green alder. Typically a sparsely inhabited vegetative understory is present under the dense canopy of shrub overstory; this sparse understory is dominated by field horsetail, and non-dominant species including marsh five finger and tall fireweed.

4. Open Low Scrub

   Only one small area of open low shrub meadow occurs in the project site It is located near the southern portion of the project site, occurring along the hillside immediately north of the quarry site and west of the landfill.

   Common plant species occurring in this community type include dwarf black spruce, dwarf birch, Labrador tea, low-bush cranberry, crowberry, and pale sedge.

5. Barren/Sparsely Vegetated

   Much of the project site is developed or has been disturbed by either historic or current mining activities. These areas are generally void of vegetation or sparsely vegetated. The sparsely vegetated areas are dominated by disturbance-adapted plant species such as green alder saplings, salmonberry, tall fireweed, and dandelion.

3.6 Surface Disturbance

Historical access to the area was by a rough thirteen-mile road from Medfra – approximately 8 air miles (Figs. 1-2 and 1-3). The right of way for this road, built decades ago with public funds to support the old mine, is still used as a winter access route to the site. It is impassable by conventional vehicles in summer, but can be traversed by small "four-wheelers."

Both placer and lode mining operations during the past 87 years have disturbed a substantial amount of the natural surface cover over a 3.5 sq. mi. area around the claims. Flumes and tailings attest to past placer operations in the beds of Hidden and Ruby creeks. Hidden Creek especially shows evidence of this with old feed water channels, unnatural pools, and spoil piles. At least six underground shafts, with accompanying clearings and old buildings, document the lode mining history of the area. Between 11,000 to 15,000 tons of old mill tailings are located in the streambed at the very head of Ruby Creek (Fig. 1-4).

Three, long unused airstrips varying in length from 950 to 3,000 ft, were located above the 1,200 ft elevation on the property. Plant communities have largely reclaimed these strips. Exploration activities during the past three decades have cleared many areas for drill pads and trenches. A road/trail system provides easy access throughout the area (Fig. 1-4).

Development since 1990 has disturbed some 89.2 acres. This includes the existing infrastructure (Fig. 1-4 and Table 2.4). It does not include areas that were disturbed and have been reclaimed.

3.7 Water

3.7.1 Surface Water Hydrology

The mine area geology is dominated by a massive granitic intrusion of quartz monzonite into the areal carbonate rocks (i.e. limestone). The intrusion is relatively impermeable rock. The permeability of the carbonate rocks is unknown, but the contact areas between the quartz monzonite and carbonates exhibit karst features and are more fractured and permeable. Mystery and Ruby Creeks may lose large percentages of their surface flow to the subsurface in these contact zones (Golder Associates, 1990).

Mystery and Ruby creeks are all very small headwater drainages and are relatively typical of interior Alaska. In general, these basins have steep slopes, shallow active zones, and small infiltration, and surface storage areas. Their discharges are dominated by two events; spring runoff from relatively impermeable frozen soils, and intense summer thundershowers. Ruby Creek is ephemeral and dries up completely during dry periods and freeze-up. Mystery Creek has a larger storage capability in the hilltop aquifer and shows greater consistency of flow (Golder Associates, 1990).

Both streams are fed by springs that originate high up on the hills. There are various other seeps into the creeks that are too small to create distinct channels. In total, these springs dominate the base flows of the creeks. Aufeis formation is likely on these springs during at least the early parts of winter (Golder Associates, 1990).

The project site has an estimated mean annual precipitation rate of 20 inches, approximately 25 per cent higher than McGrath (Golder Associates, 1990). With a mean annual evaporation rate of 13 inches the project site has an estimated mean annual runoff of 7 inches. The drainage area, basin length, and mean discharge (measured July-September 1990) for each creek are shown in Table 3-2.

Table 3-2
Surface Water Parameters
For Mystery, Ruby and Hidden Creeks

	Drainage	Basin	July to September 1990		
	Area	Length	Mean Discharge		Runoff
Basin	(mi^2)	(mi)	(cfs)	(cfs/mi^2)	(in)
Mystery Creek (above stn. 8)	1.19	0.9	1.4	1.2	3.7
Ruby Creek (above stn. 10)	2.34	1.5	0.4	0.2	0.5
Hidden Creek (above stn. 4)	1.17	1.1	1.5	1.3	4.1

3.7.2 Groundwater Hydrology

There are three groundwater systems in the mine area. The first is found in the hilltops with their shallow cover of loess and weathered bedrock, which acts as an aquifer over the impermeable granitic intrusion. Surface water infiltration into the hilltops is forced to seep out of the hills as springs at high elevations. None of the early core drilling in the mine area found free water in the bedrock. However, as mining and core drilling depths increased ground water has been encountered. Ground water filters into the lower shaft of the Crystal mine at depths that varies with the season.

The second groundwater system is found in the surface aquifers or active layers of the creek beds that thaw seasonally. Seismic investigations indicate at least 90 ft of alluvium above bedrock at one location in upper Ruby Creek. The entire cross section, however, appears to have a shallow active layer underlain by permafrost. Two exploratory wells were drilled in May 2004 in the Ruby Creek drainage to see if the area could be used for shallow injection of ground water pumped from around the mine workings. Each hole encountered permafrost to bedrock and the effort was abandoned.

The third groundwater system is the regional water table that is encountered at the base of the Crystal mine. The water elevation in the bottom of the Crystal mine varies seasonally but it has reached an elevation of approximately 475 ft (145 meters) above sea level in the mine or about 800 ft (244 meters) below the surface of the Crystal portal. Groundwater flow in the regional water table is likely most significant in the permeable contact zone between the granitic intrusion and the carbonate rocks. Surface water flows appear to have large losses to the subsurface at this contact zone. Based on topography, the regional water table should discharge to the major river valley streams to the west, east and south.

3.7.3 Water Quality, Surface and/or Ground

In general the upland water of Ruby and Mystery creeks is of drinking water quality except for naturally elevated levels of arsenic. The streams are generally of neutral ph, low alkalinity, low conductivity, cold, clear, well oxygenated and carry little sediment. In the downstream tundra areas the streams are more acidic and tinted red or yellow due to the peat bog type plant contact (Golder Associates, 1990).

The old stamp mill was built just below the origin of the uppermost spring feeding Ruby Creek. The tailings from the mill were piled directly across the spring bed, forcing the spring to pass over or through the tailings. The eventual failure of the wooden cribbing holding the tailings allowed them to wash downhill into Ruby Creek for some undetermined distance. This process of failure and erosion still continues. It is not known how far the tailings have washed down stream (Golder Associates, 1990). The milled hard rock ore contained gold, silver, copper, aluminum, iron, manganese, tellurium, bismuth and some other metals in small amounts. The mill used an amalgam process involving mercury. The tailings contain all of the above metals, including mercury. There is no apparent evidence of heavy metals in the water due to previous mining.

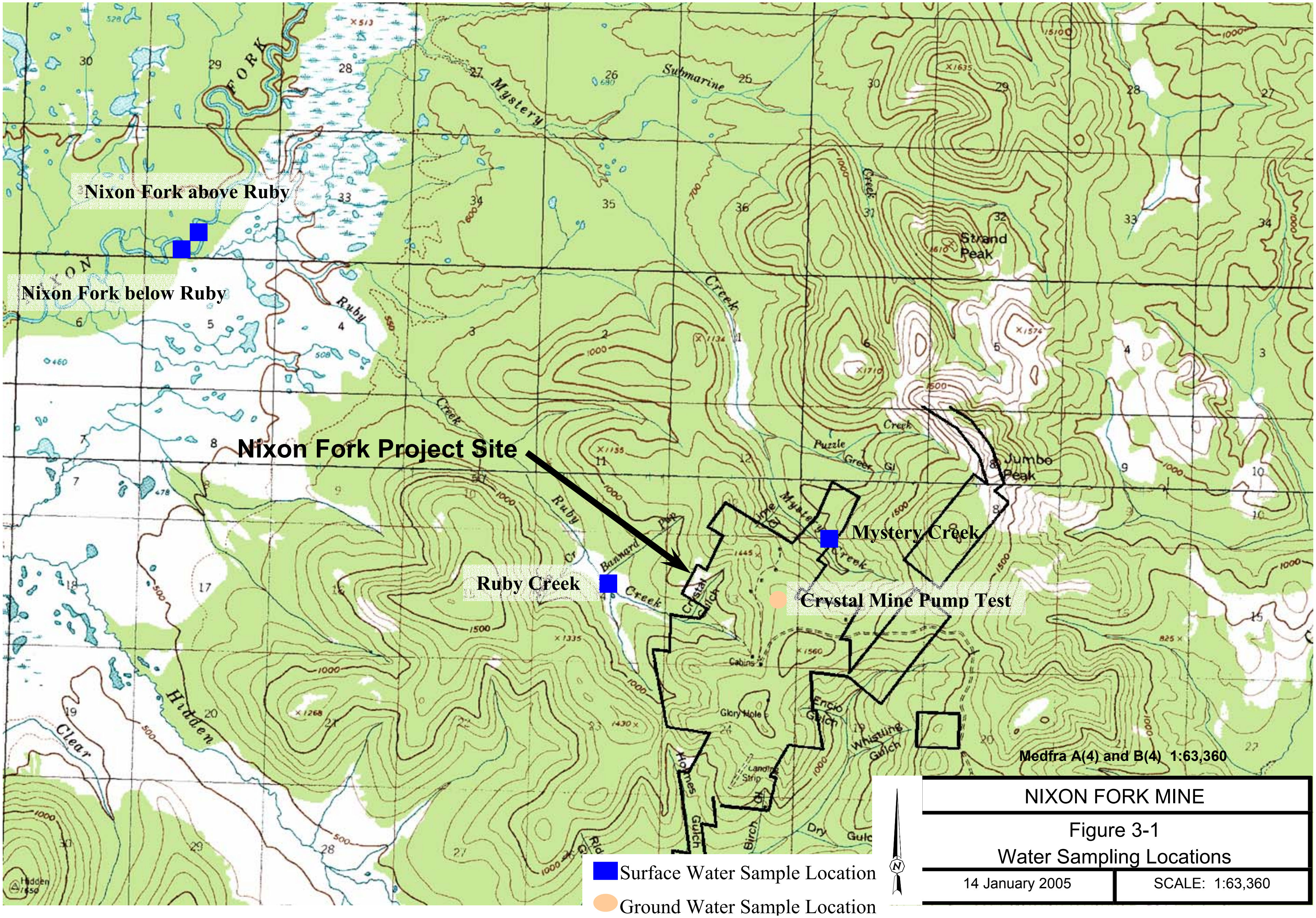
Surface water quality samples were collected from Mystery and Ruby Creeks and the Nixon Fork River during 2004 at the locations shown in Figure 3-1. Table 3-3 summarizes the 2004 surface water quality data for both Mystery and Ruby creeks. Groundwater quality was evaluated during a long-term aquifer test where water was pumped from the base of the Crystal mine in 2004. Table 3-4 summarizes the groundwater quality results.

No data on sediment transport are available except as indicated by measurements of turbidity and total suspended solids, as shown in Table 3.3. No sampling occurred, however, during the highest flows in either creek.

3.8 Wetlands/Riparian Zones

Because of the project's location atop a low range of hills, the only wetlands in the immediate area consist of narrow strips of riparian vegetation along the very upper reaches of Mystery and Ruby creeks. Depending upon gradient these strips vary from a few to approximately 70 yds in width. Willow thickets and grasses predominate in these creek bottoms. Where creek bottoms are narrow and side slopes angle up moderately the interface between willows and the upland spruce - hardwood forest is relatively abrupt. At wider points the interface is generally more gradual with black spruce found interspersed before reaching the spruce - hardwood forest type

There are six small wetland areas within the footprint of the mine facility. These are the areas on each side of the sand borrow pit, two areas adjacent to the tailings pond, a small area southeast of the powder magazine storage facility, and immediately southwest of Mystery Creek (HDR Alaska, 2004). See Fig. 1.4 for the referenced locations..



NIXON FORK MINE

Figure 3-1
Water Sampling Locations

14 January 2005	SCALE: 1:63,360

Table 3-3
Surface Water Chemistry Summary
Nixon Fork Mine

Analytes	Potential Water Quality Standards			Mystery Creek						Ruby Creek					
				Dissolved			Total Recoverable			Dissolved			Total Recoverable		
	Units	Value	Type	**Min**	**Max**	**Average(1)**	**Min**	**Max**	**Average(1)**	**Min**	**Max**	**Average(1)**	**Min**	**Max**	**Average(1)**
Metals by EPA 200.7, 200.8, and 6020															
Aluminum	mg/L	0.087	Aquatic	0.0207	0.0297	0.02302	0.064	**0.248**	**0.118**	0.012	0.0503	0.03044	ND (0.012)	0.0682	0.04222
Antimony	mg/L	0.006	Drinking	0.00055	0.00067	0.000622	0.00048	0.00087	0.000646	0.00086	0.00321	0.002322	0.0009	0.0032	0.002278
Arsenic	mg/L	0.050	Drinking	**0.0562**	**0.0613**	**0.05878**	**0.0601**	**0.0693**	**0.06334**	**0.00945**	**0.0269**	**0.01511**	0.0113	0.0318	0.0168
Barium	mg/L	2	Drinking	0.0063	0.007	0.00658	0.0067	0.009	0.00774	0.014	0.03	0.0226	0.014	0.031	0.0234
Beryllium	mg/L	0.004	Drinking	ND (0.00022)	ND (0.00022)	0.00011	0.00022	0.00022	0.00011	ND (0.00022)	ND (0.00022)	0.00011	ND (0.00022)	ND (0.00022)	0.00011
Bismuth	mg/L			ND (0.000005)	0.00002	0.000006	0.000005	0.00002	0.000015	0.00012	0.00026	0.000101	0.00023	0.00059	0.000356
Boron	mg/L	0.75	Irrigation	0.0014	0.024	0.00672	0.0013	0.027	0.00792	0.0045	0.01	0.00758	0.0051	0.013	0.0094
Cadmium	mg/L	0.0045	Aquatic	ND (0.000073)	0.0001	0.0000492	ND (0.000073)	ND (0.000073)	0.0000365	ND (0.000073)	ND (0.000073)	0.0000365	ND (0.000073)	0.00015	0.0000592
Calcium	mg/L			8.99	10.3	9.43	8.55	10.5	9.51	16.5	22	18.32	16.2	21.2	18.42
Chromium	mg/L	0.1	Drinking	ND (0.00072)	0.00094	0.000584	ND (0.00072)	0.00163	0.00073	ND (0.00072)	0.00132	0.0008	ND (0.00072)	0.00135	0.00100
Copper	mg/L	0.018	Aquatic	ND (0.000788)	0.00092	0.0004992	ND (0.000788)	0.00108	0.00074	**0.0942**	**0.18**	**0.08982**	0.107	**0.196**	0.1289
Iron	mg/L	1	Aquatic	0.019	0.0942	0.04	0.09	0.447	0.194	0.74	**1.76**	**1.13**	**1.13**	**2.16**	**1.418**
Lead	mg/L	0.0063	Aquatic	ND (0.000224)	0.000224	0.000112	ND (0.000224)	0.00027	0.0001436	ND (0.000224)	0.00028	0.0001456	ND (0.000224)	0.00035	0.00019
Magnesium	mg/L			2.03	3.4	2.39	1.1	3.8	2.23	3.3	4.4	3.87	1.7	4.4	3.50
Manganese	mg/L	0.2	Irrigation	0.0028	0.0096	0.00494	0.0052	0.017	0.00874	0.089	0.19	0.1378	0.092	**0.26**	0.1504
Mercury (EPA 245.1)	mg/L	0.00077	Aquatic	ND (0.000063)	ND (0.000103)	0.0000475	ND (0.000103)	ND (0.000103)	ND (0.0000515)	ND (0.000063)	ND (0.000103)	0.0000475	ND (0.000063)	ND (0.000103)	ND (0.0000475)
Molybdenum	mg/L	0.01	Irrigation	0.001	0.0023	0.00142	0.00076	0.0025	0.001392	ND (0.00013)	0.00062	0.000408	ND (0.00013)	0.00056	0.000289
Nickel	mg/L	0.107	Aquatic	0.00051	0.0011	0.000838	ND (0.002772)	0.00083	0.0004792	0.00153	0.00248	0.001904	0.00071	0.00179	0.001265
Potassium	mg/L			0.59	0.75	0.68				0.38	0.74	0.54			
Selenium	mg/L	0.0046	Aquatic	ND (0.000876)	ND (0.000876)	0.000438	0.006978	0.00258	0.0011328	ND (0.000876)	ND (0.000876)	0.000438	ND (0.000876)	ND (0.000876)	0.000688
Silicon	mg/L			3.3	5.6	4.38	3	6.4	4.5	2	4	3.14	2	4.1	3.12
Silver	mg/L	0.015	Aquatic	ND (0.0000566)	ND (0.0000566)	0.0000283	ND (0.0000566)	ND (0.0000566)	0.0000283	ND (0.0000566)	0.00028	0.00008	0.0001	0.00039	0.000105
Sodium	mg/L			1.9	2.2	2.02	0.98	2.2	1.836	1.5	2.4	2.02	0.96	2.5	1.792
Thallium	mg/L	0.002	Drinking	ND (0.000066)	0.00016	0.0001	ND (0.000066)	ND (0.00014)	0.0000832	ND (0.000066)	0.00013	0.000046	ND (0.000066)	0.00013	0.0000524
Tin	mg/L			ND (0.00096)	ND (0.0063)	0.0016	ND (0.00096)	0.0095	0.002284	ND (0.00096)	ND (0.0019)	0.0008	ND (0.00096)	0.0016	0.000704
Titanium	mg/L			0.0011	0.002	0.0015	0.004	0.023	0.00994	0.00046	0.0018	0.0013	0.0012	0.0026	0.00174
Uranium	mg/L			0.00049	0.0007	0.0006	0.00063	0.00095	0.000806	0.00014	0.00028	0.000216	0.00018	0.00032	0.000236
Vanadium	mg/L	0.1	Irrigation	ND (0.00035)	ND (0.00035)	0.000175	ND (0.00035)	0.00081	0.000523	ND (0.00035)	0.00039	0.000218	ND (0.00035)	0.00047	0.000291
Zinc	mg/L	0.269	Aquatic	ND (0.0015)	0.00164	0.00156	ND (0.0015)	0.00354	0.001308	0.00365	0.00717	0.00506	0.00353	0.261	0.05574

Notes:

Arithmetic average calculated using half the reported Method Detection Limit.

A hardness of 235 mg/L as $CaCO_3$ is assumed for criterion that are hardness dependent.

The arsenic maximum contaminant level (MCL) of 0.01 mg/L will become enforceable in January 2006.

Bolded cells identify concentrations that are higher than the potential regulatory criterion.

Table 3-3 (con't)

Surface Water Chemistry Summary
Nixon Fork Mine

Analyte	Potential Water Quality Standards			Mystery Creek						Ruby Creek					
				Dissolved			Total Recoverable			Dissolved			Total Recoverable		
	Units	Value	Type	Min	Max	Average(1)	Min	Max	Average(1)	Min	Max	Average(1)	Min	Max	Average(1)
Metals by EPA 200.7, 200.8, and 6020															
Anions, Nutrients, Field Parameters and Other Species															
Bicarbonate Alkalinity	mg/L as CaCO3						32.2	34.9	33				39.6	71.5	52
Carbonate Alkalinity	mg/L as CaCO3						0.208	0.428	0.373				0.208	0.428	0.373
Hydroxide Alkalinity	mg/L as CaCO3						0.208	0.428	0.373				0.208	0.428	0.373
Total Alkalinity	mg/L as CaCO3						30.5	34.4	33				37.9	71.4	52
Chloride	mg/L	230	Aquatic				0.18	0.29	0.24				0.38	0.91	0.57
Fluoride	mg/L	1	Irrigation				0.048	0.08	0.06				0.048	0.048	0.05
Sulfate	mg/L	250					3.43	3.62	3.5				3.34	19.3	10.0
Sulfide	mg/L						0.015	0.015	0.015				0.015	0.015	0.015
Hardness	mg/L			31	35	33	29	36	32	56	71	66	55	71	61
Cyanide WAD	mg/L	0.0052	Aquatic				0.0013	0.0044	0.0021				0.0013	0.0015	0.0014
TDS	mg/L						53	60	57				96	126	112
TSS	mg/L						2	20	9				1	5	2
Settleable Solids	mL/L/hr														
Turbidity	NTU						0.3	4.0	1.5				1.7	2.7	2.3
Ammonia-Nitrogen	mg/L						0.008	0.075	0.025				0.058	0.126	0.088
Nitrate/Nitrite-N	mg/L	10	Drinking				0.27	0.33	0.31				0.01	0.18	0.10
Nitrate-N	mg/L	10	Drinking				0.28	0.31	0.30				0.06	0.19	0.11
Nitrite-N	mg/L	1	Drinking				0.01	0.03	0.02				0.01	0.01	0.01
TKN	mg/L						0.332	0.332	0.332				0.435	0.520	0.488
Orthophosphate-P	mg/L						0.00141	0.00847	0.00527				0.00141	0.00506	0.00297
Phosphorus	mg/L						0.0052	0.0322	0.0145				0.0047	0.0070	0.0055
pH	pH units						7.14	7.30	7.23				7.02	7.45	7.16
Temperature	ºC						4.5	20.1	14.1				20.0	21.7	21.0
Conductivity	mS/cm						58	192	146				105	255	171
Cation															
Anion															

Note:
(1) Arithmetic average calculated using half the reported Method Detection Limit. Statistics based on five sampling events from June through October 2004.
A hardness of 235 mg/L as CaCO3 is assumed for criterion that are hardness dependent.
The arsenic maximum contaminant level (MCL) of 0.01 mg/L will become enforceable in January 2006.
Bolded cells identify concentrations that are higher than the potential regulatory criterion.

Table 3-4
Groundwater Water Chemistry Summary
Crystal Mine Pump Test
Nixon Fork Mine

				Groundwater - Crystal Mine Pump Test							
				Dissolved				Total Recoverable			
Analyte	Units	Potential Water Quality Standard		Minimum	Maximum	No.	Average(1)	Minimum	Maximum	No.	Average(1)
Metals by EPA 200.7, 200.8, and 6020											
Aluminum	mg/L	0.087	Aquatic	ND (0.012)	0.0449	22	0.0119	0.0365	**0.222**	22	**0.0900**
Antimony	mg/L	0.006	Drinking	0.00333	0.00423	22	0.00358	0.00303	0.00428	22	0.00352
Arsenic	mg/L	0.050	Drinking	0.0195	0.0237	22	0.0226	0.0198	0.025	22	0.0234
Barium	mg/L	2	Drinking	0.028	0.035	22	0.031	0.03	0.037	22	0.034
Beryllium	mg/L	0.004	Drinking	ND (0.00022)	ND (0.00022)	22	0.00011	ND (0.00022)	ND (0.00022)	22	0.00022
Bismuth	mg/L			ND (0.000005)	0.00001	22	0.00001	0.00001	0.0001	22	0.00004
Boron	mg/L	0.75	Irrigation	0.013	0.018	22	0.016	0.012	0.032	22	0.017
Cadmium	mg/L	0.0045	Aquatic	ND (0.000073)	0.00029	22	0.000089	ND (0.000073)	0.00023	22	0.000076
Calcium	mg/L			69.7	79.9	22	75.45	61.1	85	22	73.89
Chromium	mg/L	0.1	Drinking	ND (0.00072)	0.00111	22	0.001	ND (0.00072)	0.00142	22	0.001
Copper	mg/L	0.018	Aquatic	0.00311	0.0055	22	0.00394	0.00465	0.0135	22	0.00628
Iron	mg/L	1	Aquatic	0.0124	0.034	22	0.0233	0.0494	0.265	22	0.0964
Lead	mg/L	0.0063	Aquatic	0.000224	0.00106	22	0.00033	0.00062	0.00248	22	0.00105
Magnesium	mg/L			13	15	22	14	7.1	16	22	13
Manganese	mg/L	0.2	Irrigation	0.0089	0.014	22	0.01083	0.0082	0.014	22	0.01026
Mercury (EPA 245.1)	mg/L	0.00077	Aquatic	ND (0.000103)	ND (0.000103)	22	0.000052	ND (0.000103)	ND (0.000103)	22	0.000103
Molybdenum	mg/L	0.01	Irrigation	0.0017	0.0036	22	0.00237	0.002	0.0044	22	0.00255
Nickel	mg/L	0.107	Aquatic	0.00151	0.00482	22	0.00327	0.00184	0.00417	22	0.00307
Potassium	mg/L			1.2	1.5	22	1.31	0.63	1.6	22	1.28
Selenium	mg/L	0.0046	Aquatic	ND (0.000876)	ND (0.000876)	22	0.00044	ND (0.000876)	0.00206	22	0.00072
Silicon	mg/L			2.7	4.2	22	3.45	2.9	5.3	22	4.17
Silver	mg/L	0.015	Aquatic	ND (0.0000566)	ND (0.0000566)	22	0.00003	ND (0.0000566)	0.00023	22	0.00008
Sodium	mg/L			2.3	3	22	2.58	1.2	3.2	22	2.48
Thallium	mg/L	0.002	Drinking	ND (0.000066)	0.00014	22	0.00005	ND (0.000066)	0.00016	22	0.00008
Tin	mg/L			ND (0.00096)	ND (0.00096)	22	0.00048	ND (0.00096)	ND (0.00096)	22	0.000960
Titanium	mg/L			0.00095	0.0025	22	0.0014	0.0021	0.0089	22	0.0039
Uranium	mg/L			0.0033	0.0053	22	0.0039	0.0036	0.0058	22	0.0042
Vanadium	mg/L	0.1	Irrigation	0.00035	0.00051	22	0.00022	0.00035	0.00085	22	0.00041
Zinc	mg/L	0.269	Aquatic	0.0248	0.0366	22	0.0298	0.0246	0.035	22	0.0302

Notes: Table continues with notes on following page

Table 3-4
Groundwater Water Chemistry Summary
Crystal Mine Pump Test
Nixon Fork Mine

				Groundwater - Crystal Mine Pump Test							
				Dissolved				Total Recoverable			
Analyte	**Units**	**Potential Water Quality Standard**		**Minimum**	**Maximum**	**No.**	**Average(1)**	**Minimum**	**Maximum**	**No.**	**Average(1)**
Anions, Nutrients, Field Parameters and Other Species											
Bicarbonate Alkalinity	mg/L as CaCO3							192	218	22	207.6
Carbonate Alkalinity	mg/L as CaCO3							ND (0.208)	ND (0.428)	22	0.3880
Hydroxide Alkalinity	mg/L as CaCO3							ND (0.208)	ND (0.428)	22	0.3880
Total Alkalinity	mg/L as CaCO3							193	218	22	205.1
Chloride	mg/L	230	Aquatic					0.87	1.3	22	1.00
Fluoride	mg/L	1	Irrigation					0.06	0.11	22	0.08
Sulfate	mg/L	250						13	21.6	22	14.86
Sulfide	mg/L							ND (0.015)	ND (0.015)	6	0.008
Hardness	mg/L							203	259	22	245.5
Cyanide WAD	mg/L	0.0052	Aquatic					ND (0.0013)	0.0027	22	0.0009
TDS	mg/L							272	296	22	281.8
TSS	mg/L										
Settleable Solids	mL/L/hr							ND (0.068)	ND (0.14)	13	0.000
Turbidity	NTU							1.11	11.6	22	3.30
Ammonia-Nitrogen	mg/L							ND (0.0138)	0.102	22	0.038
Nitrate/Nitrite-N	mg/L	10	Drinking					4.1	7.18	22	5.30
Nitrate-N	mg/L	10	Drinking					4.17	6.97	22	4.95
Nitrite-N	mg/L	1	Drinking					0.02	0.07	22	0.05
TKN	mg/L							ND (0.332)	0.799	22	0.239
Orthophosphate-P	mg/L							ND (0.00141)	0.00567	22	0.00172
Phosphorus	mg/L							ND (0.00474)	0.0139	22	0.00781
pH	pH units							6.51	7.56	21	7.12
Temperature	ºC							6.7	10.4	22	7.43
Conductivity	mS/cm							492	1482	22	751.7

Notes:

Arithmetic average calculate using half the reported Method Detection Limit. All 22 water samples collected during June and July 2004.
A hardness of 235 mg/L as CaCO3 is assumed for criterion that are hardness dependent.
Drinking water criterion for total chromium is 0.1 mg/L. Aquatic chronic criteria for Cr(III) and Cr(VI) are 0.042 and 0.011 mg/L, respectively.
The arsenic maximum contaminant level (MCL) of 0.01 mg/L will become enforceable in January 2006.
Bolded cells identify concentrations that are higher than the potential regulatory criterion.

3.9 Fish

The Nixon Fork of the Takotna River provides spawning and rearing habitat for chinook, chum and coho salmon, and also contains Arctic grayling, Arctic char, northern pike, sheefish and several species of whitefish (Stokes, 1985; Alaska Department of Fish and Game [ADFG], 1985).

Anecdotal evidence suggests that salmon populations declined dramatically in the early 1900s and have not recovered (Stokes, 1985). The few aerial surveys conducted in recent years on the Nixon Fork suggest that escapement is limited to several hundred of each salmon species, with chum salmon probably the most abundant (ADFG, unpublished data).

The Anadromous Fish Stream Catalog (ADFG, 1982, rev. 1985) designates Mystery and Ruby creeks as anadromous fish streams providing rearing habitat for king salmon. A fish survey in 2004 found only coho salmon and concluded that the earlier survey made a common field mistake identifying coho as chinook (Stark, 2004). The upper limit of rearing habitat is three to four miles below the Nixon Fork project site (Stark, 2004).

An aquatic resources assessment study found that no fish resources were present in the upper or middle reaches of Mystery, and Ruby creeks. (Morsell, 1990). Mystery Creek was found to have long reaches of intermittent flow that effectively isolate the lower portions of the streams from the upper portions at all but the highest flow level. Extreme upper Ruby Creek also is isolated to some extent by intermittent flow. This was confirmed in a 2004 survey (Stark, 2004). The rivers in the general project area are not important for commercial fishing, although the area's spawning and rearing habitat is important to communities on the lower Kuskokwim which rely upon commercial fishing (ADFG, 1987). Recreational fishing has slowly increased, particularly as more non-local fishermen access the area. Still, the majority of such fishing is conducted by local residents of McGrath, Nikolai and Takotna, though this activity has an integral subsistence component. There is no recreational fishery in the vicinity of the mine site, the nearest being five miles to the northwest on Nixon Fork.

3.10 Wildlife

The ADNR's Kuskokwim Area Plan (1988) rates the Nixon Fork subunit 6B, within which the proposed project lies, as "low value habitat and/or harvest area." Since the lower elevations associated with stream and river valleys provide the most important habitat, the project's location atop a range of hills avoids such habitat.

The Sunshine Mountain caribou herd is characterized by small, widely scattered groups of caribou that occupy dense black spruce habitat throughout much of the year. The population in 1983 was estimated to number 525 to 750 (Pegau, 1984). The herd winters in the lowlands to the west and northwest of the mine area along the Nixon Fork, then disperses widely to the north and northeast (ADFG, 1987). The herd does not use the hills around the proposed project site (ADFG, 1973; Whitman, pers. comm.).

Moose are found throughout the project area in low numbers, with densities being somewhat less than 0.5 moose/mi^2 (J. Whitman, pers. comm.). The strip of riparian lowlands along the Nixon Fork five miles west and northwest of the project site provide moose wintering and calving habitat (ADFG, 1987). Willows along the upper reaches of Mystery, and Ruby creeks near the mine site show evidence of moderate to heavy browsing, but these are small areas surrounded by otherwise generally mediocre habitat.

Numbers of brown bear in the project area are low, but black bear densities are high. Black bears have been seen routinely, and scat and other sign are common.

The wolf population in the Nixon Fork drainage is considered moderate to high. The project site, as most of the surrounding area, provides excellent habitat for marten, which are trapped in the vicinity. The project area also provides good habitat for wolverines, but their densities are low (J. Whitman, pers. comm.).

Upper Ruby Creek, being much drier, does not support beavers. Evidence of beaver dams was seen on the lower reaches of Ruby and Mystery creeks, but none is within three miles of the mine site.

The mine site provides almost no waterfowl habitat, but the lowlands to the north and west near the Nixon Fork are used for nesting and rearing by several species of ducks as well as trumpeter swans. The large beaver dam/pond complex in upper Hidden Creek provides nesting habitat for a few pair of mallards.

The mine site provides good habitat for the typical small mammal and bird species normally found in Interior Alaska upland spruce-hardwood forests. Spruce grouse in particular are plentiful.

Hunting is an important part of the lifestyle of local residents, with moose being of greatest significance. Little caribou hunting has occurred recently, and their season has been closed for the past few years. Some of this hunting can be characterized as recreational, but most has an integral subsistence component. Little hunting occurs in the vicinity of the mine site, with the nearest being five miles to the northwest in the lowlands along the Nixon Fork.

3.11 Threatened and Endangered Species

There are no known threatened or endangered (T&E) species of plants or animals in the mine area. Only three candidate T&E species of plants are found in the upper Kuskokwim River drainage (Murray and Lipkin, 1987). All three have been documented well to the southeast in the foothills of the Alaska Range. They occur on calcareous screes, alpine slopes or in other habitats not found at the project site (D. Murray, pers. comm.).

No peregrine falcon nesting habitat has been identified within 6 miles of the mine site, nor do any historical nesting sites appear in the U.S. Fish and Wildlife Service (USFWS) data base (S. Ambrose, pers. comm.).

Lynx occur on the site and are a species of high interest, listed elsewhere but not in Alaska.

3.12 Air Quality

Ambient background concentrations are not available for the Nixon Fork Mine area, but air pollution sources in the region are few and minor. The area surrounding the Nixon Fork mine has been classified as attainment or unclassifiable for all pollutants. The closest non-attainment area is the Anchorage CO non-attainment area (Hoefler Consulting Group, 2004). Therefore, background levels in the project area are assumed to be negligible. From measurements taken in similar remote areas air pollutant concentrations are probably less than the following: particulates (PM) 30 $\mu g/m^3$, nitrogen dioxide (NO_2)10 $\mu g/m^3$, sulfur dioxide (SO_2) 3 $\mu g/m^3$, ozone (O_3) 60 $\mu g/m^3$, and carbon monoxide (CO) 500 $\mu g/m^3$. Smoke from fires during the summer is the only major naturally occurring source of pollutants (EPA, 1981).

3.13 Noise

Naturally occurring background sounds such as wind blowing through vegetation and water flowing in creeks predominate throughout the area. Man made noises include occasional overhead aircraft and seasonal mining operations.

3.14 Socioeconomics

At present, there are no permanent residents in the immediate vicinity of the Nixon Fork mine site. Neither is there year-round surface access to any permanent settlement. For this socioeconomic assessment, the project study area has been defined to include the three communities nearest the proposed project site: McGrath (32 miles southwest), Nikolai (20 miles southeast) and Takotna (45 miles west southwest). These communities are the most likely sources of local labor and other support services for the proposed project, and are most likely to experience any socioeconomic impacts stemming from its development.

The study region's limited commercial and subsistence resources have kept population low. McGrath steadily gained population from 1950 to 1990. Its population grew rapidly in the early 1980s, stimulated by the state's pump-priming expenditures. With the leveling off of state expenditures and loss of some economic opportunities, the population declined from 528 in 1990 to 367 in 2003. McGrath continues to be home for most Upper Kuskokwim residents. In contrast, the populations of Nikolai and Takotna fluctuated between 1950 and 2000 but showed little net change. The State’s 2003 population estimate for Nikolai was 121, a 21% increase over 2000, while Takotna decreased 6% to 47.

The region is endowed with limited exportable natural resources. Their commercial development is handicapped by disadvantageous transportation, energy and labor costs, plus remoteness from consumer markets. Historic and potential export commodities mainly include the region's lode and placer gold deposits; wood products; and furs. The region's salmon stocks do not support a commercial fishery, but are important for subsistence purposes.

As State petroleum revenues boosted state and local government programs after the mid-1970s, public employment became the mainstay of the local wage economy, especially at McGrath, whose role as sub regional center for transportation and governmental services has boosted its economy, and to a lesser extent at Nikolai and Takotna.

McGrath is also a sub regional center for a modest assortment of small-scale mining, trade, transportation, construction and other private sector services. The three communities fall within Doyon, Ltd.'s Alaska Native Claims Settlement Act (ANCSA) regional corporate boundaries. Finally, subsistence remains an important supplemental source of livelihood, especially at Nikolai (Waring, 1990a).

Numerous community surveys conducted over the past uniformly indicate high interest in additional local wage employment opportunities, with training programs as appropriate (Darbyshire, 1979; Tanana Chiefs Conference, 1982a, 1982b, 1982c; Ender 1985; Snow and Johnson, 1985).

Apart from the prospect of some shrinkage in state and local governmental employment, there are no pending events that imply major changes in economic conditions or population levels in the study communities. However, the restart of the Nixon Fork mine would add some stimulus to the local economy.

3.15 Subsistence

The Upper Kuskokwim region's subsistence food resources are not abundant. This circumstance partly accounts for the region's historic and contemporary low population levels, but also underscores the importance to many area residents of the limited subsistence food resources available for their livelihood (Waring, 1990b).

Due to its upland location atop hills, the productive potential of the mine site area itself as subsistence habitat and harvest area is low (Waring, 1990b). According to detailed subsistence resource use maps compiled by Stokes (1985) and Snow and Johnson (1985), the mine site proper is not productive of subsistence resources. The mine site is at the fringe of bear-hunting territory, but is otherwise not directly harvested. A Medfra trapper conducts some trapping, primarily for marten, in the mine area.

Nixon Fork valley, the main waterway five miles west and northwest of the mine site (Figs. 1-2 and 1-3), is hunted for moose and caribou by McGrath and Takotna residents, and is also used by bear hunters. Commercial fur trapping, mainly for beaver, fox, marten and lynx, continues to be a part time source of cash income for some residents of each community. McGrath trappers run trap lines through Nixon Fork valley (Waring, 1990).

At its lower end, the existing access road that links the mine site to Medfra traverses productive habitat for moose, bear, and furbearers. The riverine habitat around Medfra yields modest subsistence harvests of salmon, other freshwater fish and waterfowl (Stokes, 1985; Snow and Johnson 1985).

The salmon stocks of the Upper Kuskokwim drainage are inadequate to support a local commercial fishery, but are the primary subsistence fish species. Chum is the most plentiful species, followed by chinook and coho (Stokes, 1985). The fishing areas Nikolai residents' use are mainly upriver of the proposed project, with the exception of the Medfra vicinity, a traditional Nikolai fishing area. Takotna and McGrath residents tend to concentrate their salmon fishing efforts in the Kuskokwim River around McGrath. Takotna residents also fish near the confluence of the Takotna River and Nixon Fork (Stokes, 1985).

Apart from salmon, several other freshwater species (whitefish, grayling, pike, sheefish, Dolly Varden) are important supplemental sources of subsistence protein. These species are harvested at various riverine and lake sites throughout the area, none near the mine site, by residents of all three communities during most of the year (Stokes, 1985).

Finally, wild plants and berries are other supplemental food sources. The region's forest resources are also important as a source of firewood and building materials. Harvest of these products appears concentrated along accessible river corridors.

3.16 Cultural Resources

Settlement patterns and exploitative patterns revealed from analysis of historical and ethnological literature suggest that the Nixon Fork Mine area is not a likely location for aboriginal settlement as it does not appear to be associated with any particular food or other resource known to have been important to the Athapaskans who inhabited the region in late prehistoric times. Although the mine site is located within the Takotna band territory, it is not known to be located on any aboriginal trail system (Bacon, 1990).

Cultural resources investigations of the mine site did not identify any evidence of prehistoric archaeological sites. Analysis of topographic and sedimentological data for the Nixon Fork Mine site yields little hope of finding a deeply buried site or one that has not suffered from down slope movement of surface sediments, stream erosion or historic mining activity (Bacon, 1990).

Material remains of historic period mining, dating to the early 1920s, are found throughout the mine area. These include a mill site, abandoned cabins, caches, prospecting pits, flumes, trails and mine shafts. Bacon (1990); and Donna Redding, PhD., an archeologist for BLM-AFO, has documented these historic features. None of these remains is listed in the *National Register of Historic Place* (National Historic Preservation Act as amended, 16 USC 470), but a number of structures in the vicinity of the 10-stamp mill date to the 1930s. They have been determined eligible as a district to the *National Register of Historic Places* at the local level. Although there appears to be some archaeological potential at and near some historic features, no significant outstanding archaeological component has been identified (Bacon, 1990).

3.17 Visual Resources

BLM's visual resource management (VRM) program, as applied to developments such as the Proposed Action, is an analytical process, which inventories and evaluates visual resources and then uses these data to measure the degree of contrast between the Proposed Action and the existing landscape. BLM has not made a formal inventory of the lands involved with the Proposed Action. The VRM process is used below, however, to describe the existing visual resources as a baseline for determining contrast impacts of the Proposed Action.

Scenic quality is a measure of the visual appeal of a tract of land and refers to the degree of harmony, contrast and variety within a landscape. In the visual resource inventory process lands are given an A, B, or C rating based upon the apparent scenic quality which is determined using seven factors: landform, vegetation, water, color, adjacent scenery, scarcity and cultural modifications. Based on those criteria, the area of the proposed project could be considered as Class C, an area in which the features are fairly common to the physiographic region (BLM, 1980).

Based upon three aspects of the resource inventory, scenic quality evaluation, sensitivity level analysis and a delineation of distance zones, lands are placed in one of four visual resource inventory classes, which can serve as the basis for establishing management guidelines. While a RMP for the area has not been adopted, the visual characteristics for the proposed project site would appear to warrant a Class III designation. The objectives of this class are to partially retain the existing character of the landscape by allowing only moderate changes to the characteristic landscape. Activities may attract attention, but should not dominate the view to the casual observer (BLM, 1986a).

3.18 Recreation

Recreation may best be separated into consumptive and non-consumptive elements. The former includes sport and subsistence hunting and fishing and their associated activities (snow machining, dog mushing, hiking, boating, etc.). Some of these activities have important economic, cultural and food-gathering purposes, with recreational aspects closely intertwined (ADNR, 1986). These are more appropriately associated with the above discussions of fish, wildlife and subsistence resources.

The more classical non-consumptive recreational activities in the general project area are far less prevalent than consumptive activities. These include sled dog races, hiking, community recreation and some forms of float boating.

Nonconsumptive recreational uses in the area are relatively low, confined primarily to waterways and immediately adjacent lands (ADNR, 1986). On the Nixon Fork River such uses are relatively common, and associated with power boating or snow machining from McGrath and Takotna. The same occur from Nikolai on the Kuskokwim. Other uses include camping, dog mushing and cross-country skiing. The annual Anchorage to Nome Iditarod Dog Sled Race on the historic Iditarod Trail passes approximately 15 miles south of the project site between Nikolai and McGrath.

In the immediate vicinity of the project site there are no known present or historical non-consumptive recreational uses.

3.19 Floodplains and Riparian

The elevations of the claims vary from 800 to 1,550 ft above mean sea level (msl). None of the project facilities would be located in a floodplain as defined by Executive Order No. 11988, as amended.

3.20 Wastes, Hazardous or Solid

On June 24, 1999 following the bankruptcy of NGI, the BLM-AFO examined the site for hazardous materials. BLM identified some 135 bags and 18 five-gallon cans of industrial chemicals, plus 31, 55-gallon drums of xanthate. It also identified some 300, 55-gallon and smaller drums of used oil and grease. A detailed list is contained in the BLM case file AA-79947. In the summer of 2004 the company that holds the mining claims, Mespelt and Almasy Mining Company, LLC, had the xanthate removed from the site. The remainder of the material is to be cleaned up and removed from the site by BLM in the summer of 2005 (Larry Beck pers. comm.).

None of this material or its clean up and removal is the responsibility of MCRI (BLM letter June 6, 2003).

3.21 Land Status

The property consists of federal mining claims, which lie on either side of the line between Township 26 South, Ranges 21 and 22 East, Kateel River Meridian (KRM) (Fig. 1-3). The majority of the known mineral resource is on lands in Range 21 East, which, though state selected, is still under the jurisdiction of BLM. Potential additional resources exist immediately to the east in Range 22 on federal claims surrounded by lands owned by Doyon, Ltd., the Native regional corporation for interior Alaska.

3.22 Other Critical Elements

In the vicinity of the project there are no areas of critical environmental concern (Federal Land Policy and Management Act of 1976, 43 USC 1701 et seq.), prime or unique farmlands (Surface Mining Control and Reclamation Act of 1977, 30 USC 1201 et seq.), wild and scenic rivers (Wild and Scenic Rivers Act as amended, 16 USC 1271), or wilderness areas (Federal Land Policy and Management Act).

No environmental justice concerns have been identified in this area. No non-native species have been identified in this area. There are no known Native American religious sites at this location– (Donna Redding, pers. comm.).

Chapter 4

Environmental Consequences

4.1 Impacts of the Proposed Action

4.1.1 Critical Elements

Table 4-1 shows where the 15 BLM critical elements may be found in this chapter.

Table 4-1
EA Critical Elements Tracking, Environmental Consequences

Critical Element	EA Section	Critical Element	EA Section
Air Quality	4.1.10	Subsistence	4.1.13
ACEC	4.1.18	T&E Species	4.1.18
Cultural Resources	4.1.14	Waste Hazardous/Solid	4.1.17
Environmental Justice	4.1.18	Water Quality, Surface and/or Ground	4.1.5
Farm Lands, Prime or Unique	4.1.18	Wetlands, Riparian Zones	4.1.7
Floodplains	4.1.18	Wild and Scenic Rivers	4.1.18
Invasive Non Native Species	4.1.18	Wilderness	4.1.18
Native American Religions Concerns	4.1.18		

4.1.2 Surface Disturbance

The Nixon Fork claims are located in a historic mining area that retains the evidence of original placer works, flumes, tailings, airstrips and roads as well as contemporary exploration drill pads, trenches and roads.

Approximately 89.2 acres have been disturbed for mine facilities that would be used for the operation of the mine. (See Table 2-4.) All of this is on BLM-administered federal mining claims. Approximately 38.2 additional acres would be cleared to increase the life and handling capacity of the mine. Approximately five to ten acres per year would be partially disturbed during surface exploration and would be reclaimed on an annual basis. At mine closure approximately 115.9 acres would need to be reclaimed as described in the *Nixon Fork Mine, Plan of Operation and Reclamation Plan*, August 2005. For a summary of the proposed reclamation see Table 4-2. The complete reclamation plan is contained in the document, *Reclamation Plan and Cost Estimate, Nixon Fork Mine, September 2005*. The effects of this surface disturbance are discussed below under soils, vegetation, wildlife, and visual resources.

4.1.3 Soils

The clearing of surface vegetation for mine facilities (airstrip, campsite, mill site, explosives magazine, mine portals/waste rock dumps, ventilation raises, overburden stockpiles, fuel depot, and roads) has removed vegetation and exposed approximately 89.2 acres of soil. Most of these areas, have been covered with gravel, or waste rock and the actual soil disturbance is shallow. Almost no erosion has occurred over the natural condition. Many of the roads and other disturbed sites such as the gravel extraction areas, septic field area, and unused or lightly used roads have been naturally re-colonized by native species. Existing disturbance, and additional areas to be disturbed are listed in Table 2-4.

Table 4-2
Summary of Existing and Potential Surface Disturbance and Reclamation
Nixon Fork Mine 2005-2011

Land Use	Description	Reclaim
Existing surface disturbance	Pre-2004 & needed for life of project see Table 2.4	Detailed plan for mine closure in MCRI, 2005, Beck
Development rock	Add to existing Crystal rock dumps	Sloped, contoured, and reclaimed at closure
Filtered tailings disposal site	Used for initial 24 to 36 months	Reclaimed when tailings pond is available
Expansion of tailings pond & tailings disposal	Located at the existing pond/dam site	Covered with rock & growth media & re-claimed at closure
Borrow sources	Open former site that has been reclaimed	Contour and reclaim at closure of the source
Airstrip	1995 Hercules airstrip	Would remain as emergency airstrip
Exploration	Trails, trenches, drill pads, need not clear all vegetation	Reclaimed at end of each exploration season

The area in which the FTDS would be constructed is part of an old, closed airstrip. Natural plant invasion has occurred. Construction of the FTDS would re-disturb 13.5 acres. Soils would be excavated and stockpiled for reclamation of the site. Some erosion could occur on the stockpile during the 24 to 36 months the FTDS would be used.

Clearing for, and construction of the tailings dam lift would expose approximately 11.6 acres of soil. Until re-vegetation stabilizes the dam area some erosion would occur.

Approximately 3.6 additional acres would be disturbed for borrow extraction. This could cause some fugitive dust.

The knob at the end of the airstrip would be lowered approximately 18 ft to the existing level of the runway. The material removed would be used as fill which would cover approximately three acres of existing soil. Some erosion may be expected until vegetation stabilizes the area.

Surface mineral exploration would disturb up to 10 acres per year. MCRI proposes, whenever possible, to remove only the trees, leaving the vegetative mat in place on trails and drill pads. Access roads, if needed, and trenching, if used, would require disturbing the soil. Exploration disturbance would be reclaimed either at the end of each exploration season or during the following summer season. Thus, erosion or runoff would be minor. Runoff could occur if an access road becomes necessary. Common ditching and water barriers would address this.

Approximately 38.2 acres of new soil disturbance would occur, excluding the possible 50 acres of exploration. With concurrent reclamation of the exploration disturbance, the FTDS, the landfill, and the old campsite approximately 119 acres out of approximately 178 acres would require reclamation at closure.

4.1.4 Vegetation

The 1995 construction of the existing project components has altered, covered, or removed existing natural plant communities on approximately 89.2 acres. Of this total, approximately 10 percent remains covered by existing ground level vegetation after the trees were removed (e.g., around the edge of the tailings impoundment, and along roadsides). The cleared areas around the camp and office complex, and portals would remain so for the duration of mining operations. Other cleared areas –septic field, materials source at bottom of the dam, unused or lightly used roads - have been naturally re-colonized by native species. Some change in composition of plant communities adjacent to disturbed areas has occurred due to increases in sunlight and to changes in runoff where drainage patterns were altered. The existing landfill site is already fully disturbed with an additional capacity of some 10 years at permitted levels.

Additional vegetation to be cleared would be the approximately 28.5 to 78.5 acres discussed under soils in section 4.1.3. An additional approximate 9.7 acres would be covered by the rock dump and fill at the airstrip for a total of 38.2 to 88.2 acres. This would bring the total disturbed area to approximately 178 acres. Recolonization of disturbed areas with disturbance adapted plant species such as green alder saplings, salmonberry, tall fireweed, and dandelion has occurred on site and can be expected to begin the second summer. Exploration trails and drill sites generally would be cleared only of the trees leaving the understory. For reclamation see the Appendix C.

4.1.5 Water Quality Surface and/or Ground

The 1995 through 1999 mining operation withdrew water from Mystery Creek, most of which was used in the mill process. The mill, before operations were suspended, was using approximately 10,000 gpd of water from Mystery Creek and 18,000 gpd recycled from the tailings pond for a total of approximately 28,000 gpd of water. Under this proposal process water would be recycled from the tailings pond with some 10,000 gpd coming from Mystery Creek for domestic use.

On an annual basis, an average of approximately 7 gpm of water would be withdrawn from Mystery Creek. (For reference, a garden hose flows at the rate of approximately 5 gpm). This would amount to approximately three percent of Mystery Creek's approximate mean annual flow of 300 gpm at the site of the water infiltration gallery (Golder Associates, 1990). In all but the driest of years, this withdrawal would be minor at the take point. At the uppermost point of fish use, approximately 4 miles downstream, this amount of water withdrawal is only a small part of the flow even in dry years.

The existing tailings dam and impoundment are designed to withstand the 100-year, 24-hour storm event without overtopping, including one foot of freeboard for wave run-up, as shown by the following volumes. The proposed additional storage (including the 100-yr/24-hr storm volume) is based on maintaining a 3 ft freeboard.

	Existing 986 ft Crest Elevation	Proposed 1008 ft Crest Elevation
Tailings (at 1% slope)	121,160 yd^3	423,030 yd^3
100-yr/24-hour storm (3.5 in.)	3,050 yd^3	5,100 yd^3
Additional Storage	8,190 yd^3	6,140 yd^3
Total	132,400 yd^3	434,270 yd^3

As discussed in 2.1.6 and 2.1.8.2 neither the tailings nor development rock would be acid generating. In addition, the metal leaching potential of the development is low (Table 2-1). If there were some leaching the metal concentrations would tend to be better than water quality standards based on the MWMP testing results.

Qualitatively, there would be no changes in surface waters because all mill process solutions would be discharged to the lined, zero discharge tailings impoundment from which water would be recycled to the mill. Neither does the development rock pose a risk of contamination (See Section 2.1.6.). The landfill, located on a hill is periodically compacted and covered with over burden per the ADEC permit. As no spoilable or hazardous materials are permitted there would be little or no effect on water quality.

4.1.6 Storm Water Runoff

The relative low precipitation limits runoff potential at the site, except during spring thaw. Generally, runoff is into the vegetation where it soaks into the ground. Runoff that approaches the tailings pond is collected in perimeter ditches and routed around the pond and into the vegetation. Runoff from the mill site soaks into the development rock dump or into the vegetated soil on the adjacent hillside. Table 2-1 suggests that this would not be a problem. Run off from the old airstrip adjacent to the Hercules airstrip follows the road north and flows downhill toward the Mystery adit. Some erosion has occurred on the access road to Mystery Creek but this has been corrected. Runoff from the filtered tailings disposal area would be captured in an infiltration pond. EPA requires a Storm Water Pollution Prevention Plan (SWPP). This would be prepared and copies kept on site with one submitted to ADEC, as requested, before operations begin. The plan would require monitoring of storm water runoff at various locations, including the development rock dump and filtered tailing disposal area.

4.1.7 Wetlands/Riparian Zones

The mine facilities are located to minimize impacts to wetlands pursuant to Executive Order No. 11990 and the Clean Water Act. Because of the topography in the mine area, and with no practical alternative, a tailings impoundment was approved and constructed in the Ruby Creek drainage. The impoundment covers approximately 10.2 acres, only a small part of which could have been considered wetlands. Relatively little wetlands acreage, far less than 10 acres overall, has been impacted by existing facilities. No additional wetlands would be impacted (HDR Alaska, 2004). Implementation of the SWPP would prevent siltation in these areas.

Following completion of mining, reclamation of the tailings impoundment would include dewatering and grading, with the stockpiled topsoil spread over the surface. Slopes would be contoured to accommodate natural revegetation. Over time natural drainage patterns would be established and wetlands similar to any around the impoundment may be reestablished.

The small area disturbed during construction of the infiltration gallery and pond at Mystery Creek have been naturally reclaimed. Only the small area around the pump house and access road remain disturbed. This would naturally reclaim at the end of mining with the removal of the pump house and pond.

4.1.8 Fish

There would be no impacts on fish from the Proposed Action.

4.1.9 Wildlife

Wildlife in the proposed project site historically has been exposed to mining and associated exploration activities for 87 years. Although quantifiable data are not available, the area is generally considered of low habitat and harvest value. (Alaska Department of Fish and Game 1988.)

The clearing of approximately 89.2 acres for the existing facilities has resulted in direct habitat loss by physical destruction. This loss could have had some effect, primarily on small resident mammal and bird species only on a very local basis. Following completion of mining activities all disturbed areas would be reclaimed and revegetated, and eventually would return to a condition useable by wildlife.

Because the project would be air supported, without an extensive ground transportation system, most noise and activities would be confined to the immediate mine area. Therefore, indirect habitat loss, which is the effective loss of habitat due to human contact and associated mining activities and noise, would be relatively low and confined locally.

Species primarily affected would be those with a low tolerance for such activities, primarily brown bears and marten. These species would avoid the entire project site. Black bears, if not attracted by improper garbage disposal or feeding, would also tend to avoid the area, but they are normally more accommodating of human activity than brown bears. Moose also would likely avoid the immediate mine area, but would tend to adapt to activities on the project's fringes. Upon completion of mining the associated activities would end and indirect habitat loss would cease.

Wildlife movements would be minimally affected as the project footprint is small. Since the mine area is not fenced, however, some animals, e.g., moose or black bears, would occasionally wander into the mill site, campsite, or the portal areas. These animals would usually not be harmed, but would probably need to be herded out by project personnel. In unusual cases, they might have to be killed.

During the nine years of the life of this mine shore birds, waterfowl, and other species have not been attracted to the tailings impoundment. Its barren nature, the sediment content of the water, the lack of food, and the availability of natural alternative water sources likely discourage much use. Birds or mammals that might land on, or walk into the tailings pond would find the water unpalatable (sediment), but likely would not be harmed given the nature of the water. A plan to monitor the impacts of the mine on wildlife, particularly around the tailings pond, has been in place and would continue. Bear claw marks have been found on the pond liner indicating that bears are in the area. No wildlife carcasses have been found.

The solid waste disposal facilities would continue to be maintained in a manner, which would not attract wildlife such as black bears. All spoilable wastes would be incinerated and residual ash and material would be covered in a landfill. If, however, these procedures were not rigidly adhered to, or if the prohibition of feeding of animals were not strictly enforced, bear/human contacts might occur which could result in serious injury to workers and/or the death of wildlife.

4.1.10 Air Quality

Analysis of potential emissions from the Proposed Action showed that the major non-point sources (e.g., roads) and point sources (e.g., power plant) would occur from: 1) the roads between the portals and the mill; 2) the airstrip; 3) the mill site with its diesel power plant, and 4) the boiler generating heat for the Crystal mine.

The primary source of dust emissions would be from trucks hauling development rock and ore from the Crystal mine portal to the development rock pile and the mill, respectively. The Crystal portal, is less than 100 yds from the mill. Other sources of dust would be from development rock and ore dumping operations, losses from the development rock dumps due to wind erosion, and aircraft operations. Dust emissions would be minor from underground ore production operations.

Dust controls would be most effective on the ore haul road and development rock storage piles. Dust generation would be a potential problem from June until August, although some road dust could be generated throughout the year. Ore haul roads would be water sprayed once or twice a day in dry weather if necessary to control dust. Dust from the development rock dumps would be controlled by windscreen berms of rock or with water sprays. Revegetation would be undertaken on those areas that had reached their final configuration.

Dust (and gaseous) particulate emissions from the airstrip would be much less than from the roads due to its relatively infrequent use. In dry weather, however, a landing or take off by Hercules or DC-6 aircraft would cause dust emissions if the runway were not properly maintained. As with the ore haul roads, the runway would be sprayed with water and/or chemical stabilizers applied during dry weather to control fugitive dust.

Gaseous emissions would come from diesel-powered equipment such as front-end loaders, dozers, haul trucks, utility and passenger vehicles, and fuel storage operations. The small amount of mobile diesel-powered equipment would emit low quantities of pollutants.

The largest point source of emissions would be the power plant, with substantially fewer emissions coming from the mill processes, and boiler. Based on the emission source inventory, the mine project will be classified as a PSD (prevention of significant deterioration) major stationary source under 18 AAC 50.300(c)(1) if permitted to operate with no restrictions on air emissions. The major source of emissions will be these generators. However, as allowed by 18 AAC, MCRI requested a limit on fuel used (Owner Requested Limits or ORL) to avoid classification as a major source. Specifically, MCRI requested an ORL of 1,075,000 gallons of fuel per 12-month period for the generators. This will limit the potential for air emission to less than 250 tons per year for each applicable criteria pollutant. The Air Quality Control Construction Permit (AQ837CPT01 – Project X-226) has been issued by ADEC.

Experience with properly operated and maintained incinerators, commonly used throughout Alaska, indicates that the incinerator would be in compliance with the visible emissions standards. The incinerator has a nominal capacity rated at less than 1,000 pounds per hour, therefore ADEC standards are not applicable (Hoefler, 2004). Non-hazardous waste that cannot be burned and that meets the state regulations, such as tires, would be placed in the mine's landfill in compliance with the permit issued by ADEC.

4.1.11 Noise

Noise sensitive receptors in the vicinity of the proposed project would be workers and wildlife. The noise levels audible to these receptors, and the distances at which noise could be heard, would vary with the activity, its location, and ambient noise such as the wind.

Operation of drills, heavy equipment such as ore hauling and dust control trucks, loaders, dozers and diesel generators would produce sustained noise levels of 90-100 dB(A) at 50 ft (Table 4-3). Within the mill, power plant, and underground these noises largely would be contained and would not be audible at distances of over 1/2 mile.

Major noise sources at the mill site, campsite, access roads, airstrip, and the tailings impoundment are estimated in Table 4-3. Assuming a time of simultaneous activity, the combined sound pressure level would be approximately 66 dB(A) at a distance of 1.5 miles on the ridge tops to the east; a level above natural noise levels. Beyond those ridge tops, and at the Nixon Fork itself approximately four miles to the west, sound generated by mine area facilities and equipment would not propagate at levels above those caused by wind and rain. Underground blasting would produce almost no noise above ground.

Table 4-3

Estimated Sound Levels Generated by
Mine Area Equipment and Facilities

Sound Source	Sound Pressure Level dB(A)
Blasting	170 @ 300 ft
Bulldozers	87 @ 50 ft
Front-end loaders	90 @ 50 ft
Ore trucks	90 @ 50 ft
Primary/secondary crushers/grinding mill	95 @ 50 ft
Diesel-powered generators	100 @ 50 ft
Utility vehicles	80 @ 50 ft
Worker accommodations	60 @ 50 ft
Aircraft operations	95 @ 50 ft
<u>For comparison:</u>	
OSHA regulation (15 min exposure)	115 (max allowable)
Discotheque	110 (on dance floor)
Jackhammer	95 @ 50 ft
OSHA regulation (8 hr exposure)	90 @ ear
Automobile (62.5 mph)	71 @ 50 ft
Typical outdoor noise (wind, rain, birds)	40 @ 50 ft
Soft whisper	35 @ 6 ft

Source: EPA, 1984

4.1.12 Socioeconomics

Putting the mine back in operation with the proposed construction, proposed process changes, and the rehabilitation of facilities would, initially, add approximately $8,000,000 to the Alaskan economy. A portion of that economic stimulus would accrue to the communities in the project area (primarily McGrath). During project construction seasonal jobs, requiring both skilled and unskilled workers, would be available to qualified local residents of McGrath, Nikolai, and Takotna. Local workers are preferred by

MCRI since they are familiar with living and working conditions in bush Alaska. Presently there are 10 employees on site - 2 from McGrath, 2 from Nikolai, 2 from Wasilla, 3 from Palmer, and one from Anchorage.

Annual operating expenses are estimated at $5,000,000. During mine operation, fuel and other supplies flown to the site likely would come directly from Anchorage, or Fairbanks, thereby bypassing McGrath. These three local communities, however, would benefit primarily from creation of some permanent, year-round jobs. Of the approximately 45 persons employed by the project, it is estimated that approximately 12 to 16 jobs would be created that local residents might fill if they possess appropriate skills (e.g., equipment operators, mechanics, camp workers). The annual payroll is estimated at $2,500,000.

The project life is estimated at six years based on present resource projections. Additional exploration could increase reserves and extend mine life. A small increase in the populations of local communities could occur as a result of job creation at the mine. This would produce a small increase in the need for community services such as housing, schools and other social services. Such impacts would be minor.

4.1.13 Subsistence Section 810 (A) Evaluation and Finding

The Proposed Action would occur on federal mining claims currently under BLM jurisdiction, and, are federal public lands under the definition in ANILCA sec. 102(3); thereby falling under the authority of the Federal Subsistence Board and Management Regulations for the Harvest of Wildlife on Federal Public Lands, and the Management Regulations for the Harvest of Fish and Shellfish on Federal Public Lands in Alaska. (BLM 2004)

The federal public lands involved in the Proposed Action, currently, are moderate to poor habitat for moose,

poor habitat for caribou, and good habitat seasonally for black bear. Moose are transitory. Caribou (Sunshine Mountain Herd) are absent at the present time, but do occur in very low numbers seasonally in adjacent areas, and could easily alter movement and seasonal use patterns to utilize the mine area for transitory seasonal use. Upland game birds (spruce grouse) are present and common. Furbearers occur on the site with marten the primary species. There are no fish resources available on the subject lands. The area does not produce a sustainable yield of large mammals as habitat use is seasonal at best. Most large animals, with the exception of black bears, are transitory, and not present in sustainable numbers during open harvest season. There is no documentation of specific community or family traditional and customary use and harvest of resources from the specific federal lands involved in the Proposed Actions except marten trapping. The trapping is facilitated by access roads to the mine site. Subsistence harvest that has occurred is termed opportunistic, and made available via the infrastructure and access provided by mine and operational access, and employment from regional communities. (BLM, 2004)

Therefore, at this time, the Proposed Action would not significantly restrict federal subsistence uses, decrease the abundance of federal subsistence resources, alter the distribution of federal subsistence resources, or limit qualified subsistence user access from currently existing conditions. The Proposed Action may increase access to other non-federal lands and resources for subsistence users. (BLM, 2004).

4.1.14 Cultural Resources

Historic period remains would be avoided resulting in little or no impact. Site clearance investigations did not find any remains to be located where facilities for the proposed project are built.

Many of these remains are still in personal use by the claims owners, or are used for storage, or in the conduct of exploration. Some remains would be affected to a minor extent by the Proposed Action through exposure to some increased dust and vibrations from heavy equipment. The remains would be flagged and posted, and exploration by workers would be prohibited by the operator's policy.

4.1.15 Visual Resources

Under the VRM system, the general area of the Proposed Action was given an overall scenic quality rating of Class C, which means the features are fairly common to the physiographic region. The visual characteristics for the area were given a Class III visual resource designation, the objectives of which are to partially retain the existing character of the landscape by allowing only moderate changes to the characteristic landscape. Activities in such areas may attract attention, but should not dominate the view to the casual observer.

Because of the remoteness of the mine site, and the lack of overland access except in winter, the number and sensitivity of potential viewers would be very limited. In addition to the employees, only passengers on chartered airplane flights over the area would be likely to view the project site. The major components visible to such passengers would be the airstrip, the FTDS, the campsite and mill site, the portals and waste rock dumps, and the tailings impoundment. Their view, and therefore perception, of these components would depend upon such factors as distance, angle of observation, length of time in view, relative scale, season, and light and atmospheric conditions.

The VRM contrast rating system is a systematic process that analyzes potential visual impacts of proposed projects. It predicts the degree to which an activity would affect the visual quality of a landscape by determining the contrast created between that activity and four specific characteristics of the landscape (form, line, color and texture).

For the Proposed Action this visual contrast rating system indicated that for "line" (the path the eye follows when perceiving abrupt differences in form, color or texture) the Proposed Action would generate "moderate" contrasts for land, vegetation and structural features. This means that the element's contrast begins to attract attention and to dominate the characteristic landscape. For "form" (the mass or shape of an object), a moderate contrast also was indicated for vegetation. For other contrasts of land, vegetation and structural features with line, form, "color" and "texture," the Proposed Action rated a "weak" contrast. This means that the elements' contrast could be seen but would not attract attention (BLM, 1986b).

With the proposed reclamation the Proposed Action would meet the visual resource management objectives for a Class III designation.

4.1.16 Recreation

There are no present recreational uses of the mine area, nor would the Proposed Action likely create such uses by local or non-local residents other than those directly involved with the mining operation. Recreation by employees would be limited by work schedules and relatively little free time to the general area surrounding the developed mine-related facilities. Summer recreational uses would include hiking, wildlife viewing, and berry picking, while winter uses might include cross-country skiing and snowshoeing.

4.1.17 Wastes, Hazardous/Solid

Reagents would be mixed in the mill building. Any spill of these reagents would be contained and cleaned up inside the building. Should any of the spill reach the floor drains it would drain into the lined tailings pond. Chemicals would be packaged to prevent spills, but a spill could occur as chemicals were off-loaded at the airstrip, or when transported to the mill. Cyanide, for example, would arrive on site as hard briquettes in plastic lined wooden boxes. In the event of a spill, the briquettes would be shoveled up, and transported to the mill for use. Xanthates and the other reagents, except MICI, also would be shipped in drums, in wooden boxes in a powder or pellet form, and, also could be shoveled up and used at the mill. MICI (methyl amyl alcohol) is a liquid. If spilled it can be cleaned up with absorbent pads, and the soil excavated and treated. Any such spill would be contained and cleaned up according to the HMHP. Should there be a spill of any of the reagents used to extract minerals there would be little to no environmental impact.

An accumulation of reagents or used oil and grease left at the site, as occurred during NGI's operations, could cause an impact if containers were to fail. Since the mine is on a ridge and distant from streams, the impacts would be limited to the immediate storage area. With approval of the HMHP by BLM, implementation by MCRI, and appropriate bonding, no accumulation of excess reagents or used oil or grease should occur beyond that which would be permitted.

Spill of fuels could occur. Full implementation of MCRI's SPCCP serves to minimize the potential for spills occurring and provides a framework for detecting accidental releases and responding rapidly to mitigate effects of any spill detected. Undetected releases of fuel can also occur along the buried pipeline, and from underneath the bulk storage area (e.g., if the containment liner fails at a point beneath a bladder). Detected spills would be expected to be small, as the operator would respond rapidly. Given the location of the fuel storage areas and the pipelines, risk of spilled fuel reaching surface waters of the U.S. is remote. Undetected small leaks over a period of time from the containment area liners or buried pipeline would impact large volumes of soil and potentially impact ground water.

4.1.18 Critical Elements

The listed critical elements would not be affected by the Proposed Action.

Areas of Critical Environmental Concern (ACECs)
Environmental Justice
Floodplains
Native American Religious Concern
Wild and Scenic Rivers
Farm Lands, Prime or Unique
Invasive, Non-native Species
Threatened or Endangered Species
Wilderness

4.2 Impacts of Alternative #1 - No Action Alternative

4.2.1 Critical Elements

The following table shows where the 15 critical elements may be found in the No Action Alternative.

Table 4-4
EA Critical Elements Tracking, No Action Alternative

Critical Element	EA Section	Critical Element	EA Section
Air Quality	4.2.10	Subsistence	4.2.13
ACEC	4.2.18	T&E Species	4.2.18
Cultural	4.2.14	Hazardous Waste	4.2.17
Environmental Justice	4.2.18	Water Quality, Surface and Ground	4.2.5
Farm Lands	4.2.18	Wetlands	4.2.7
Floodplains	4.2.18	Wild and Scenic Rivers	4.2.18
Invasive Non Native Species	4.2.18	Wilderness.	4.2.18
Native American Religion	4.2.18		

4.2.2 Surface Disturbance

Under the No Action Alternative there would be no additional surface disturbance caused by mining activity.

However, the last operator of the mine went bankrupt and is not available to reclaim the land. Depending on determining the responsible party the site might or might not be reclaimed.

4.2.3 Soils

The soils would remain as they currently are.

Without reclamation, erosion could occur along the roads and on the face of the dam. Should erosion cause dam failure the tons of tailings would wash out of the pond and cover the soils below the dam.

4.2.4 Vegetation

Vegetation would naturally invade those areas with sufficient soil. Large areas with compacted soil without being scarified could take a little longer, but vegetation would be re-established.

4.2.5 Water Quality, Surface and/or Ground

Generally water quality would remain as described in the Affected Environment at 3.7.3.

4.2.6 Storm Water Runoff

Precipitation would over whelm the ditches around the pond, allowing it to fill up. Should the water level overtop the dam, the dam could fail allowing the tailings to cover soils and vegetation below the dam. Ditches at curves along roadsides would eventually fail, permitting soil to wash into vegetation, and erosion to occur.

4.2.7 Wetlands, Riparian Zones

Wetlands would reestablish around the potable water intake point on Mystery Creek, and along points where the roads cross any of the small drainages.

4.2.8 Fish

Fisheries would remain as described in the Affected Environment at 3.9.

4.2.9 Wildlife

As vegetation is reestablished there would be some improvement in wildlife habitat. Wildlife sensitive to human activity, and attracted to new vegetation would probably move into the site when mine associated activity ceases.

4.2.10 Air Quality

Air quality would improve marginally with the elimination of the dust from the roads and the burning of fossil fuels. In the short term some increase in dust would occur without dust control on the exposed roads, mill site and rock dumps.

4.2.11 Noise

The noise would only be natural sounds and background levels.

4.2.12 Socioeconomics

Economic activity in the region as it relates to goods, services and employment at the mine would return to the early 2003 level when there was no activity at the mine.

4.2.13 Subsistence Section 810(A)

Under this alternative, activity at the mine would cease. Therefore the No Action Alternative would not significantly restrict federal subsistence uses, decrease the abundance of federal subsistence resources, alter the distribution of federal subsistence resources, or limit qualified subsistence user access from currently existing conditions.

4.2.14 Cultural Resources

Historic remains would continue to slowly weather and deteriorate.

4.2.15 Visual Resources

The large mining-related structures such as the mill complex, camp and tailings impoundment would be left in place. Scenic quality would remain a Class C.

4.2.16 Recreation

There would be no impacts to recreation.

4.2.17 Wastes, Hazardous/Solid

BLM has let a contract to remove the hazardous waste, primarily used oil and grease, from the site. The No Action Alternative would have no impact on this element.

4.2.18 Critical Elements

The listed critical elements would not be affected by the No Action Alternative.

ACECs	
Environmental Justice	Farm Lands, Prime or Unique
Floodplains	Invasive, Non-native Species
Native American Religious Concerns	Threatened or Endangered Species
Waste, Hazardous/Solid	Wild and Scenic Rivers Wilderness

4.3. Impacts of Alternative 2

The impacts of alternative 2 are the same as the Proposed Action except for surface disturbance, soils, vegetation, air quality, noise, visual resources and hazardous waste.

4.3.1 Critical Elements

The impacts on critical elements are the same as the Proposed Action.

4.3.2 Surface Disturbance

If the knob at the end of the airstrip would be left in place additional surface disturbance would be reduced by 6.5 acres.

4.3.3 Soils

The 6.5 acreage reduction, noted above, would reduce the erosion potential during the time needed to establish vegetation on the filled area around the knob removal. Other than this the impacts would be the same as the Proposed Action.

4.3.4 Vegetation

Leaving the knob would reduce the vegetation loss by 6.5 acres (3.5 acres graded and 3.0 acres filled). Other than this the impacts would be the same as the Proposed Action.

4.3.5 Water Quality Surface and/or Ground

The impacts would be the same as the Proposed Action.

4.3.6 Surface Runoff

The impacts would be the same as the Proposed Action.

4.3.7 Wetlands/Riparian Zones

The impacts would be the same as the Proposed Action.

4.3.8 Fish

The impacts would be the same as the Proposed Action.

4.3.9 Wildlife

The impacts would be the same as the Proposed Action.

4.3.10 Air Quality

The difference, if any, in the impact of this alternative on air quality and noise from the Proposed Action would be quite small. Approximately one flight per week shipping in chemicals would not be needed.

4.3.11 Noise

The noise level would be reduced by approximately one flight per week. See 4.3.10.

4.3.12 Socioeconomics

The impacts would be the same as the Proposed Action.

4.3.13 Subsistence Section 810 (A) Evaluation and Finding

The impacts would be the same as the Proposed Action.

4.3.14 Cultural Resources

The impacts would be the same as the Proposed Action.

4.3.15 Visual Resources

Omitting the tailings reprocessing would alleviate the need to place a 30 ft high filtered tailings pile on the old airstrip. However, this would not change the Class III visual resource designation.

4.3.16 Recreation

The impacts would be the same as the Proposed Action.

4.3.17 Wastes, Hazardous/Solid

If reagents, to be used in the milling process, were not brought on the site a spill could not occur. This difference would also be quite small as transportation spills would be shoveled up, or otherwise cleaned up, and process spills would be contained within a structure or lined tailings pond.

4.3.18 Critical Elements

The impacts would be the same as the Proposed Action.

4.4. Cumulative Impacts

4.4.1 Proposed Action

The area in vicinity of the mine has been worked since the 1920s and contains many old roads, trails, flumes, and placer workings as well as the remains of an old mill, tailings pile, other structures, and three airstrips. The development and operation of the mine since 1990 disturbed approximately 89.2 acres that have not been reclaimed. Development of the Proposed Action would add approximately 38.2 to 88.2 acres of disturbance to these existing man-made changes. All new disturbances would occur within the existing footprint of the site. The ADNR's Kuskokwim Area Plan for state lands indicates the area would be managed for multiple use with emphasis on mining and wildlife (ADNR, 1988). Development of the Proposed Action, therefore, would indicate expected economic viability of lode gold mining in the area and might encourage greater mineral exploration and development in the area.

The proposed project, with its year-round employment for a small number of local residents, would provide a relatively low but nonetheless positive economic benefit to the three nearby communities. It is doubtful that additional workers would be attracted to the area on a permanent basis. Thus, there should be few additional pressures placed upon existing social institutions. Any increase in economic activity attributable to project development would be favorable to the local communities for the six-year duration of the project. While this is usually considered a positive impact, when combined with other small increases in the private sector employment in the area it would represent a cumulative economic impact.

4.4.2 No Action Alternative

The No Action Alternative would have no cumulative impacts other than the continued deterioration of the facilities.

4.4.3 Alternative # 2 - Modified Components

There are no additional cumulative impacts from sending the concentrates offsite, or leaving the knob on the south end of the airstrip.

4.5 Mitigation Measures

The adverse environmental consequences of the Proposed Action are mitigated through the concurrent reclamation process and the reclamation at closure of operations. No additional, specific mitigations measures are required to address environmental impacts. See chapter 2 and the *Reclamation Plan and Cost Estimate, Nixon Fork Mine Project, September 2005 (*MCRI 2005, Beck).

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Appendix A

Glossary, Abbreviations, and Acronyms

Glossary

Acid base accounting - A method to determine if a material has the potential to generate acidic leachate. Both the acid-producing potential and the ability of the material to neutralize acid are determined and compared. If the acid-producing potential of the material is greater than its natural neutralizing capacity, the material is considered a potential acid-producing material.

Acid generation potential (or net acid generation potential) - A measure of the sulfide minerals in mine dumps and mill tailings and their capability, under oxidizing conditions, to form acid.

Aufeis - A sheet of ice formed on a river floodplain in winter when shoals in the river freeze solid or are otherwise dammed so that water spreads over the floodplain and freezes.

Ball mill - A large rotating cylinder partially filled with steel balls. The cascading balls grind the ore into fine particles.

Crusher - A machine that reduces (or crushes) material by compression. The machine consists of a movable conical head gyrating within an inverted concave cone. Material is crushed between the movable head and the bowl. The material is fed by gravity through the crusher. Gyratory crushers reduce rock from the size of a small vehicle to 10 inches. Shorthead cone crushers reduce rock from 2 inches to 3/8 inch.

Cyclone (hydrocyclone)- A particle-sizing device that uses circular motion to generate centrifugal forces greater than the force of gravity. The high forces are used to separate particles by size and specific gravity.

Development rock - Rock that is non-economic, or has no mineral value, that must be removed to allow access to the ore. Development rock can be used as fill in construction of roads, dams, and other mine facilities.

Doré - A metal alloy composed of gold and other precious metals. Typically the final product from a precious metals mine.

Gravity circuit - A circuit with any of several devices that use the differences in specific gravity of materials to separate gold from other material.

Hydrometallurgy – Method of producing metals by reactions that take place in water or organic solvents.

Mill - A facility in which ore is treated to recover valuable metals such as gold.

Milling - The process of separating the valuable constituents (gold) from the non-economic constituents, which after milling are called tailings. Milling typically consists of crushing and grinding to liberate or free the gold, which then is recovered through a leach or gravity circuit.

Mining - The process of removing ore from the ground and transporting it to the mill. This will include drilling, blasting, loading into trucks, and hauling to a primary crusher from underground stopes.
porting it to the mill.

Overburden - Non-mineralized material that overlies the ore body.

Appendix A
Glossary, Abbreviations, and Acronyms (con't)
Glossary

Sub-aerial deposition - Discharge of tailings slurry onto land, as opposed to underwater. A beach-like deposit is formed, which allows water to drain from the tailings, and the tailings to densify more than when it is deposited sub-aqueous. Water is collected in a pool and recycled to the mill. Typically the method is used during summer.

Sub aqueous deposition - Discharge of tailings underwater in the tailings impoundment. Solids in the tailings slurry settle to the bottom and the water is recycled to the mill. Typically the method is used during winter to minimize ice formation.

Tailings - A slurry of ground ore in water that is discharged from the mill after the gold or other minerals have been extracted.

Toe - The bottom of a fill, such as a road embankment or dam.

Underflow - That portion of a slurry that exits a hydrocyclone through the bottom and contains the larger, denser particles in the slurry.

Waste rock - See development rock.

Zero discharge - The standard of performance for protecting surface waters that requires containing all process fluids with no discharge outside the process circuit.

Abbreviations and Acronyms

AAC	Alaska Administrative Code
ac	acre
ACEC	area of critical environmental concern
ADF&G	Alaska Department of Fish & Game
ADEC	Alaska Department of Environmental Conservation
ADNR	Alaska Department of Natural Resources
ADR	Alaska Department of Revenue
ADL	Alaska Department of Labor
AFO	Anchorage Field Office
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act
ANFO	ammonium nitrate/fuel oil
ATV	all terrain vehicle

Appendix A
Glossary, Abbreviations, and Acronyms (con't)

Acronyms

BLM	Bureau of Land Management
$CaCl_2$	calcium chloride
$CaCO_3$	calcium carbonate
CEQ	Council on Environmental Quality
CFR	*U.S. Code of Federal Regulations*
CO	carbon monoxide
cfs	cubic feet per second
COE	U.S. Army Corps of Engineers
CWA	Clean Water Act (1977)
dB	decibel
dB(A)	decibel A-weighted
EA	environmental assessment
EPA	U.S. Environmental Protection Agency
Fig	figure
FONSI	finding of no significant impact
ft	feet/foot
gal	gallons
gpd	gallons per day
gpm	gallons per minute
HMHP	hazardous materials handling plan
ICP/MS	Inductively Coupled Plasma Mass Specifications
In.	inch
LAD	land application disposal
KRM	Kateel River Meridian
kW	kilowatt
MCL	maximum contaminant level
MCRI	Mystery Creek Resources, Incorporated
MFP	management framework plan
$MgCl_2$	magnesium chloride
mg/L	milligrams per liter
mi	mile
MSHA	Mining Safety and Health Administration
msl	mean sea level

Appendix A
Glossary, Abbreviations, and Acronyms (con't)

Acronyms

MWMP	meteoric water mobility procedure
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act (1969)
NGI	Nevada Goldfields, Inc.
NO_2	nitrogen dioxide
O_3	ozone
PM	particulate matter
Pb	lead
Pers. Comm.	Personal communication
PSD	Prevention of Significant Deterioration air quality permit
RMP	resource management plan
ROW	right of way
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SPCC	spill prevention, containment, and countermeasure
sq	square
stn	station
TDS	total dissolved solids
T&E	threatened and endangered
tpd	tonnes per day
tpy	tonnes per year
TCLP	toxicity characteristic leaching procedure
T&E	threatened or endangered
URA	unit resource analysis
USFWS	U.S. Fish and Wildlife Service
VRM	visual resource management
VLDPE	very low-density polyethylene
WAD	weak acid dissociable
yd	yard
yd^3	cubic yard

Appendix B

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