# Mystery Creek Resources, Inc.

# Nixon Fork Mine
# Plan of Operations and
# Reclamation Plan

## Volume I

of

Two Volumes

Submitted to the

Anchorage Field Office
Bureau of Land Management
6881 Abbott Loop Road
Anchorage, AK 99507

by

Mystery Creek Resources, Inc.
2221 East Street, Suite 200
Golden, Colorado 80401

August 2005

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August 2005

# EXECUTIVE SUMMARY

## NIXON FORK MINE
## PLAN OF OPERATIONS
## AND RECLAMATION PLAN

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 will 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 will 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 will accommodate C-130 or Hercules size aircraft.

The proposed operation generally will be as was permitted from 1995-1999, with the following exceptions. The milling circuit will 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 will be recycled in the system, and tailings will go through a cyanide destruction process. No free cyanide will be released to the environment in the milling process.

Existing tailings in the impoundment will be pumped to the mill for processing to recover residual gold. The reprocessed tailings and tailings from mined ore will 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 will 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 will leach metals from these materials in the future.

The site will be reclaimed according to a site plan approved by the Bureau of Land Management (BLM) and the State of Alaska. MCRI will post a bond for reclamation of the site as directed by the Bureau of Land Management and the State of Alaska.

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**August 2005**

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Rev. 09/06/05

# 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** |

# Chapter 1
# Introduction

Mystery Creek Resources, Inc. ("Mystery Creek" or "MCRI"), current lessee and operator of the Nixon Fork Mine, has been restoring the existing mining and milling facilities at the mine in support of exploration activities since May 2003. This work has been accomplished under an Exploration Plan of Operation approved by the Bureau of Land Management (BLM), and various permits issued by the Alaska Department of Natural Resources (ADNR) and the Department of Environmental Conservation (ADEC). No production has occurred since 1999. Mystery Creek proposes to reinstitute mining and gold production from the facility beginning in the winter of 2005-06. MCRI is a wholly owned subsidiary of St. Andrew Goldfields, Ltd., a publicly listed mining company headquartered in Oakville (Toronto), Ontario, Canada.

The project currently consists of two developed small ore bodies with currently defined in place resources of approximately 126,400 tonnes, containing 131,500 ounces of gold. In addition, approximately 116,000 tonnes of existing mill tailings containing 30,200 ounces of gold will be reprocessed. Several other mineralized zones are known to exist between or adjacent to the two ore bodies which future drilling will evaluate. Currently, underground drilling is in progress from the Crystal decline to expand these resources and upgrade them to reserve status.

Existing infrastructure, constructed by the former operator, Nevada Goldfields Inc. (NGI) in 1995, will be augmented by structural and mechanical improvements to that infrastructure. A FTDS will be constructed to be used for up to three years. The existing tailings facility may be modified to provide for a five-year capacity. Metallurgical modifications to the milling process will be made as discussed below. Based on the existing deposit and anticipated additional resources, the project has an expected life of approximately six years from commencement of mining through reclamation. Current exploration indicates a probability that project life could be extended.

All activities will occur on existing unpatented federal mining claims administered by BLM. See Volume II Appendix A for a list of mining claims. This Plan of Operations document details the initial six years of activities currently planned by MCRI for the Nixon Fork Mine.

## 1.1 Purpose

The purpose of this document is to present a Plan of Operations and Reclamation Plan for the Nixon Fork Mine project as partial fulfillment of the requirements for an approved plan of operations under 43 CFR 3809. The reclamation plan is a stand-alone document incorporated by reference. A separate document titled Nixon Fork Mine Environmental Assessment (EA) will be prepared by a third party contractor for BLM addressing the environmental impacts of this proposed project.

## 1.2 Locations and Status

The mine site is located approximately 32 miles northeast of McGrath and 8 miles north of Medfra in west central Alaska (Figs. 1-1, 1-2 and 1-3). The property consists of federal and state mining claims that lie on either side of the line between Township 26 South, Ranges 21 and 22 East, Kateel River Meridian (KRM). With a minor exception the mine site, and all known mineral resources are on federal mining clams in Range 21 East, that are State selected, but remain under the jurisdiction of BLM. The exception is a switchback on the

Mystery Creek mine road which goes off the federal claims onto State claims. Potential additional resources exist immediately to the east in Range 22 on federal claims on lands selected by Doyon, Ltd., the Native regional corporation for interior Alaska, and on private land owned by Doyon, Ltd. MCRI does not currently have an agreement to explore and/or mine minerals on private Doyon lands. 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.

### 1.3 History

The area surrounding the present day Nixon Fork Mine was first staked 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.

The Nixon Fork Mine, as it exists today, was placed in operation in 1995 by NGI. A Plan of Operations was submitted to BLM in February 1995 and an environmental assessment (EA) was completed resulting in a finding of no significant impact (FONSI). 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 Nixon Fork Mining, Inc., 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, ADNR, and 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 – or the currently approved exploration phase), 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. In phase two the mine will be returned to production. Production will include reprocessing the tailings from the tailings pond to recover gold and silver missed in the initial milling by NGI, and resuming underground mining with the ore being processed through the mill.

*Note: Tonnage and grade of ore and development rock throughout this report are expressed in metric tons (tonnes) and grade of gold and silver in grams/tonne (g/t). Tonnes equal one metric ton (2204.6 pounds).

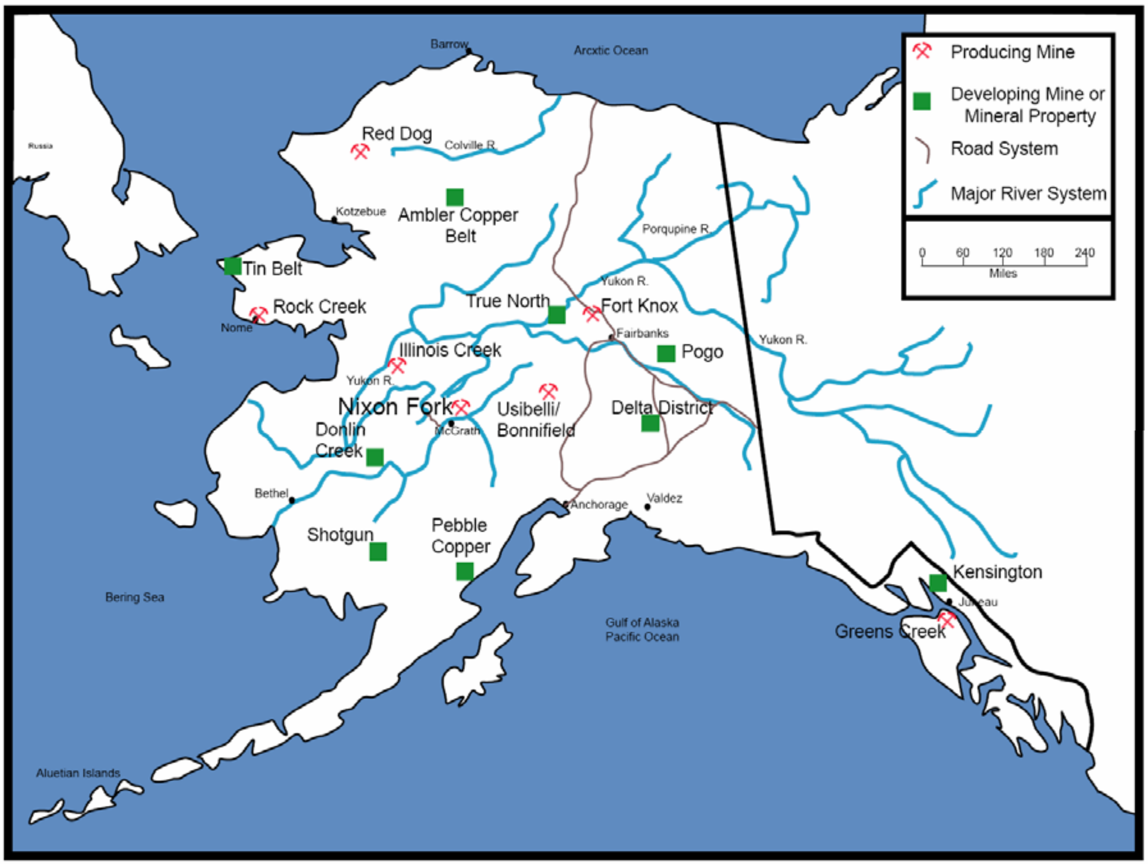
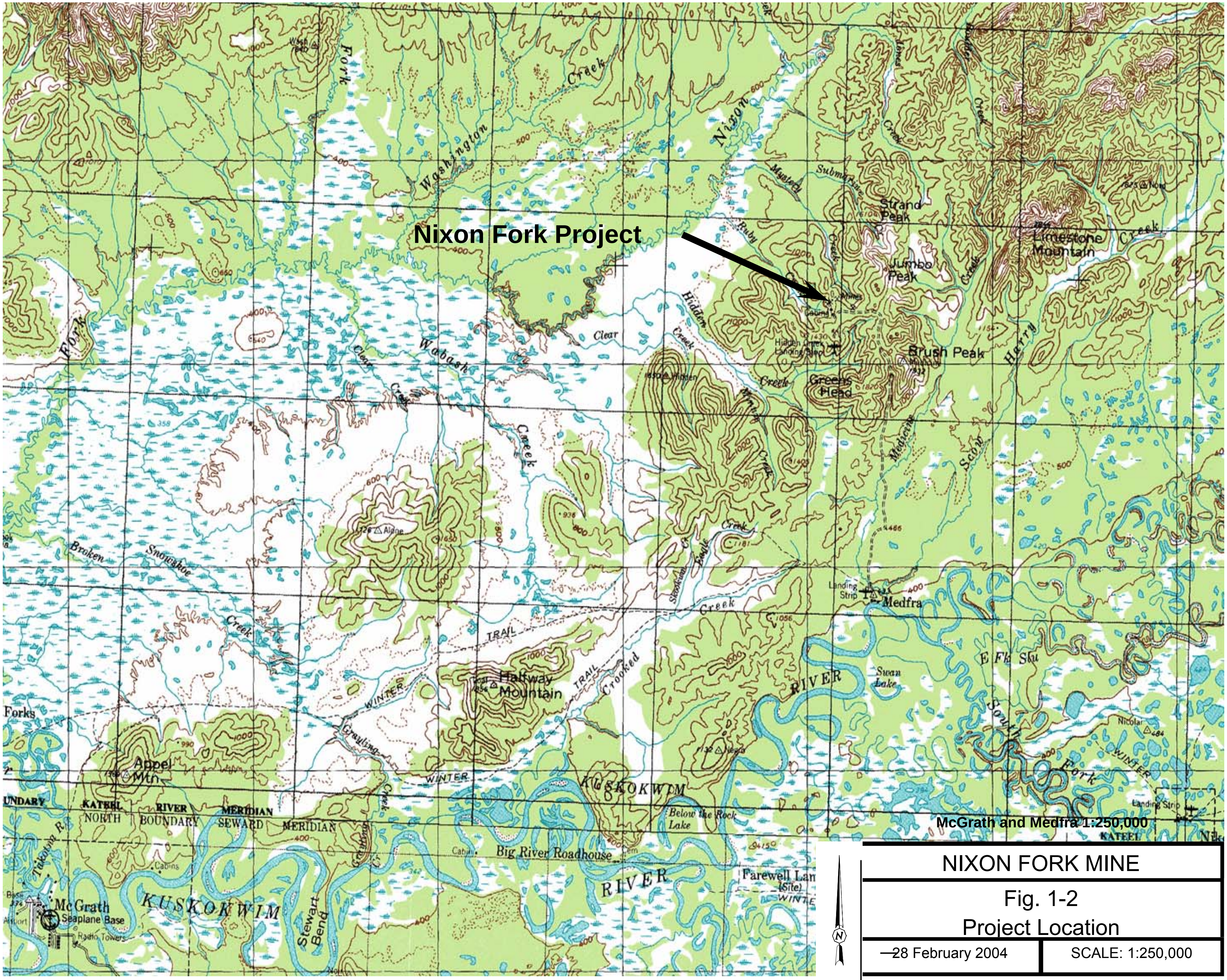


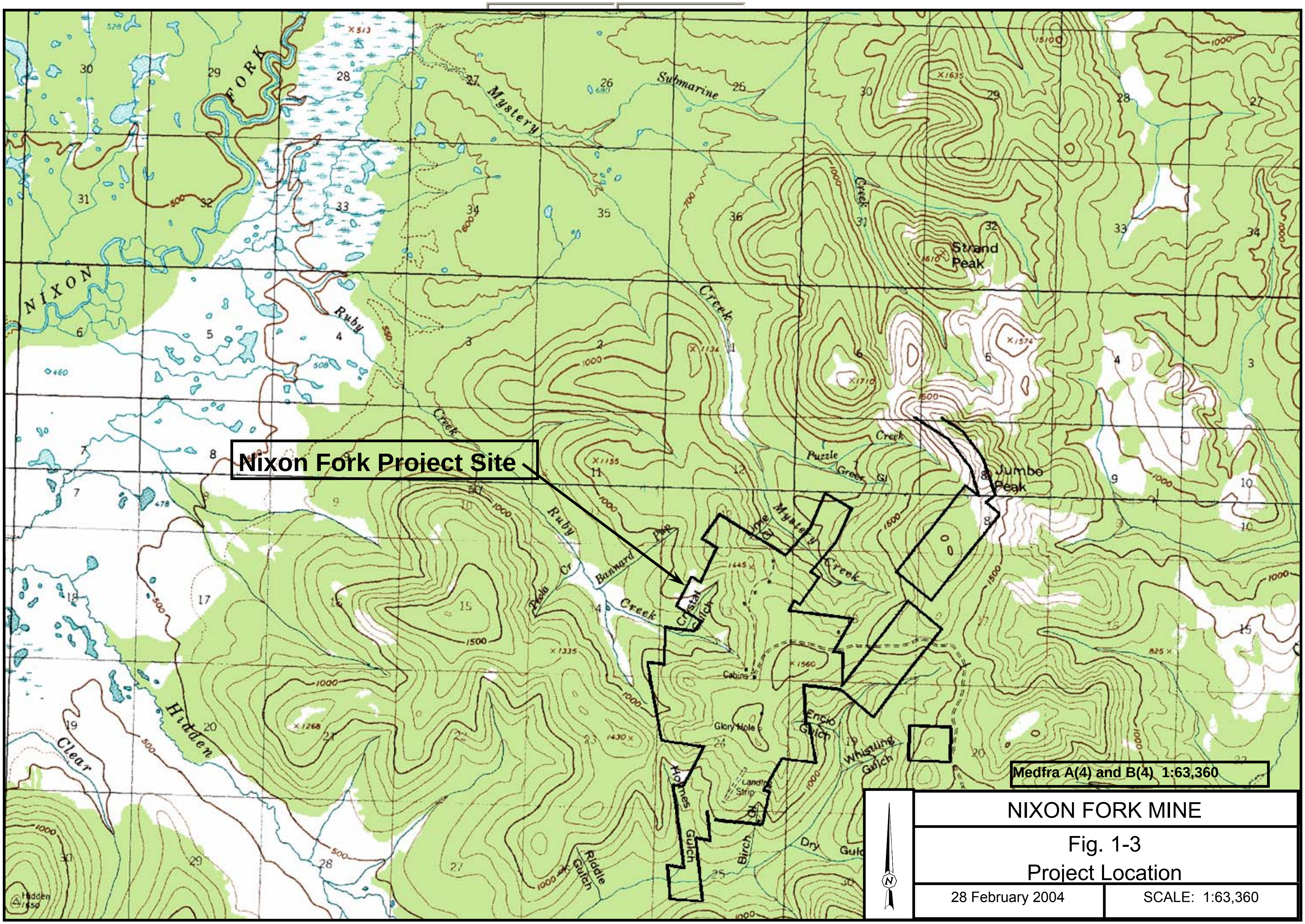

Figure 1-1. Nixon Fork General Location




NIXON FORK MINE

Fig. 1-2
Project Location

28 February 2004 | SCALE: 1:250,000




NIXON FORK MINE

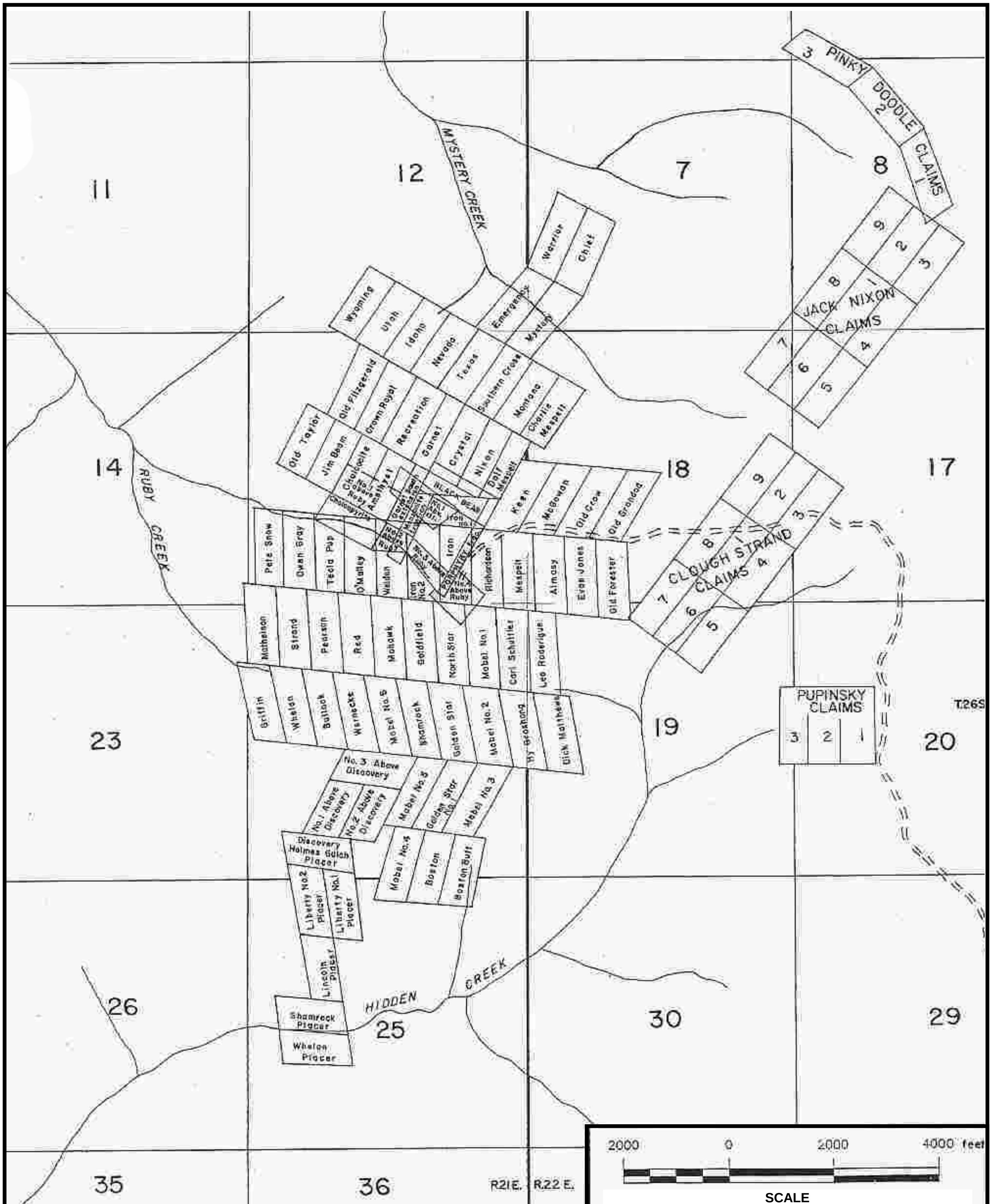
Fig. 1-3
Project Location

28 February 2004 | SCALE: 1:63,360

Figure 1-4

Existing Nixon Fork Mine Area Improvements

Insert 11x 17 with double fold



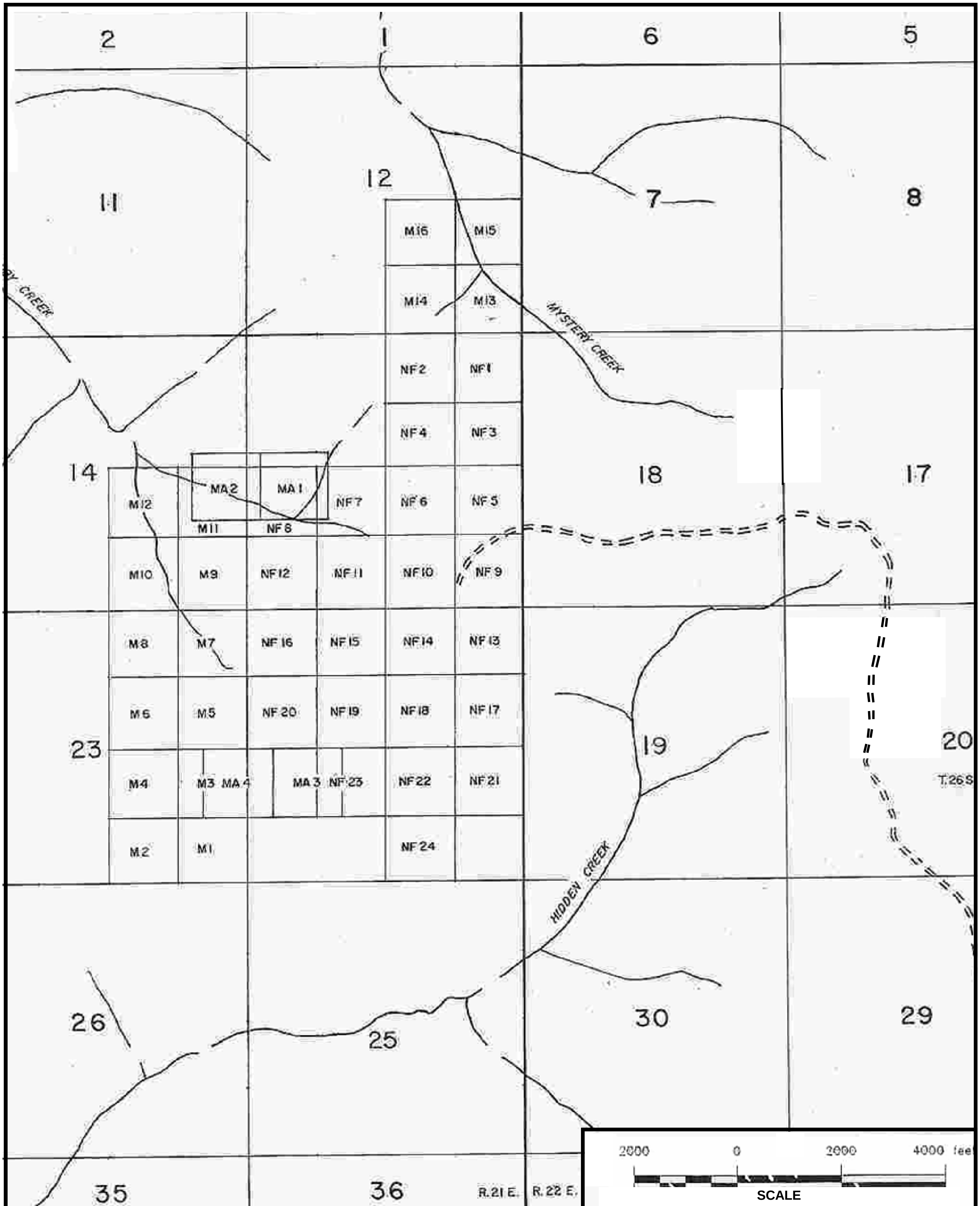

Medfra A4/B4 Quadrangles, Kateel Meridain

NIXON FORK MINE

Fig. 1-5

Federal Claim Location Map

28 February 2004




| | | | |
|---|---|---|---|
| Abbreviations<br>M MAR<br>MA Mespelt and Almasy | Medfra A4/B4 Quadrangles, Kateel Meridain | | NIXON FORK MINE<br>Fig. 1-6<br>State Claim Location Map<br>28 February 2004 |

# Chapter 2

# APPLICANT INFORMATION

This chapter contains specific legal and corporate information about the applicant.

## 2.1 Mining Claims

Figures 1-5 and 1-6 show the location of federal and state mining claims respectively associated with the Nixon Fork project. A complete listing of those claims is contained in Volume II Appendix A.

## 2.2 Corporate Information

| | |
|---|---|
| Business Name: | Mystery Creek Resources, Inc. |
| Address: | 2221 East Street, Suite 200<br>Golden, Colorado 80401 |
| Telephone: | 303-277-1222 |
| FAX: | 303-277-0006 |
| President: | Paul C. Jones |
| Secretary: | J.P. Tangen |
| Address: | Attorney at Law<br>1600 A Street, Suite 310<br>Anchorage, Alaska 99501-5148 |
| Telephone: | 907-222-3985 |

## 2.3 Corporate Officer Completing Application

| | |
|---|---|
| Name. | Paul C. Jones |
| Title: | President |
| Telephone: | 303-277-1222 |

## 2.4 Designated Facility Contact Person

| | |
|---|---|
| Name. | William J. Burnett |
| Title: | Exploration Manager |
| Telephone: | 907-743-0451 |

## 2.5 Alaska Registered Agent

| | |
|---|---|
| Name: | J.P. Tangen |
| Address: | Attorney at Law<br>1600 A Street, Suite 310<br>Anchorage, Alaska 99501-5148 |
| Telephone: | 907-222-3985 |

# Chapter 3
# Plan of Operations

This Plan of Operations covers five years of operations and a year of reclamation beginning April 1, 2005 through March 31, 2010.

The proposed operation of the Nixon Fork Mine will 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.

Other than these items, MCRI, basically, will be “turning the lights on” at Nixon Fork and going back to work.

## 3.1 Overview Project Description

The following is an overview of MCRI’s planned mining and milling activities. Details of the activities are provided in Sections 3.2 through 3.24. See Fig. 1-4 for the location of mine facilities.

| | |
|---|---|
| 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 will be stored underground. |
| Production Rate | Reprocessing of the tailings in the tailings pond will proceed at 350 tonnes per day until all tailings have been process.<br><br>A mining rate of approximately 150 tpd producing approximately 10-15 tpd gold/silver/copper concentrate is planned. The tailings will be hydrometallurgically treated on site to produce gold-silver dore´. |
| Milling Method | Reprocessing of the existing mill tailings in the pond will 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 will involve crushing, grinding, gravity separation, and flotation followed by cyanide leaching of the entire flotation tails product for gold recovery. The cyanide solution will be reprocessed and reused in the system. A cyanide destruction process will 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 3.8 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 will be filtered and dry stacked for permanent disposal on the 13.5 acre FTDS at the high point of the old airstrip. See Fig. 3-4. Reprocessing of existing tailings will 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 will also be dry stacked at the FTDS. After the pond is reactivated, new tailings will 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 will 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 will 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 will 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 will 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. |

## 3.2 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.

## 3.3 Mine Life

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

## 3.4 Access

Personnel, fuel, supplies and equipment will be flown in to the site. Concentrate and dore' will 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 surfaced 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 are made it will 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

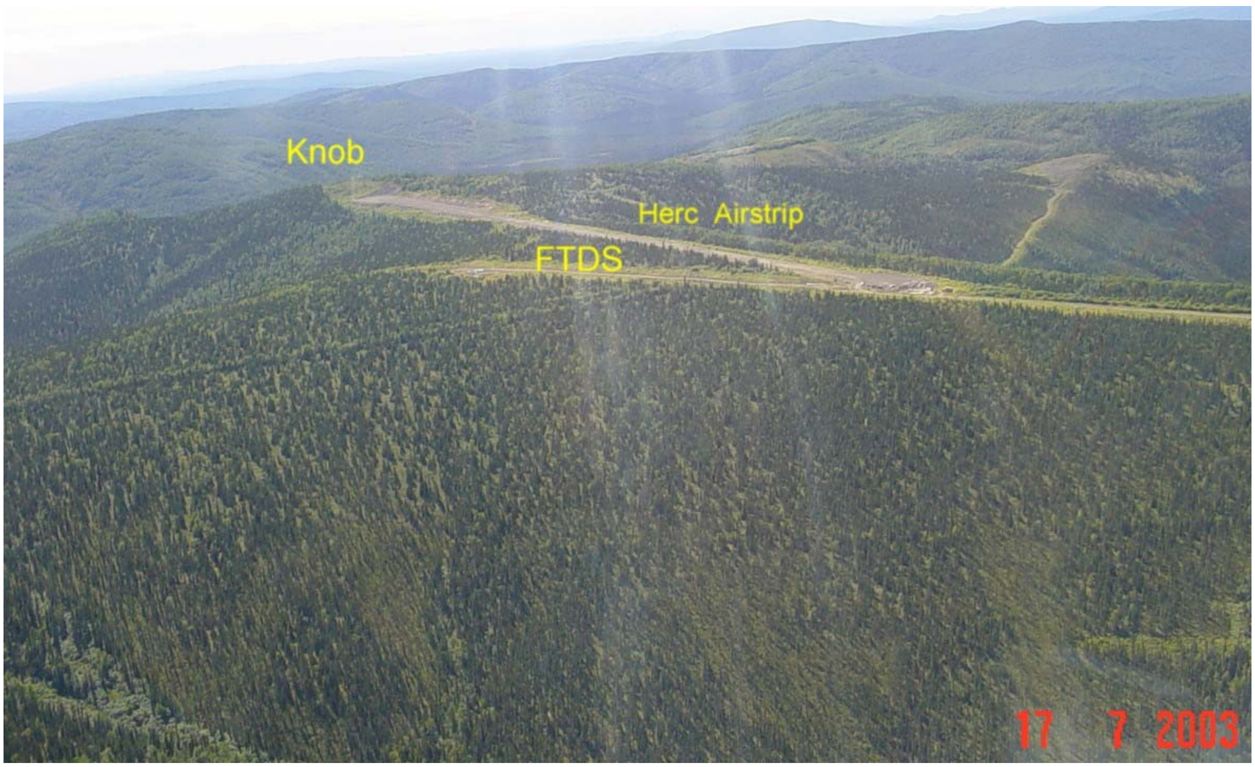



Photo 1: FTDS and Knob On South End of Hercules Airstrip

that portion of the existing road network that will be used for the proposed mine development and operation, and for the ongoing exploration program.

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 will be appropriately posted. Anyone establishing a need to cross the property will 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 will be available for emergency and official governmental agency aircraft operations.

### 3.5 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 will 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 orebodies 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, will be developed in the more competent limestone material. Generally, mining of deposits will use shrink stoping, mechanized cut and fill, or sublevel stoping methods. In the mining process the ore will be drilled and blasted, loaded into 10 to 16-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.

### 3.6 Mine Development Rock

The mining process includes development and stope mining. All rock mined in the stopes will be hauled to the mill. The development rock will either be backfilled in the mine, or will 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 will be placed on the Crystal surface dump during the five-years of operations. Development rock will 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 will 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 will 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 will 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 will either be hauled to the mill and processed or backfilled in the mine. If the sulfide content is less than 5% the development rock will 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 3-1 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 see Volume II, Appendix B.

The nitrate level at 9.77 mg/l is close to the drinking water criteria of 10. Blasting will 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 will 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 will 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 will 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 will monitor storm water runoff and will 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 will be included in the comprehensive monitoring plan.

Table 3-1
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) | 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,
[d] Selenium criteria is based on the speciation of selenium.
Shaded cells exceed strictest regulatory criterion.

Source: Golder Associates. See volume II Appendix B.

## 3.7 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.

## 3.8 Milling Process

### 3.8.1 General

MCRI intends to mine the tailings currently contained in the tailings impoundment, and ore from underground. The existing tailings will 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 will 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 expected to begin in the winter of 2005-06. Mining and processing of the existing tailings will begin the following spring, and will continue each spring until the pond is empty. After all the existing tailings are processed and the pond inspected, MCRI intends to mine ore from underground with the resultant tailings placed in the tailings pond as slurry.

MCRI will be using a similar mill process and much of the same equipment used by NGI. However, a cyanide leach and electrowinning circuit will be added to the mill process to improve gold recovery. MCRI intends 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 metabisulfite ($Na_2S_2O_5$) 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 will be filtered and washed on a filter unit to recover the cyanide solution. The filtered tailings will 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 will then be dried to no more that 17% moisture (daily maxium – 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-hyrdroxide 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 will be sampled on a routine basis for WAD cyanide and compliance with regulations. Typical results with the sulfur dioxide process are shown in the Table 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 planned to be added to the mill site. Initially, because of air requirements, the generator sets will 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 will house the cyanide leaching circuit. Both buildings will be located on concrete slabs, and will 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 will 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 will be valved to permit isolation in case of a leak. Construction drawings of buildings and equipment to be used in the cyanide process will be submitted to ADEC for review prior to construction.

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

### 3.8.2 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 3-2, Samples 1-1 through 2-3). In Table 3-2 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 3.8.3. A more detailed discussion is found in 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, will be determined by ADEC in the waste water permit (L. Boles personnel communications). The tailings have a low potential for acid generation with a neutralization potential (NP) to acid generation potential (AP) ratio of 213. (See Table 3-3).

### 3.8.3 Reprocessed Tailings

Rather than bury a valuable resource, MCRI intends to reprocess the tailings that are in the tailings pond to recover gold and silver contained in that material. The reprocessing is expected to begin in late spring 2006. These tailings, which will be recovered at the rate of up to 350 tonnes per day, will be pumped to the mill as a dense slurry of 45% solids. At the mill

## Table 3-2
## Meteoric Water Modeling Procedure Results
## Existing and Reprocessed Pond Tailings and New mined Ore Tailings

| **Parameter** | **Strictest Potential Regulatory Criteria** | | **Existing Tailings** | | | | | | | | | | | | **Re-Processed** | | **New Mined Ore Tailings (Sample #3)** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **Sample 1-1** | | **Sample 1-2** | | **Sample 1-3** | | **Sample 2-1** | | **Sample 2-2** | | **Sample 2-3** | | **Tailings (Sample T-31)** | | | |
| pH | 6.5 to 8.5 | Aquatic | 7.93 | | 7.89 | | 7.92 | | 7.82 | | 7.87 | | 7.86 | | NA | | NA | |
| Alkalinity | 20 (minimum) | Aquatic | 88 | | 83 | | 94 | | 46 | | 81 | | 87 | | NA | | NA | |
| Bicarbonate | | | 88 | | 83 | | 94 | | 46 | | 81 | | 87 | | NA | | NA | |
| Aluminum | 0.087 [a] | Aquatic | < 0.01 | | 0.01 | | < 0.01 | | 0.01 | | < 0 | | < 0.01 | | <0.020 | | <0.020 | |
| Antimony | 0.006 | Drinking | **0.031** | J | **0.036** | J | **0.033** | J | 0.006 | J | **0.037** | J | **0.038** | J | **0.071** | | **0.12** | |
| Arsenic | 0.05 [e] | Drinking | 0.014 | | 0.012 | | 0.009 | | < 0.01 | | 0.012 | | 0.011 | | **1.3** | | **0.12** | |
| Barium | 2 | Drinking | 0.028 | | 0.029 | | 0.027 | | 0.043 | | 0.032 | | 0.034 | | 0.018 | | 0.016 | |
| Beryllium | 0.004 | Drinking | <0.001 | | < 0 | | < 0 | | < 0 | | < 0 | | < 0 | | <0.000093 | | <0.000093 | |
| Bismuth | | | < 0.0003 | | < 0 | | < 0 | | < 0 | | < 0 | | < 0 | | <0.00005 | | NA | |
| Boron | 0.75 | Irrigation | 0.39 | | 0.40 | | 0.39 | | 0.04 | | 0.36 | | 0.39 | | 0.22 | | 0.20 | |
| Cadmium | 0.00045 [b] | Aquatic | < 0.0001 | | < 0 | | < 0 | | < 0 | | < 0 | | 0.0001 | J | **0.0055** | J | **0.0019** | J |
| Calcium | | | 275 | | 272 | | 252 | | 57.6 | | 336 | | 550 | | 13 | | 4.6 | |
| Chloride | 230 | Aquatic | 15 | | 14 | | 14 | | 14 | | 17 | | 16 | | 14.5 | | 19.6 | |
| Chromium | 0.1 [b,c] | Drinking Irrigation | 0.004 | | 0.004 | | 0.003 | J | < 0 | | 0.003 | J | 0.004 | | <0.0056 | | <0.0056 | |
| Cobalt | 0.05 | Irrigation | 0.0052 | | 0.005 | | 0.0050 | | 7E-04 | | 0.01 | | 0.0194 | | 0.0060 | | 0.0021 | J |
| Copper | 0.018 [b] | Aquatic | 0.002 | | 0.003 | | 0.003 | | 0.008 | | 0.004 | | 0.008 | | **0.019** | | **0.16** | |
| Cyanide WAD | 0.0052 | Aquatic | < 0.005 | | **0.01** | | < 0.01 | | < 0.01 | | < 0 | | < 0.01 | | **0.019** | J | **0.0053** | J |
| Fluoride | 1 | Irrigation | 0.46 | | 0.46 | | 0.43 | | 0.20 | | 0.40 | | 0.44 | | 0.53 | | 0.56 | |
| Iron | 1 | Aquatic | < 0.02 | | 0.02 | | < 0.02 | | < 0.02 | | < 0 | | < 0.02 | | 0.088 | | 0.15 | |
| Lead | 0.0063 [b] | Aquatic | 0.0004 | | 0.002 | | 2E-04 | | 3E-04 | | 0.001 | | < 0 | | <0.0029 | | **0.0088** | J |
| Lithium | 2.5 | Irrigation | < 0.05 | | < 0.05 | | < 0.05 | | < 0.05 | | < 0.1 | | 0.067 | | 0.0028 | | 0.0016 | J |
| Magnesium | | | 40.7 | | 40.2 | | 37.4 | | 6.49 | | 46.1 | | 66.5 | | 2.2 | | 0.38 | |
| Manganese | 0.2 | Irrigation | **0.444** | | **0.434** | | **0.443** | | **0.380** | | **0.666** | | **1.06** | | 0.0022 | J | 0.0081 | |
| Mercury | 0.00077 | Aquatic | < 0.0001 | | < 0 | | < 0 | | < 0 | | < 0 | | < 0 | | 0.00075 | | 0.00035 | |
| Molybdenum | 0.01 | Irrigation | **0.0349** | | **0.034** | | **0.029** | | **0.018** | | **0.035** | | **0.0412** | | 0.0084 | | 0.011 | |
| Nickel | 0.107 [b] | Aquatic | 0.012 | | 0.012 | | 0.013 | | < 0 | | 0.015 | | 0.027 | | NA | | 0.0021 | |
| Nitrate | 10 | Drinking | < 0.5 | | 0.7 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | 0.303 | H | 0.111 | |
| Nitrite | 1 | Drinking | < 0.5 | | < 0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.5 | | <0.023 | H | 0.137 | |
| Phosphorous | | | < 0.1 | | < 0.1 | | < 0.1 | | < 0.1 | | < 0.1 | | < 0.1 | | 0.064 | J | 0.027 | J |
| Potassium | | | 32.4 | | 32.7 | | 30.6 | | 11.7 | | 37.8 | | 45.7 | | 5.2 | | 2.2 | |
| Selenium | 0.0046 [d] | Aquatic | **0.0071** | | 0.004 | J | 0.0040 | J | 0.0020 | J | **0.009** | | **0.0122** | | **0.026** | J | <0.010 | * |
| Silver | 0.015 [b] | Aquatic | < 0.0001 | | < 0 | | < 0 | | < 0 | | < 0 | | < 0 | | 0.0049 | J | <0.0036 | |
| Sodium | | | 28.8 | | 27.9 | | 26.2 | | 2.95 | | 28.1 | | 31.2 | | 450 | | 85 | |
| Strontium | | | 0.794 | | 0.799 | | 0.755 | | 0.132 | | 0.807 | | 1.15 | | 0.057 | | 0.014 | |
| Sulfate | 250 [f] | Drinking | **910** | | **870** | | **780** | | 150 | | **1000** | | **1600** | | **2,530** | | 50.4 | |
| Thallium | 0.002 | Drinking | < 0.0002 | | < 0 | | < 0 | | < 0 | | < 0 | | < 0 | | <0.018 | * | <0.018 | * |
| Tin | | | < 0.001 | | < 0 | | < 0 | | < 0 | | < 0 | | < 0 | | 0.021 | B | <0.0076 | |
| Titanium | | | < 0.005 | | < 0.01 | | < 0.01 | | < 0.01 | | < 0 | | < 0.01 | | <0.0023 | | <0.0023 | |
| Vanadium | 0.1 | Irrigation | 0.002 | | < 0 | | < 0 | | < 0 | | 0.003 | | 0.006 | | <0.0029 | | <0.0029 | |
| Zinc | 0.269 [b] | Aquatic | < 0.01 | | < 0.01 | | < 0.01 | | < 0.01 | | < 0 | | < 0.01 | | 0.035 | B | 0.023 | |

**Notes:**

NA - not applicable

Bolded cells identify exceedance of strictest regulatory criterion.

[a] Criterion expressed as total recoverable concentration.

[b] Aquatic criterion is hardness dependent. A hardness of 235 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. Cr(III) criterion is hardness dependant (235 mg/L as $CaCO_3$ assumed).

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

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

[f] National Secondary Drinking Water Standards. Adopted by Alaska as enforceable standards (18 AAC 70.220).

Explanation of Data Qualifiers:

B = Analyze detected in the associated Method Blank, value not subtracted from result.

J = Estimated value (identifies a compound that is detected below the LQL).

* = Reporting limit is higher than strictest regulatory standard.

H = Sample analyzed outside of holding time.

Whole Ore sample temperature upon arrival at Evergreen Analytical Laboratory = 21 °C.

Re-Processed Tailings sample temperature upon arrival at Evergreen Analytical Laboratory = 13 °C.

Table 3-3
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 |

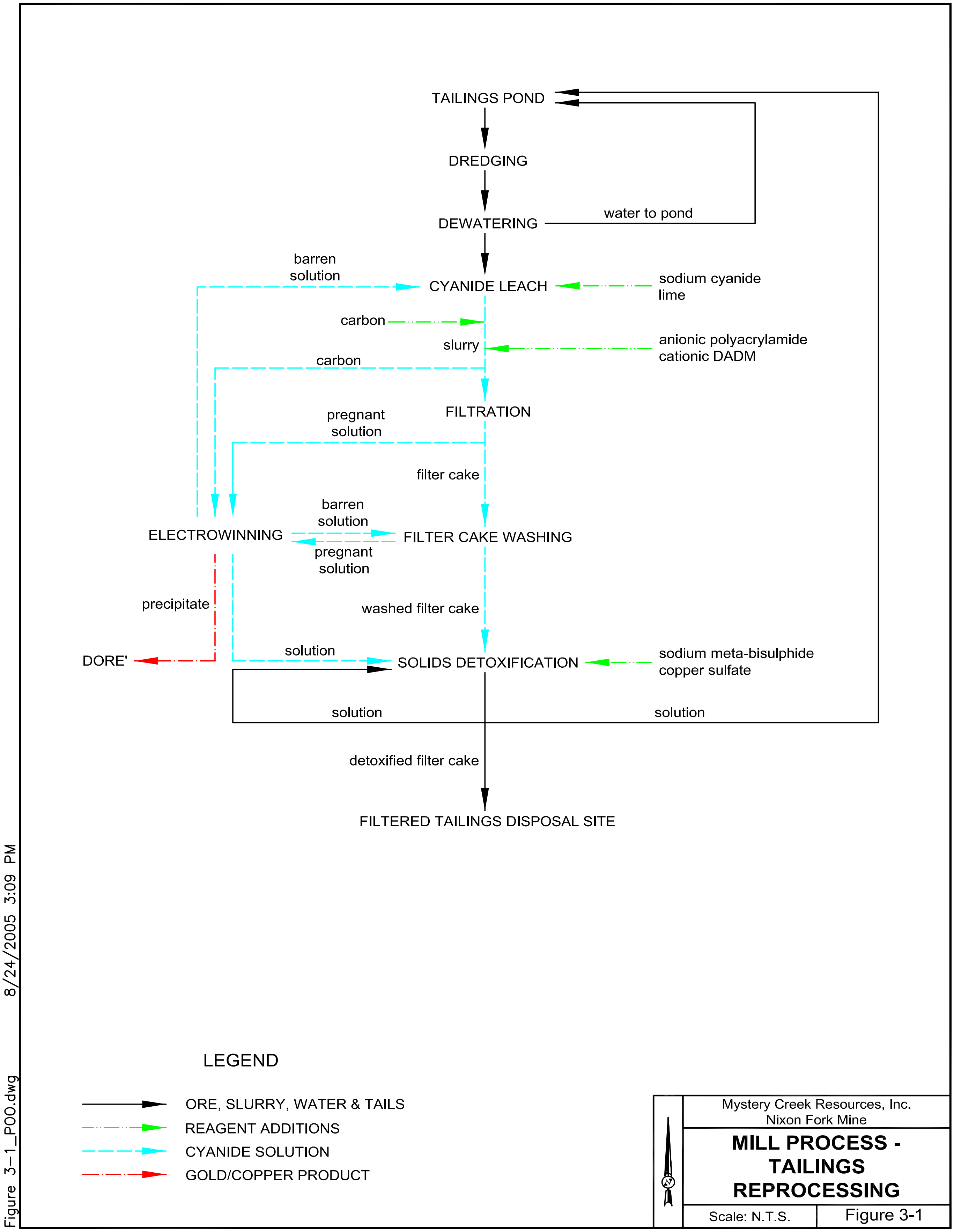
**Notes:**
NP - Neutralization Potential
AP - Acid Potential (calculated from sulfide sulfur)
NNP - Net Neutralization Potential (NNP) (calculated as NP-AP)
NPR - Neutralization Potential Ratio
[a] Average of 6 samples, tests conducted prior to re-processing.
Source of Tables 3.2 and 3.3; Golder Associates. See Appendix.

this slurry will be dewatered to 80% solids and the excess water returned to the pond. Some fines may also be returned to the pond.

The dewatered tailings will be mixed with recycled, barren sodium cyanide solution, and agitated in five leach tanks for 12 to 14 hours. The leached ore will then be transfered by pump to a filter were the pregnant solution contained in the slurry will be filtered out and washed with barren solution for gold recovery. The filtered tailings will 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 will then be piped into the electrowinning circuit where gold will 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 will be recycled to a tank, and refortified with sodium cyanide and sodium hydroxide for reuse. See Fig. 3-1 for a diagram of the mill process for the existing tailings. The filtered tailings will be dry stacked near the south end of the runway (Fig. 3-4) as discussed in Section 3.10.

Table 3-2 presents the MWMP results for the reprocessed tailings (sample T-31) that will 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


TAILINGS POND
DREDGING
DEWATERING
water to pond
barren solution
CYANIDE LEACH
sodium cyanide
lime
carbon
slurry
anionic polyacrylamide
cationic DADM
carbon
FILTRATION
pregnant solution
filter cake
barren solution
ELECTROWINNING
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 - TAILINGS REPROCESSING
Scale: N.T.S.
Figure 3-1
Figure 3-1_P00.dwg 8/24/2005 3:09 PM

permeability of the placed tailings, estimated at $10^{-6}$ cm/sec, will 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 3-3 and Section 3.10 for a complete discussion of the tailings. See also Volume II, Appendix C and D for detailed data on the tailings. Additional sampling will be done during operation for both MWMP and ABA.

### 3.8.4 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 locations of these holes were selected by the Nixon Fork Exploration Manager. 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 a 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 will 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 will be crushed in a stationary jaw and secondary crusher, and then ground into a slurry in two ball mills. The reduced product will pass through a gravity separation process where free gold and heavy minerals are removed from the slurry. The gravity concentrate will either become a portion of the dore' or will become a portion of the dore' slag which will be returned to the grinding circuit for reprocessing. The remaining slurry, consisting of mineral sulfides containing gold, silver, and copper, will go to a flotation process where a an initial sulfide concentrate containing gold/silver/copper will 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 will 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%) will be reground in a regrind mill.

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

The gold and silver remaining in the tailings will be recovered by cyanide leaching followed by filtration. The “gold pregnant” solution will report to a conventional electrowinning circuit. The gold-silver precipitate as well as the gold and silver recovered in the gravity circuits will be shipped as a dore’. The recovered sodium or calcium cyanide solution recovered in the electrowinning process will then be recycled in the flotation tailings leach process. Excess cyanide solution will report to the cyanide destruction circuit.

The filter cake from the filtration step will also be rinsed, in the same manner as the previously discussed reprocessed tailings, where residual cyanide solution will be destroyed. Table 3-2, reports WAD CN reduced to 0.019 mg/L. Following filtration in the cyanide destruction circuit, the hydrometallurgical tailings slurry residue will 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 3-3. The new mined ore tailings, when deposited in the FTDS, will be on top of, or sandwiched between the reprocessed tailings that have a neutralization ratio of 29.1. See Volume II, Appendix C WAD Cyanide Results. See Fig. 3.2 Mill Process – Mining With Filtered Tailings Disposal.

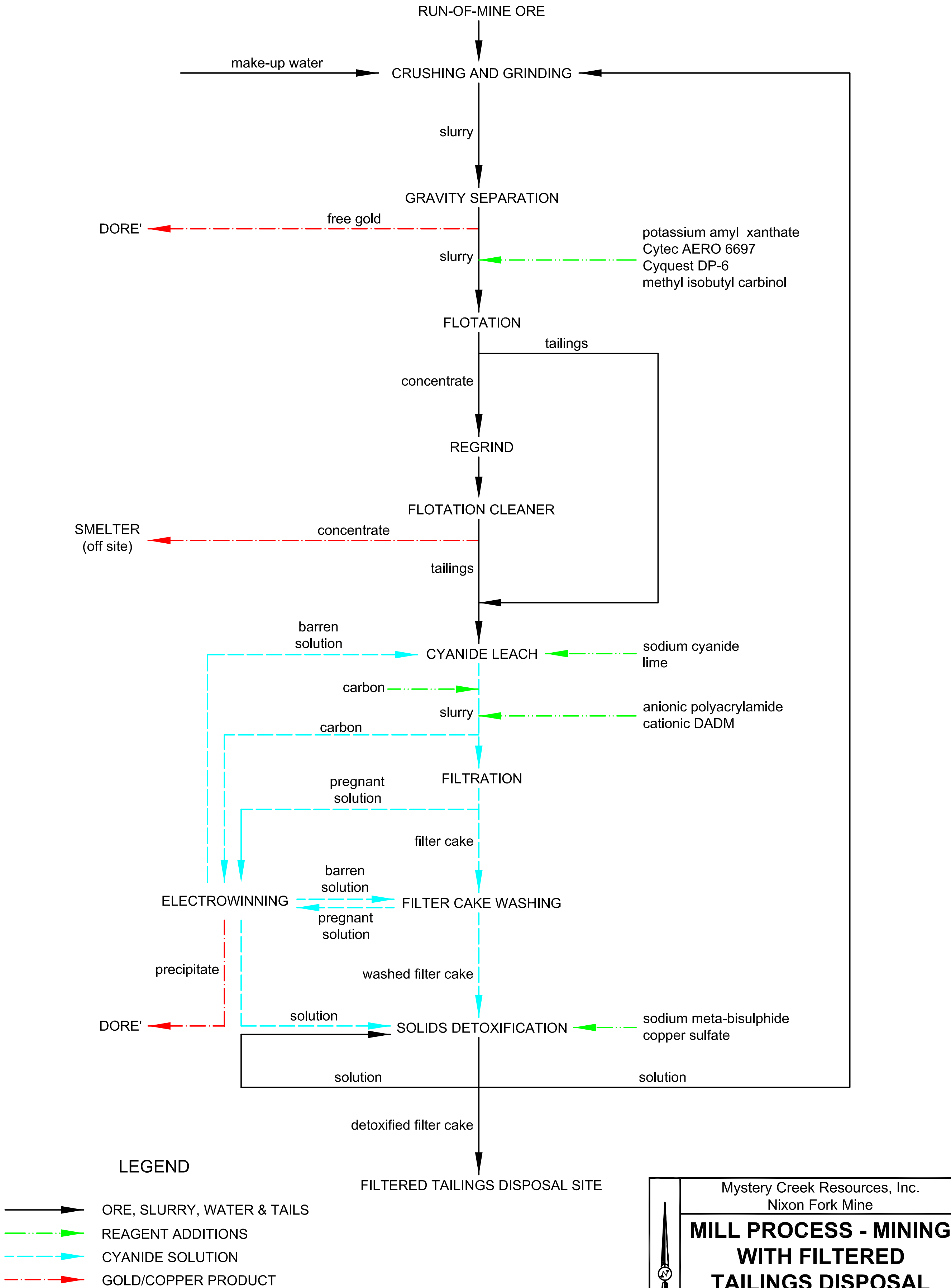
Filter cake produced after the tailings pond has been emptied and reactivated will be reslurried with make up water at the mill and deposited in the tailings pond. The MWMP results are contained in Table 3-2. As with the reprocessed tailings, sampling will be done during operation for both MWMP and ABA, and is included in the monitoring plan. The original monitoring wells at the toe of the dam have been replaced and will 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. 3-3 Mill Process – Mining with Tailings Pond Disposal. Also see Section 3.10.

### 3.9 Reagents

Chemicals and reagents required for project operation will be purchased from vendors in Anchorage or the Lower 48 States and will be flown in. Hazardous materials will 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, will 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) will be developed before the system is placed in operation.



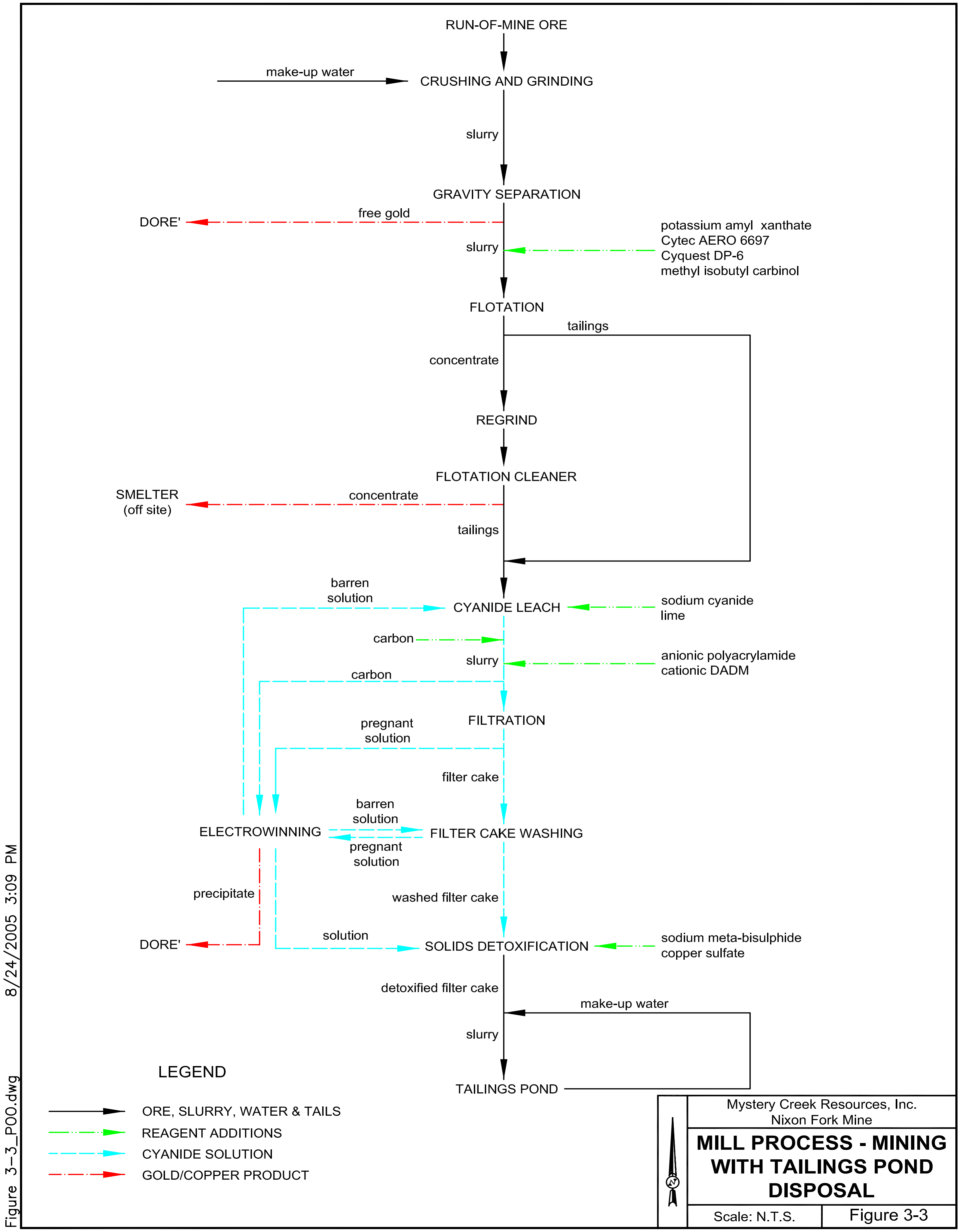

Mystery Creek Resources, Inc.
Nixon Fork Mine

**MILL PROCESS - MINING WITH FILTERED TAILINGS DISPOSAL**

Scale: N.T.S.

Figure 3-2

Figure 3-2_POO.dwg 8/24/2005 3:09 PM


RUN-OF-MINE ORE
make-up water
CRUSHING AND GRINDING
slurry
GRAVITY SEPARATION
DORE'
free gold
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
pregnant
solution
FILTRATION
filter cake
barren
solution
ELECTROWINNING
FILTER CAKE WASHING
pregnant
solution
precipitate
washed filter cake
DORE'
solution
SOLIDS DETOXIFICATION
sodium meta-bisulphide
copper sulfate
detoxified filter cake
make-up water
slurry
TAILINGS POND
LEGEND
ORE, SLURRY, WATER & TAILS
REAGENT ADDITIONS
CYANIDE SOLUTION
GOLD/COPPER PRODUCT
Mystery Creek Resources, Inc.
Nixon Fork Mine
MILL PROCESS - MINING WITH TAILINGS POND DISPOSAL
Scale: N.T.S.
Figure 3-3
Figure 3–3_POO.dwg 8/24/2005 3:09 PM

| . 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 |

## 3.10 Tailings Disposal

Tailings disposal will occur in the FTDS and the tailings pond. These two disposal methods are discussed below.

### 3.10.1 Reprocessed Filtered Tailings

The existing 116,000 tonnes (128,000 tons) of tailings in the Nixon Fork tailings pond will be hydraulically removed from the tailings pond and reprocessed through the Nixon Fork mill. This will 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 will 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 will 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 will be washed into the sump with water using hoses similar to fire hoses. The slurry will be pumped with a low-pressure pump through a hose to the edge of the tailings pond.

The slurry will then be transported by high-pressure pump and pipe to the mill for reprocessing. The stationary high-pressure pump will 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 will be hosed back into the pond.

A new surface pipeline will be installed extending from the stationary high-pressure pump to the mill building. The pipe will 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 will 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 will be placed in the diversion ditch where the tailings pipe crosses the ditch. The culvert will extend 25 feet to each side of the tailings pipe. The culvert will be buried, and the surface above the culvert will be sloped towards the tailings pond. A berm will 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 will be removed and the ditch restored to its original condition.

No rubber-tired or tracked equipment will be operated on the liner. Upon completion of the tailings reprocessing, the remaining water in the tailings pond will 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 will be inspected for damage and repaired if and as needed. Upon completion of repairs, the impoundment will again be used for slurried tailings disposal as originally permitted.

In the final stages of the mill process, the tailings will be dried to at least 85 percent solids, a consistency that does not bleed water. Drying will be accomplished with the use of a filter to be installed in one of the new buildings. The dried tailings will 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 will not generate dust during transportation. The haul roads will be sprayed with water to suppress road dust when necessary.

The FTDS will be located on top of the low hill east of the airstrip. (See Photo 1, Section 3.4, and Fig. 3-4 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. (Volume II, Appendix D, Filtered Tailings Disposal Site Soil Size Distribution.)

The FTDS will 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. 3-5 Filtered Tailings Disposal Site Excavation Plan).

Precipitation that falls on the tailings repository will be collected in the perimeter ditch and flow to a percolation pond at the low point of the ditch (Fig. 3-6 Filtered Tailings Disposal Site Drainage Plan.). The percolation pond will 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 will provide for sampling and analysis of liquids in the percolation pond.

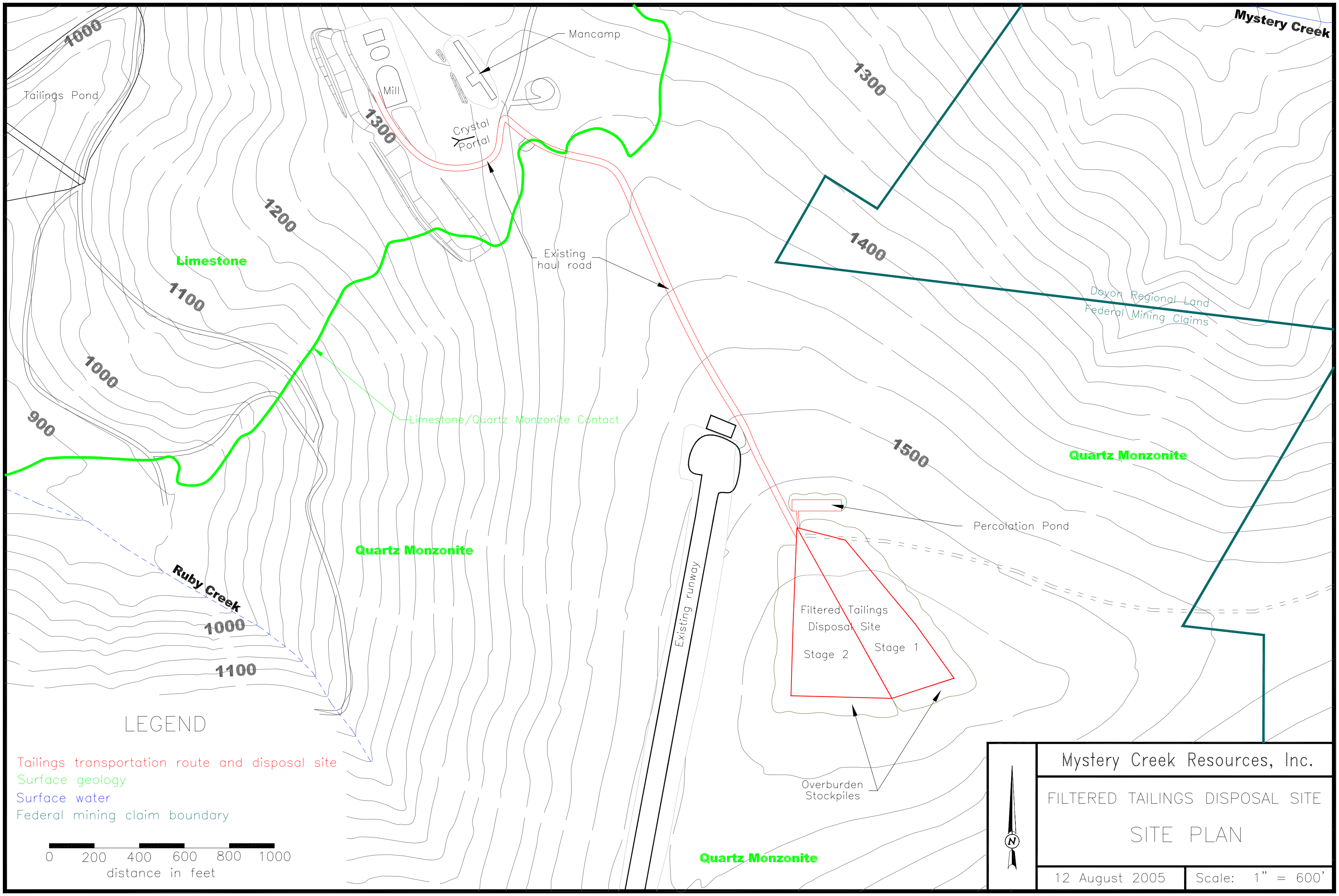



**Figure 3-4: FILTERED TAILINGS DISPOSAL SITE PLAN**

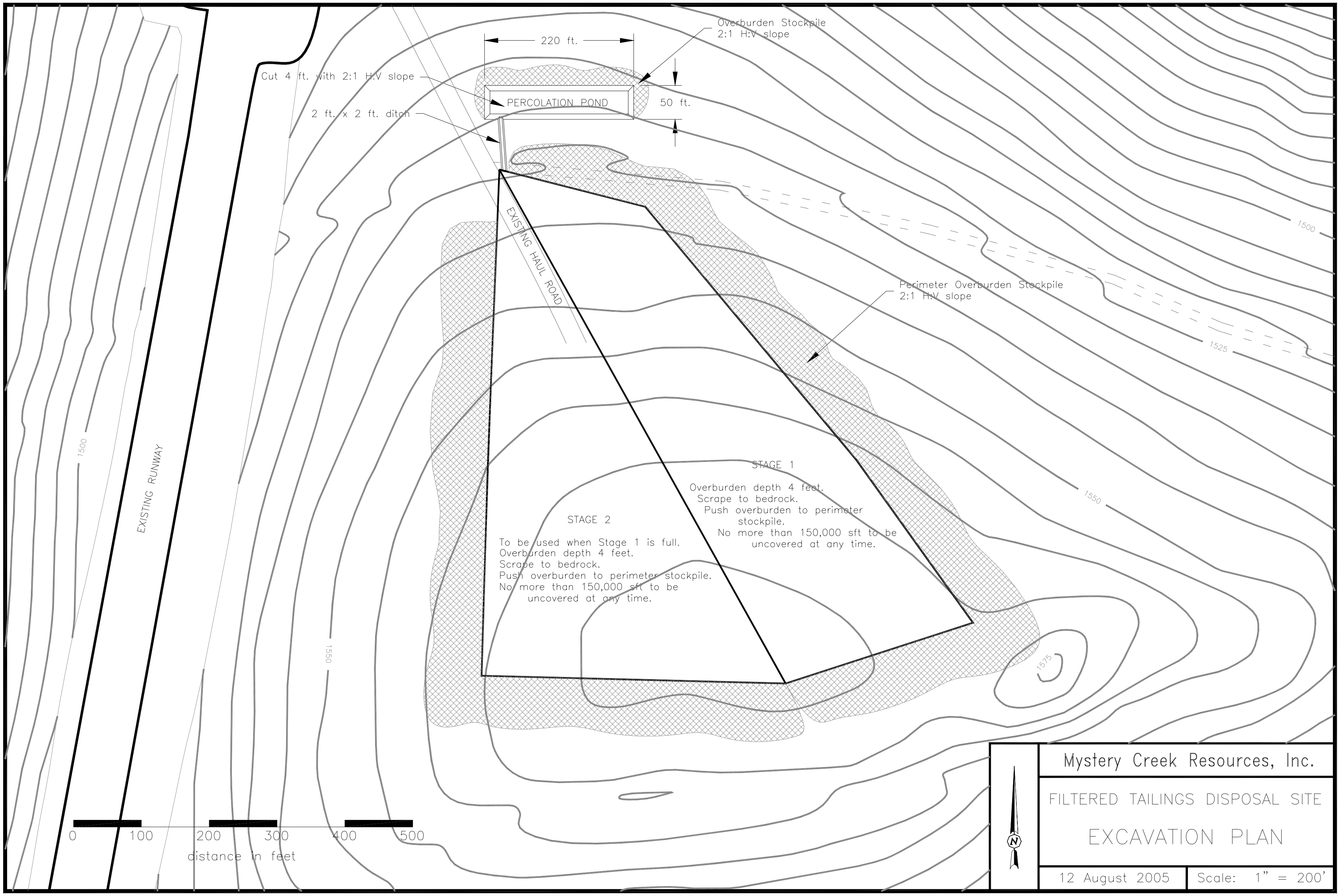



**Figure 3-5: FILTERED TAILINGS DISPOSAL SITE EXCAVATION PLAN**


**Figure 3-6: FILTERED TAILINGS DISPOSAL SITE DRAINAGE PLAN**

Tailings will be deposited by end-dumping, beginning at the southeast end of the repository. A dozer will push the dried tailings to their final location and shape the pile. The loose tailings will be spread 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 will 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 will be sloped to blend in with the existing topography and will 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 will 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 will include the collection of FTDS samples daily with moisture content determined, recorded, and reviewed daily by appropriate mine personnel. The monthly average goal will be less than 15 %, with maximum daily moisture content of 17%. The monitoring plan will also include MWMP and ABA analysis of the tailings.

The pile height will not exceed 30 feet. As the repository is filled and shaped, the previously excavated overburden will 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 will be done concurrently with tailings disposal during the months of May through October. During the winter months, tailings will be placed and shaped before they freeze. The overburden will be placed on the tailings during the following summer. Upon completion, the filtered tailings disposal site slopes will not exceed 4:1 H:V, and the top will slope with a three percent grade to ensure that precipitation does not pond on top of the site (Fig. 3-7 Filtered Tailings Disposal Site Reclamation Plan).

### 3.10.2 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, Volume II, Appendix D). Precipitation will 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 will 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, Volume II, Appendix D). The tailings will 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. 3-7.)

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 2-2. While some of the results exceed the strictest potential water quality standards, the potential for generating

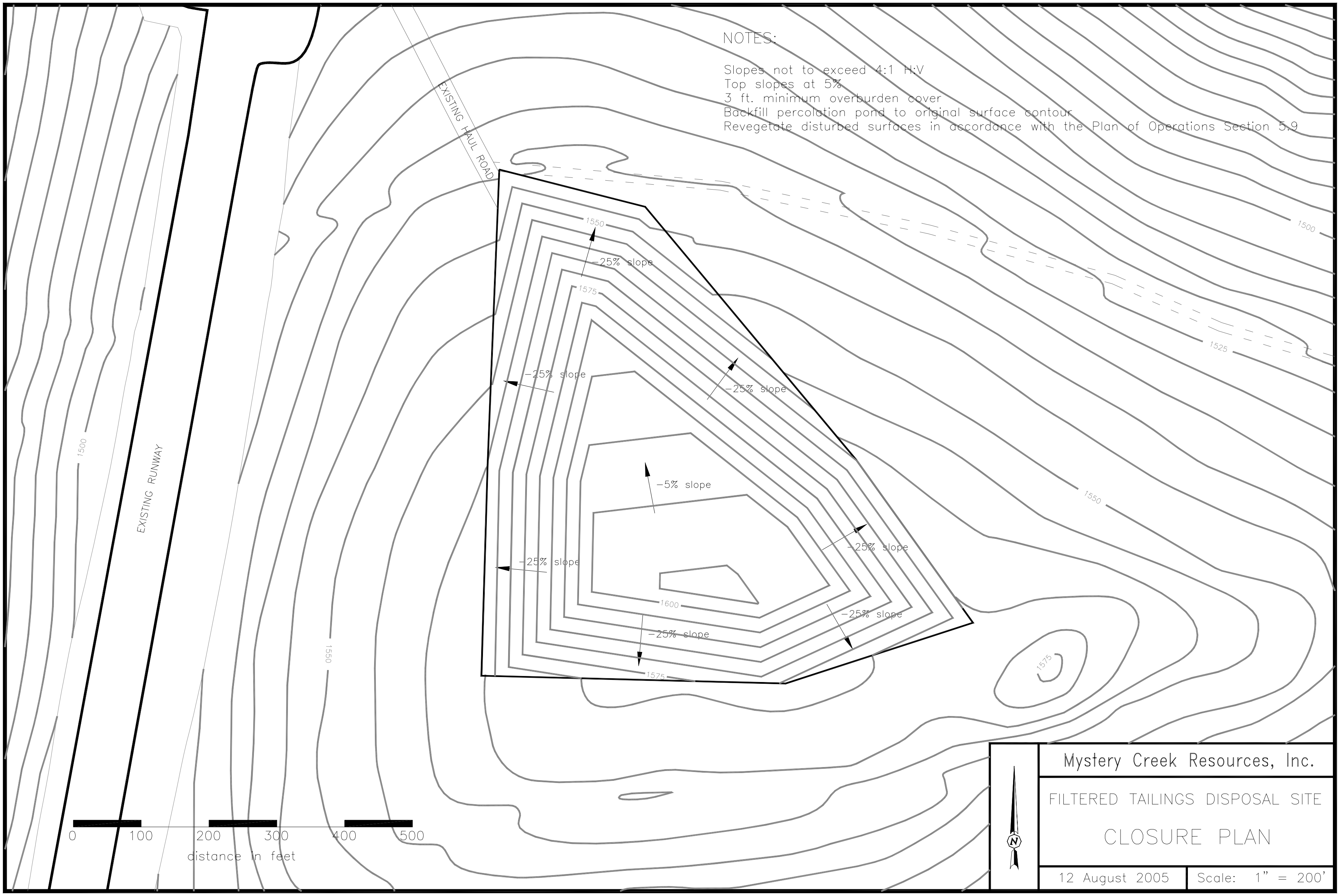



**Figure 3-7: FILTERED TAILINGS DISPOSAL SITE CLOSURE PLAN**

leachate is limited because the low permeability of the placed tailings, estimated at $10^{-6}$ cm/sec, will 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 3-3). Also see Golder letter dated October 15, 2004 in Volume II Appendix C.

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

### 3.10.3 Milled Ore Tailings

The tailings pond will be emptied of tailings as explained in the above, inspected and repaired as necessary. This process will 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 will be sent to the pond. Tailings will 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 will form a pond covering the tailings. Water will 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 planned 995 feet to 1008 feet will require additional fill at the toe of the dam. The disturbed area will increase 11.6 acres for a total of 21.8 acres. See Fig. 3-8. Modifications to the dam will require plan approval and permits from ADNR's Dam Safety Section and ADEC before construction.

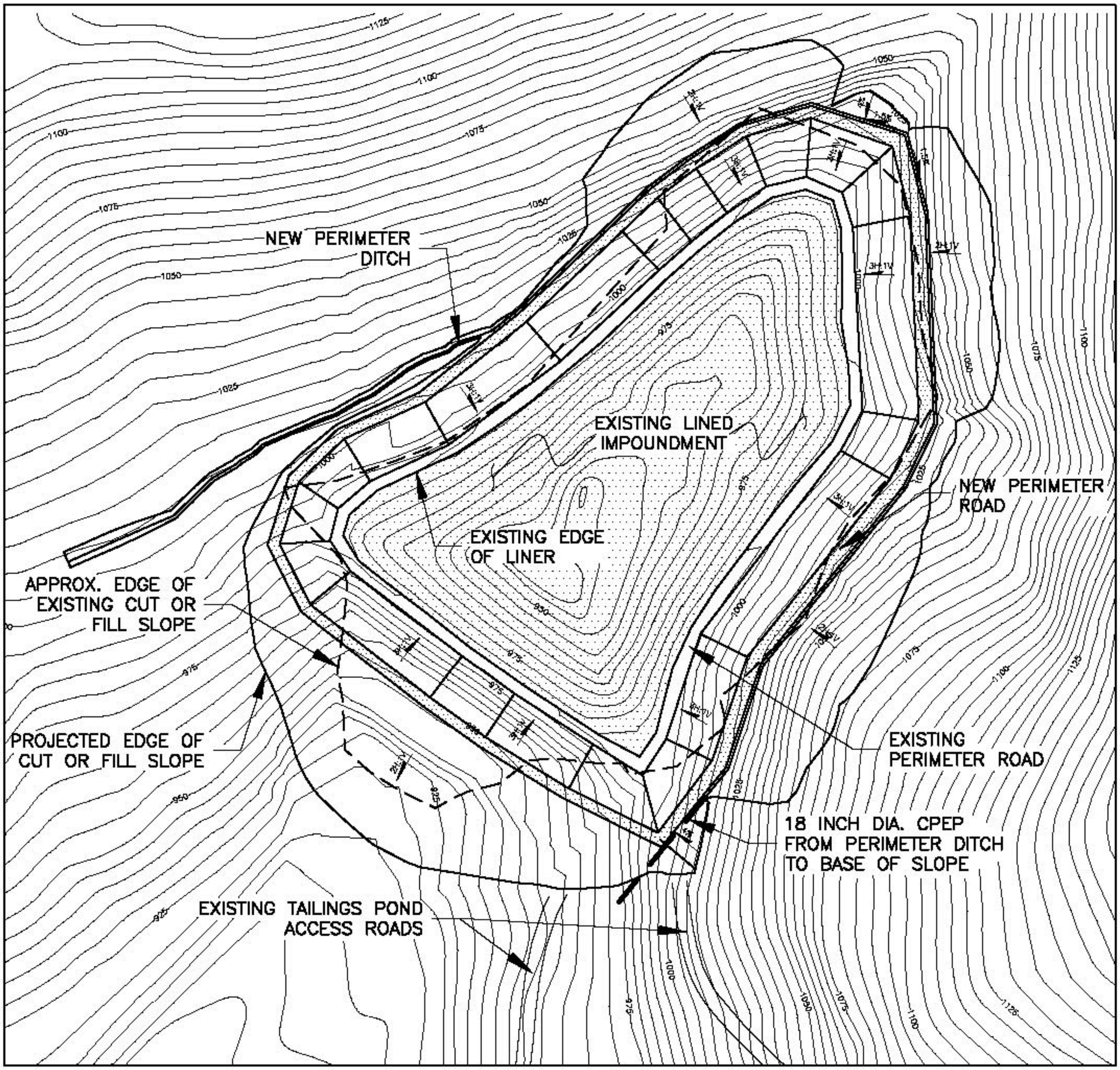
## 3.11 Water Supply

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 will be lowered to 0.010. See Table 3-4 Surface Water Chemistry Summary 2004.

Water for milling processes will be supplied from the tailings pond water. Water used underground will be supplied from underground sumps. Water for domestic purposes will 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 contents meets the current standard but will exceed the 2006 standard of 0.010 mg/L. See Table 3-5 Ground Water Chemistry Summary 2004.

The water from the infiltration gallery will be pumped from Mystery Creek through a buried, insulated, 3-in high density polyethylene (HDPE) pipe to a 20,000-gal insulated, heated




200 0 200

1 INCH = 200 FEET FEET

## 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_1.DWG |
| DESIGN | | | SCALE AS SHOWN | REV. 1 |
| CADD | SLA | 03/14/04 | **Figure 3-8** | |
| CHECK | | | | |
| REVIEW | | | | |

storage tank located just east of the Crystal Portal and the camp. From the storage tank water will 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 will be some 10,000 gpd (50 person x 200 gpd) much of which will go to the septic system. See Section 3.13 for water balance.

Table 3-4 details the surface water quality data for both Mystery and Ruby creeks. Table 3-5 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 Volume II Appendix E and F.

## 3.12 Wastewater Disposal

Four types of wastewater will 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 3.13 for water balance.3.12.1 Mine Water

### 3.12.1 Mine Water

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

### 3.12.2 Mill Process Water

All process water leaving the mill will 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 will 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 will be recycled to the mill.

To maintain operational efficiencies in the operation of the tailings pond, it will be necessary to make a Land Application of water stored within the tailings pond beginning in June, 2006. This application will 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 will occur in May or June of 2006-2008 and the fall of 2009 and 2010. See Section 3.13 (Water Balance) for details.

# Table 3.4
# Surface Water Chemistry Summary
# Nixon Fork Mine

| Sample Location | | Potential Water Quality Standard | | Mystery Creek | | | | | | Ruby Creek | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date | | | | Dissolved | | | Total Recoverable | | | Dissolved | | | Total Recoverable | | |
| | Units | | | 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 |

Note:
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.
Source: Golder

# Table 3.4 (con't)
# Surface Water Chemistry Summary
# Nixon Fork Mine

| Sample Location / Sample Date | Units | | Potential Water Quality Standard | Mystery Creek Dissolved Min | Mystery Creek Dissolved Max | Mystery Creek Dissolved Average(1) | Mystery Creek Total Recoverable Min | Mystery Creek Total Recoverable Max | Mystery Creek Total Recoverable Average(1) | Ruby Creek Dissolved Min | Ruby Creek Dissolved Max | Ruby Creek Dissolved Average(1) | Ruby Creek Total Recoverable Min | Ruby Creek Total Recoverable Max | Ruby Creek Total Recoverable 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:
Arithmetic average calculated using half the reported Method Detection Limit.
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.
Source: Golder Associates

# Table 3.5
# Groundwater Water Chemistry Summary
# Crystal Mine Pump Test
# Nixon Fork Mine

| Analyte | Units | Potential Water Quality Standard | | Groundwater - Crystal Mine Pump Test | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Dissolved | | | | Total Recoverable | | | |
| | | | | 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 3.5**
**Groundwater Water Chemistry Summary**
**Crystal Mine Pump Test**
**Nixon Fork Mine**

| Analyte | Units | Potential Water Quality Standard | | Groundwater - Crystal Mine Pump Test | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Dissolved | | | | Total Recoverable | | | |
| | | | | 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 using half the reported Method Detection Limit.
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.
Source: Golder Associates. See Appendix

### 3.12.3 Shop and Laboratory Wastewater

Shop wastewater will result from washing and servicing mobile equipment. It will 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 will be collected and burned in the incinerator.

The analytical and metallurgical laboratory processes will use sodium floride, and hydrochloric, sulfuric, and nitric acid. Less than twenty five gallons of each will be used annually. Disposal into a lined zero discharge tailings pond would be appropriate according to ADEC. (Boles, pers communication, May 2004.) ADEC will 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 will be characterized for Resource Conservation and Recovery Act (RCRA) purposes prior to disposal. Depending on the results of the characterization, the resulting wastewater will be combined with the mill process wastewater and tailings for disposal in the tailings impoundment, or otherwise disposal of as required by regulation.

### 3.12.4 Domestic Sewage

Domestic sewage from the camp and mill site will 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 will use honey buckets or chemical toilets that will be trucked to the surface and processed through the mill site septic system.

## 3.13 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 will 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 will 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 will 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 will 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 will begin in December 2005 and continue through December 2010. In this scenario, the milling of the existing tailings will 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 (Figure 3-9 through 3-16 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 Volume 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 3.12.2 above, a land application of water from the tailings pond will 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 will 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 will 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 3-10, 3-12, 3-14-16 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 will 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 |

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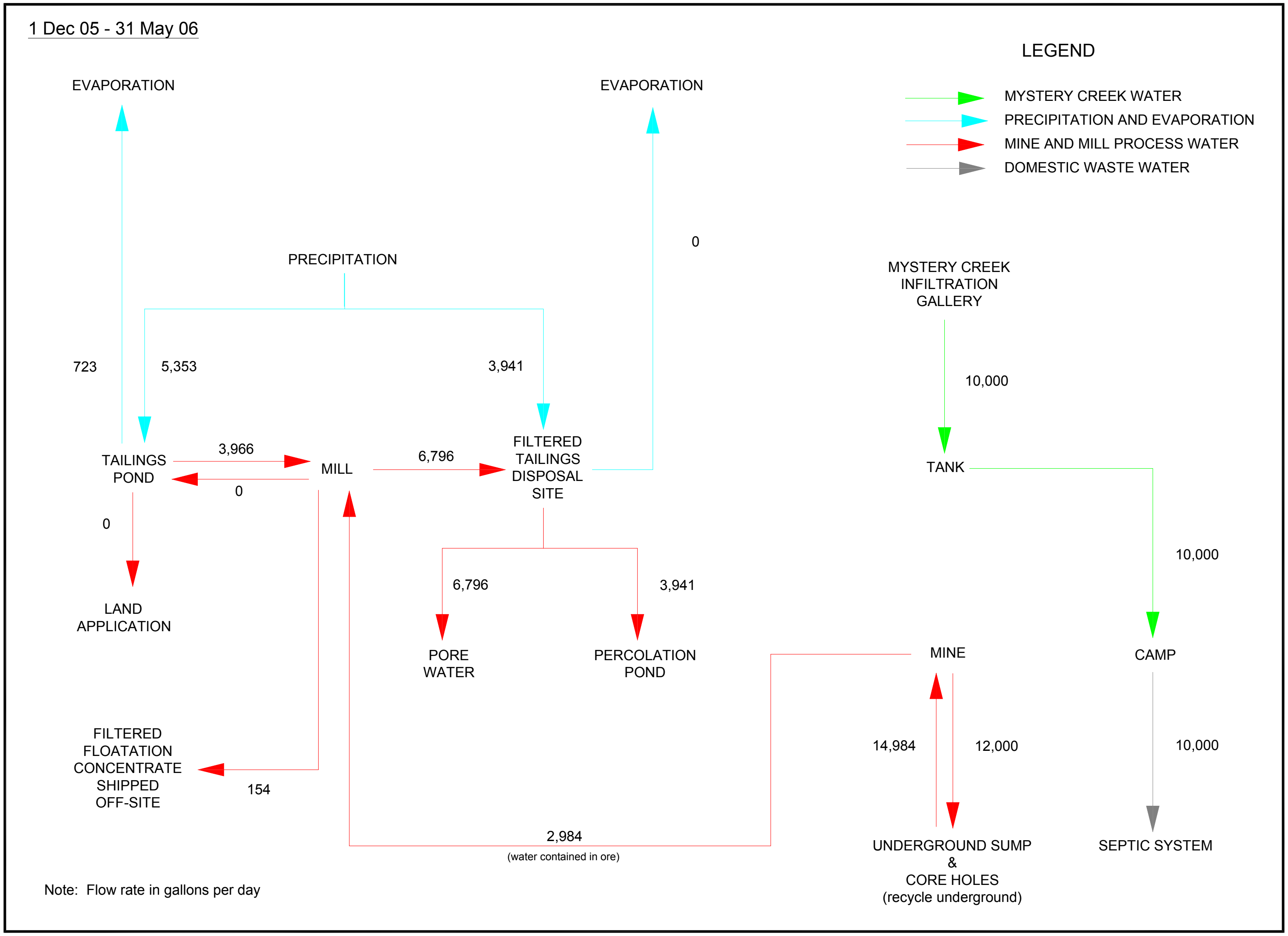


**Figure 3-9: Water Balance: Mined Ore With Filtered Tailings Disposal Dec. 2005 – May 2006**

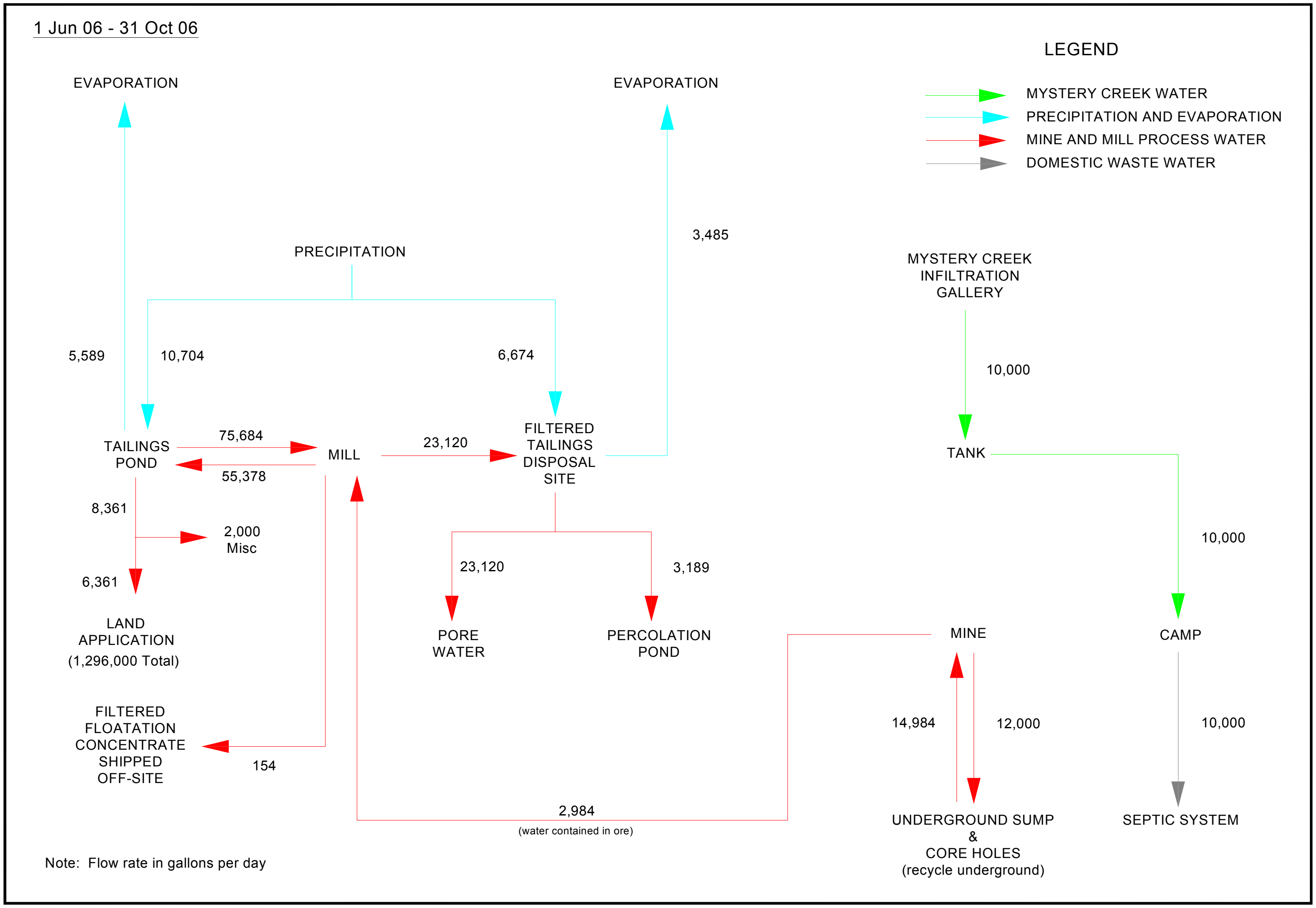


**Figure 3-10: Water Balance: Mined Ore and Tailings Processing With Filtered Tailings Disposal June 2006 – Oct. 2006**

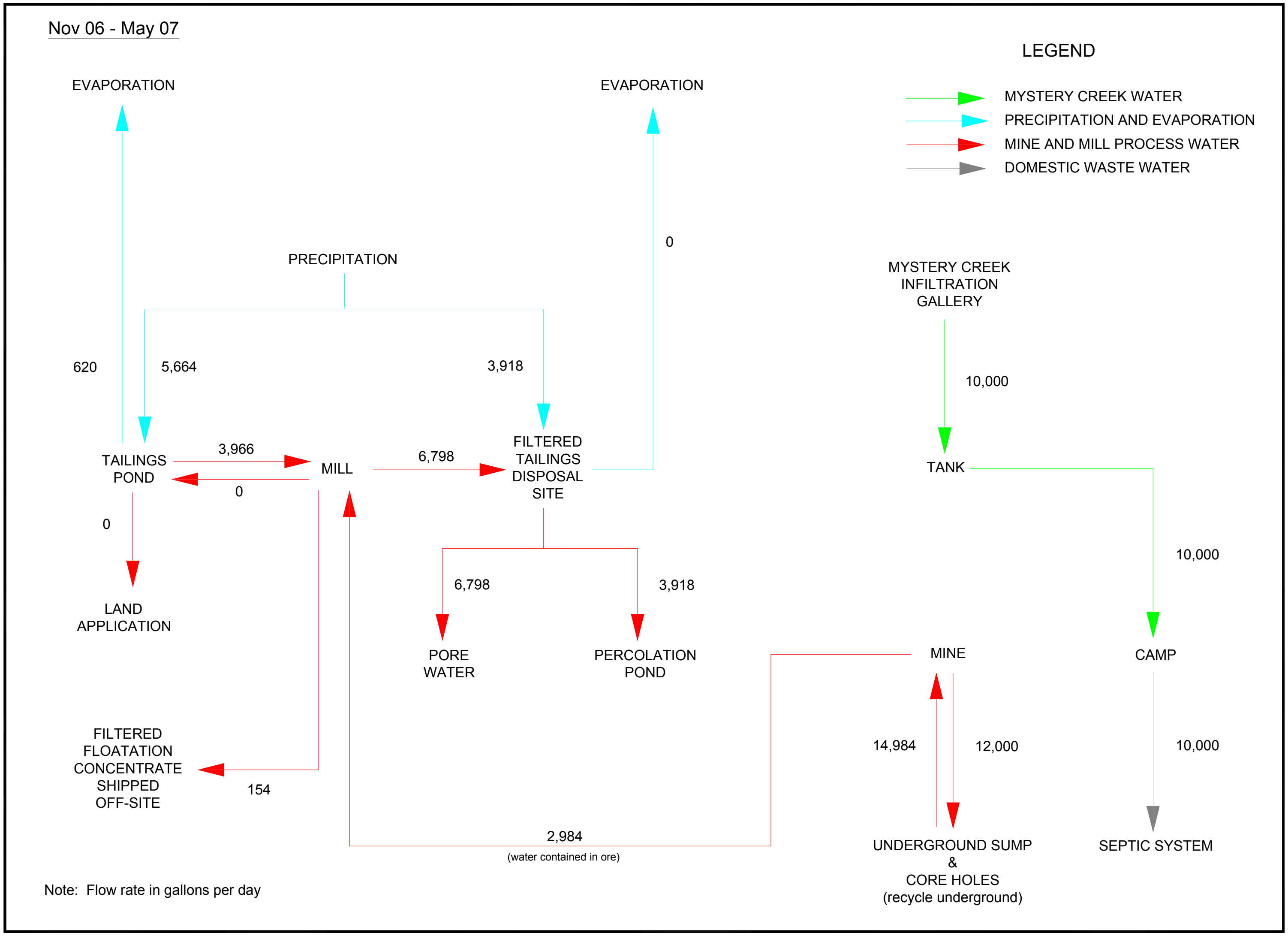


**Figure 3-11: Water Balance: Mined Ore With Filtered Tailings Disposal**
**Nov. 2006 – May 15, 2007**

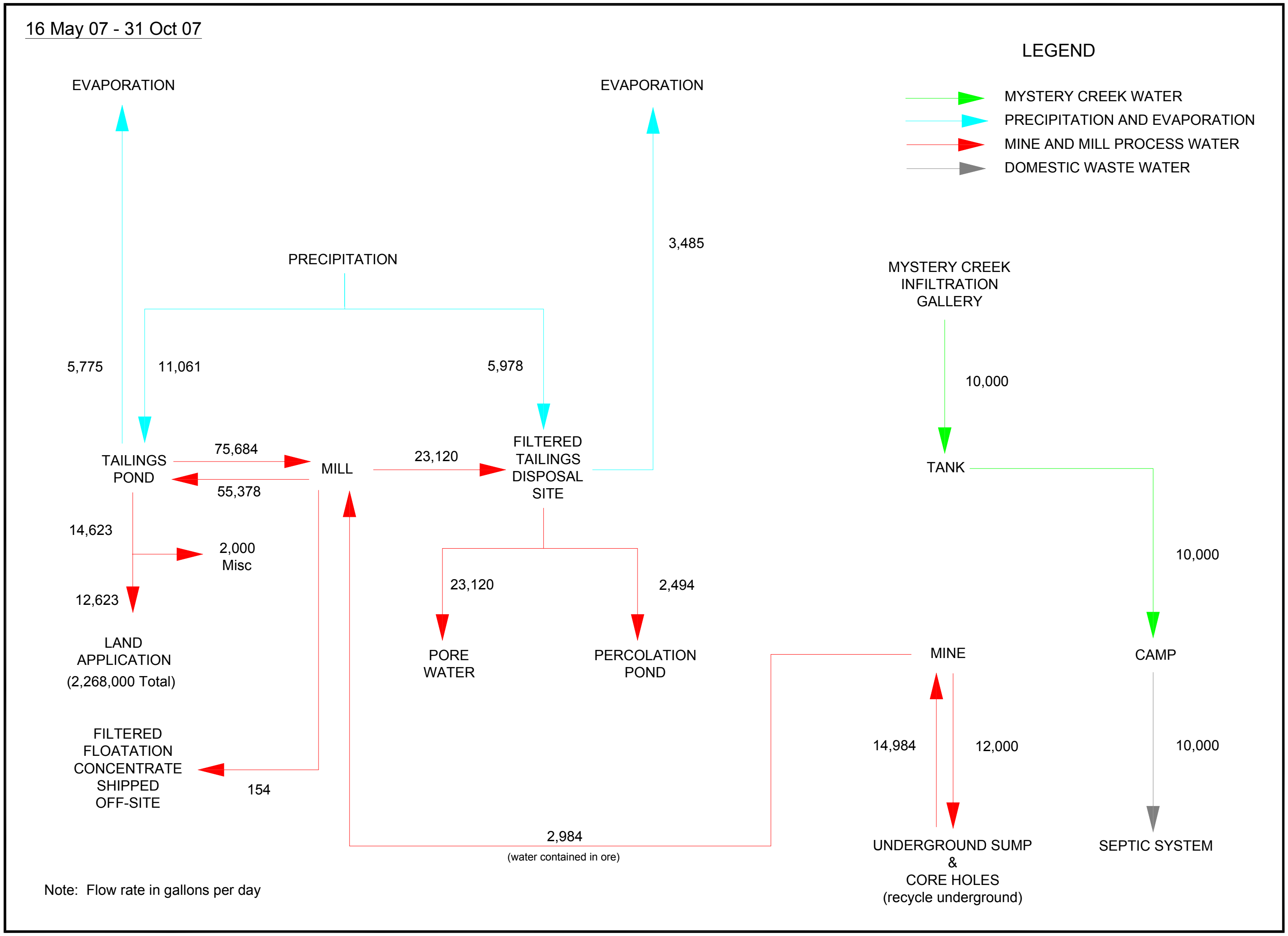


**Figure 3-12: Water Balance: Mined Ore and Reprocessed Tailings With Filtered Tailings Disposal May 16, 2007 – Oct. 2007**

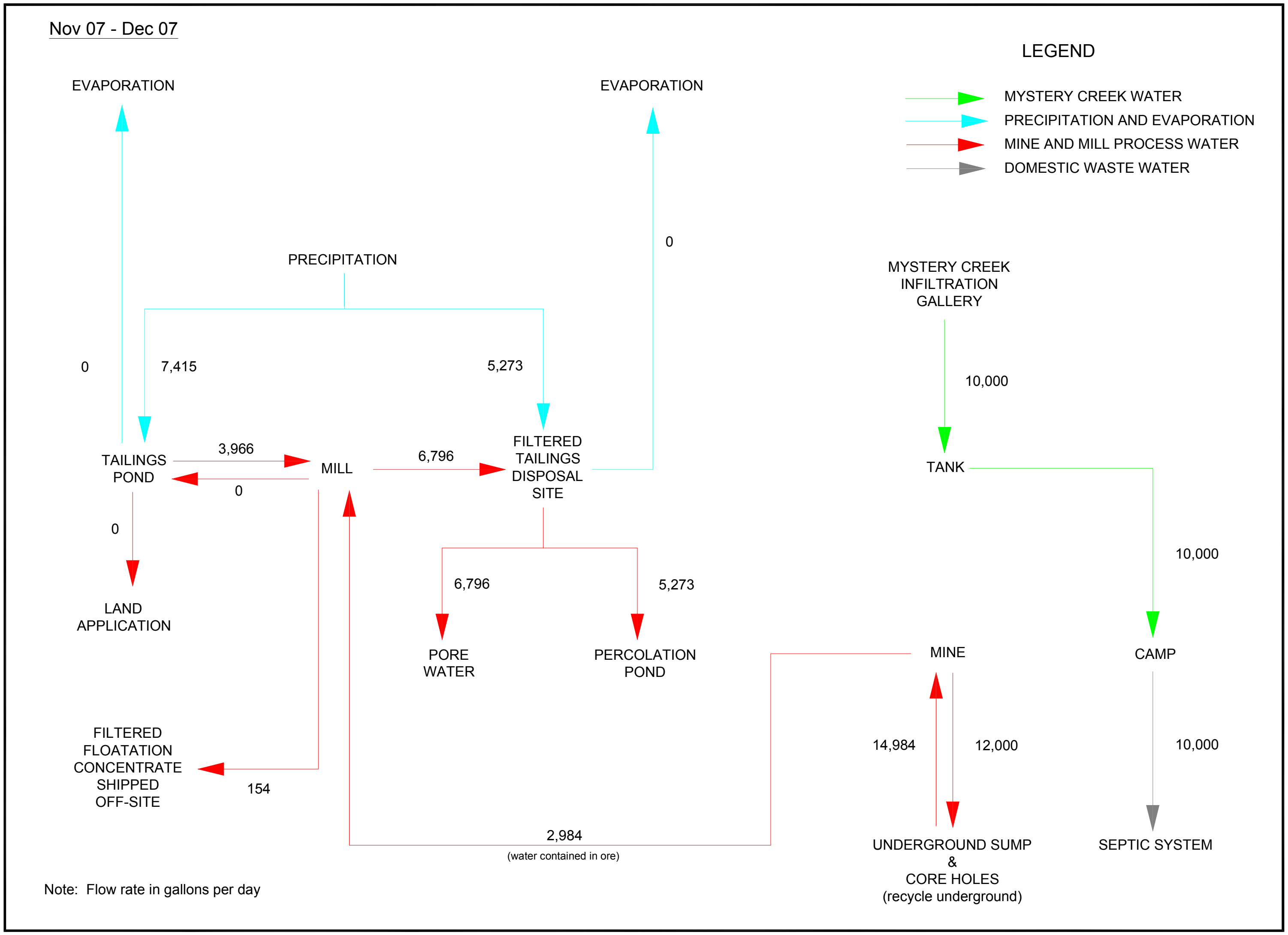


**Figure 3-13: Water Balance: Mined Ore With Filtered Tailings Disposal**
**Nov. 2007 – Dec. 2007**

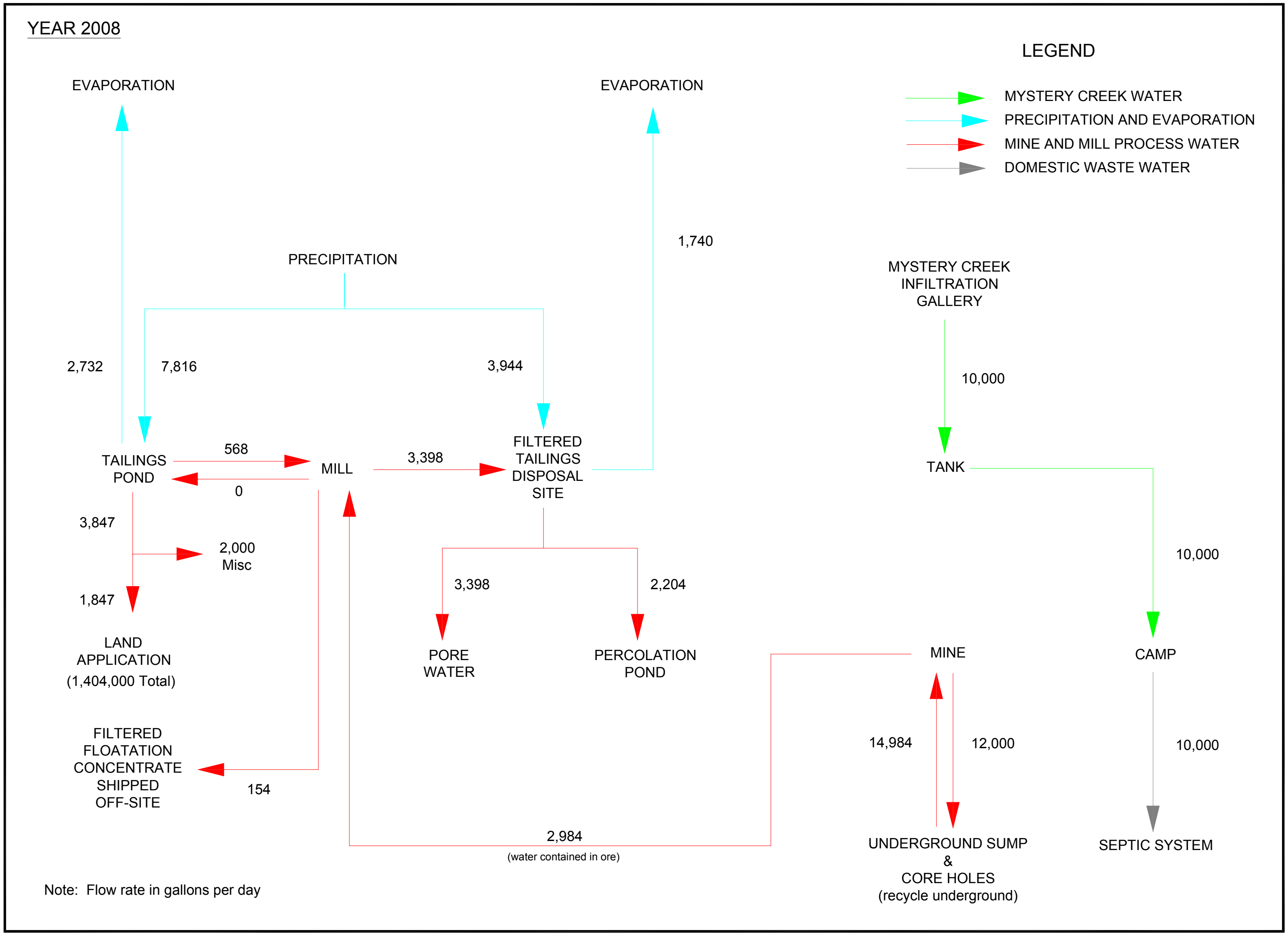


**Figure 3-14: Water Balance: Mined Ore With Filtered Tailings Disposal 2008**

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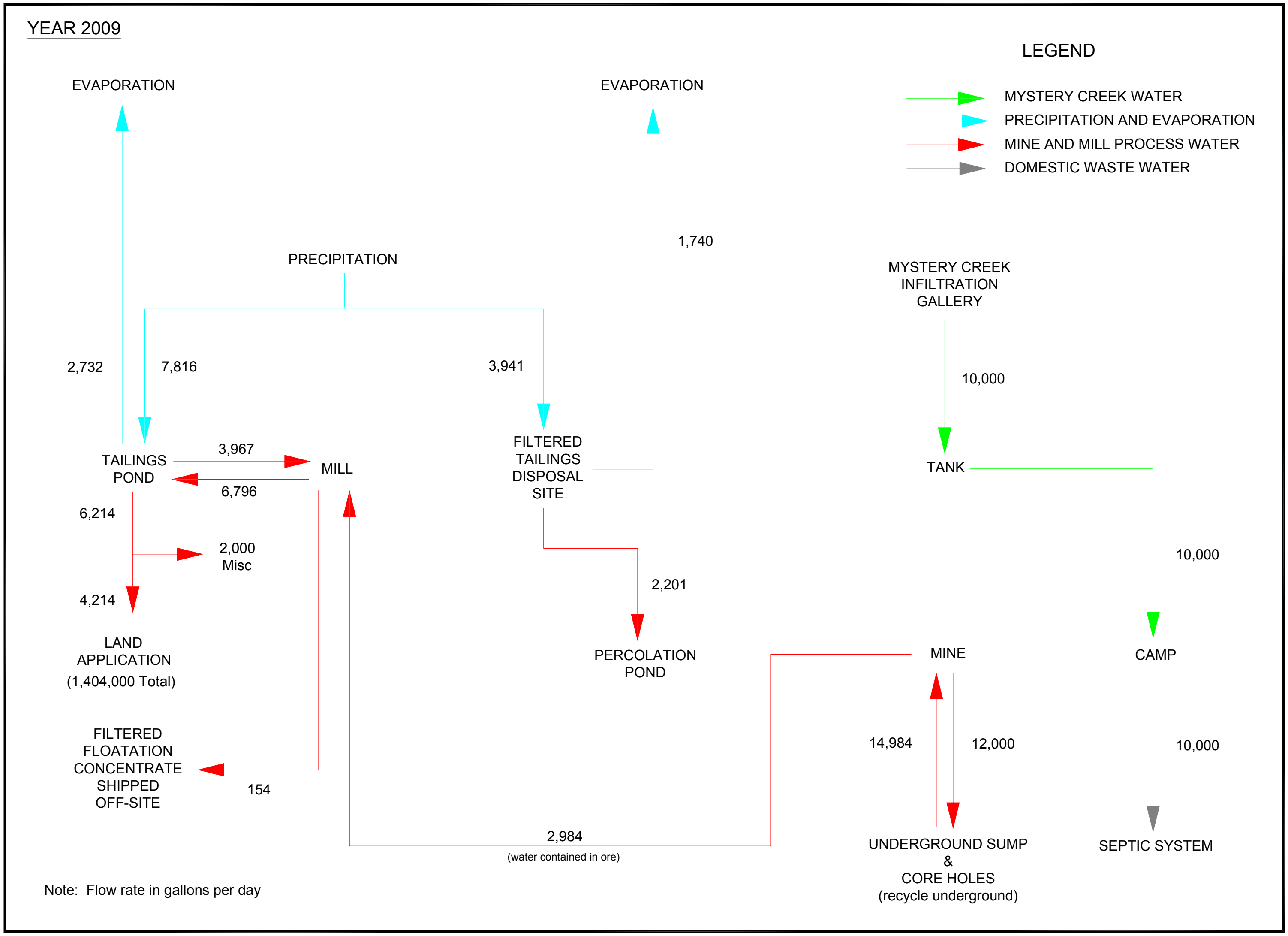



**Figure 3-15: Water Balance: Mined Ore With Tailings Pond Disposal 2009**

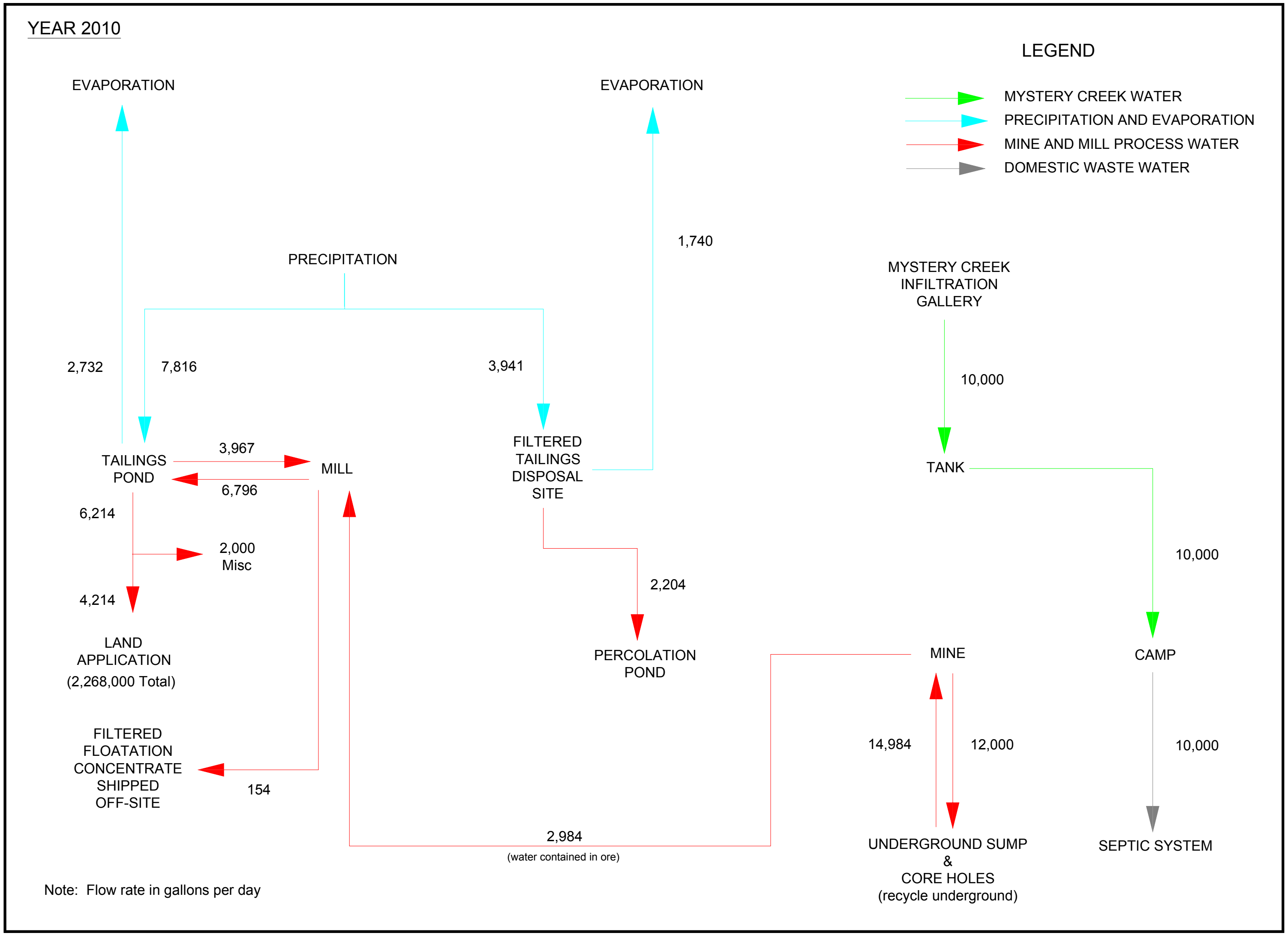



**Figure 3-16: Water Balance: Mined Ore With Tailings Pond Disposal 2010**

### 3.14 Power Supply

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

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 under 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.

The power plant will 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 will be connected to a common 1,000 gallon fuel day tank at the power plant site which, in turn, will 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 will 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 will be dissipated at the power plant site with fan cooled radiators. Power will 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.

### 3.15 Fuel Supply

Fuel will be flown into the site by DC-6 or similar aircraft with a freight tank of approximately 3,000 gallons. The fuel will 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 will 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 will 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 will 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 will provide additional reserve fuel for periods when weather prevents aircraft fuel delivery. The spill prevention plan will be updated prior to installation of this bladder. This will require repair of an existing containment dike from which the bladder was removed in the summer of 2003.

### 3.16 Borrow Source

The primary borrow source will 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 will be reopened and approximately 150,000-bank $yd^3$ of borrow or fill material will be used to raise the tailings dam if that structure is modified in the future. The area of the re-opened material site will be approximately 3.4 acres.

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

### 3.17 Explosives

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

### 3.18 Solid Waste Disposal

Non-tailings solid wastes, such as inorganic, non-burnable solid wastes, will 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 will be stored inside the dining hall building or in bear-proof containers prior to disposal. All combustible and spoilable wastes will be incinerated (daily, weather permitting) and reduced to ash residual before disposal in the solid waste site. The incinerator will 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) will be placed in the solid waste site.

### 3.19 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 will be used by MCRI.

#### 3.19.1 New Materials

All new materials containing oil and/or hazardous substance will be transported, stored, used, and disposed of by MCRI or its agents in strict compliance with federal and state regulations. MCRI has prepared and will maintain a Spill Preventions Control and Countermeasures Plan (SPCCP) (January 2004). All hazardous wastes generated on site, including solid wastes such as batteries, will 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 will 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., will be used to produce heat for the shop or burned as fuel in the solid waste incinerator. Approximately 3,000 gallons of used oil will be needed to heat the shop during the winter (six months). The facility will create approximately 2,300 gallons per year. Approximately 1,150 gallons (21 barrel equivalent) of used oil will be accumulated during the summer (six months) for winter heating. No more than 6 months accumulation of used oil will be on site at any one time. No more than two month's accumulation of used grease will be on site at any one time.

### 3.19.2 Hazardous Chemicals

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

### 3.19.3 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 will 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 will be managed in accordance with 40 CFR 260-279. MCRI will 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 will be properly disposed of off-site. Regulated solid waste will be removed from the site on a regular basis in accord with the hazardous materials handling plan.

### 3.19.4 Program Management

MCRI will 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 3.9.

## 3.20 Wildlife Protection

Employees transported to the mine site, or individuals otherwise on site, will not be permitted to have firearms, and will not be permitted to hunt, trap, or fish in the area surrounding the mine. Company firearms will be available only for defense of life and property (DLP). Hunting will not be permitted by anyone in the immediate vicinity of the project facilities for public safety reasons. Feeding of animals by workers will be strictly prohibited. Storage of all food items will be in bear-proof containers or facilities at all times. Employees will 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 will 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 will be recorded by date, species, number, and specific location on the site, and submitted to BLM annually. This will also include any animal destroyed for DLP or incidentally destroyed by mine facilities/activities. A wildlife monitoring plan for the tailings pond will be developed. Wildlife mortalities associated with the tailings facility or FTDS will be reported to ADNR. Semiannual reports will 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.

### 3.21 Surface Disturbance

Table 3-6 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 will 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 will disturb approximately 3.4 acres of reclaimed land. Less than 12 acres of disturbance will 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, less than 116 acres will require reclamation at the end of mine life.

All disturbed areas are, or will be stabilized to prevent erosion and reclaimed. Reclamation for all areas to be disturbed, as shown in Table 3.6, will be bonded as approved by ADNR and BLM. BLM will administer the bond in cooperation with the State of Alaska.

### 3.22 Clearing and Stockpiling

Areas to be covered by development rock or fill material, whenever possible, will 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 will be put into windrows at the edge of the cleared areas. Topsoil and overburden then will be removed and stockpiled at an immediately adjacent site for use during reclamation. Because revegetation in the project area usually occurs naturally and relatively fast, stabilization of stockpiles likely will occur quickly. It is anticipated that approximately 88.2 acres will require clearing during the five-year permit period. Fifty acres of the new disturbance will occur with surface exploration that will be reclaimed the following year. At closure approximately 58.7 acres of the new disturbance will have been reclaimed.

Table 3-6

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.

### 3.23 Employment

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

### 3.24 Exploration

Exploration activities will consist of surface exploration drilling, trenching, soil sampling, and underground definition drilling. Annually, MCRI will 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 will 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 will be used insofar as possible. If new roads are needed for access to the drill sites, surplus overburden will be stockpiled along the road so it will be available for reclamation. Trails to drill sites, and the drill sites, where possible, will be constructed by clearing the trees and leaving the vegetative mat and soil in place to minimize erosion.

All trenches, drill pads and trails will be reclaimed in the same year as created or in the following spring. Drill fluids will be contained in a metal tank. Drill polymers will be used that are environmentally safe. Diapers and/or drip pans will be used beneath the drill engine to catch any oil or fuel drips. At drill pads, bore holes will be plugged when drilling is complete, and all drilling equipment and supplies will be removed. All drill holes will 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 will 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 will 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) will be regraded to original ground, scarified as needed, and capped with the overburden stockpiled during construction. The entire area will be fertilized as recommended by ADNR's Plant Materials Center.

No surface disturbance will occur from underground exploratory drilling.

# Chapter 4

## ALTERNATIVES CONSIDERED

In March 1991, BLM prepared an EA that resulted in a finding of no significant impact (FONSI) for a Nixon Fork Mine development plan proposed by Central Alaska Gold Company. In 1995, BLM again prepared an EA that resulted in a FONSI for a Nixon Fork Mine development plan proposed by Nevada Goldfields, Inc. (NGI). BLM approved the development plan with stipulations. NGI constructed the facilities and operated under the BLM approved Plan of Operation and EA-FONSI until 1999 when activities were suspended due to bankruptcy of the company. MCRI proposes to continue the operation begun by NGI.

NGI processed Nixon Fork ore using a crushing, gravity separation, and flotation process. The resulting concentrate was shipped to a smelter outside Alaska. Tailings were deposited in a tailings pond, and the water recycled for use in the mill. MCRI considered using the same mill process as NGI, but determined that better recovery could be achieved with the addition of a cyanide leach circuit to the mill.

NGI and MCRI's exploration programs located ore bodies below the mine's natural water table. MCRI had the ground water tested and it was found to meet drinking water standards. "Pump" tests were also performed to determine if the mine's water table could be lowered sufficiently to permit the ore to be mined safely and economically. Based on an analysis of these tests it is currently not cost effective to pump the volume of water believed necessary to lower the water table for mining. MCRI continues to look for ways to mine the ore below the water table. MCRI also investigated ways to dispose of ground water if it were to be pumped to the surface. Injection wells were considered and two geotechnical test wells were drilled. These wells found permafrost extending all the way to bedrock prohibiting the use of shallow injection wells.

Processed tailings will be deposited in the FTDS, or, as with NGI, in the lined, zero discharge tailings pond. MCRI has considered dry stacking tailings in the top of the valley above the existing tailings pond, as well as mixing cement with the tailings and pumping the resulting paste into mined out workings above the water table. Dry stacking above the pond was eliminated because of increased surface disturbance, the relatively steep slope, small useable area, and the possible effect on the stability of the tailings pond dam. Pumping the cemented tailings underground was eliminated based on the cost of installing and operating the equipment and piping.

Because of the milling process used by NGI, precious metals remain in the tailings currently in the tailings impoundment. MCRI is proposing to reprocess the old NGI tailings to recover the remaining gold. Reprocessing these tailings will necessitate disposing of reprocessed tailings in a different location. Three locations other than the proposed site were considered:

- The existing rock quarry – quarry rock will be needed to raise the tailings dam, the site is too small, and is a long haul from the mill site.
- Above the tailings pond – increased surface disturbance, the relatively steep slope, small usable area, and the possible effect on the stability of the tailings pond dam.

- Northern end of the old airstrip – already disturbed ground, close to the mill, but too small.

Supplies and fuel will be flown in and concentrates and dore’ flown out. It was briefly considered to barge freight in and out of Medfra and use the Medfra Road right-of-way for overland access to the mine. Winter only use of the Medfra Road was also considered. For winter or year-round use it will be necessary to construct infrastructure at the Medfra end of the road including a barge docking facility, fuel depot, storage yard, and cold weather emergency facilities. The infrastructure plus construction of an all weather road is not considered economically feasible at this time.

# Chapter 5

# Reclamation Plan and Cost Estimate

Responsibility for reclamation at Nixon Fork is somewhat complicated due to: 1) the long history of mining on the property; 2) whether certain disturbance occurred before or after 1981 when BLM received authority to enforce reclamation; and 3) the nature of current activities which include concurrent exploration, mine development, and reclamation programs.

The Nixon Fork Mine area has been explored and mined sporadically since the early 1900s. Because of this there are several sites disturbed prior to 1981 that are not a part of the proposed project and are not the responsibility of MCRI. MCRI has used some of these old sites during exploration activities and is committed to the reclamation of any disturbance which has been caused by their activity at the Nixon Fork Mine site."

MCRI retained the services of J. M. Beck & Associates to prepare the reclamation plan for the Nixon Fork Mine site. J. M. Beck & Associates is an independent mining and environmental engineering consultant.

The Reclamation Plan and Cost Estimate is based on this Plan of Operations and has been developed to identify and assess all closure, reclamation, and post-closure requirements, and to identify and determine the associated closure, reclamation, and post-closure costs for bonding purposes.

The Reclamation Plan and Cost Estimate has been developed under the assumption that BLM and/or the Alaska Department of Natural Resources, as the administering agency, would contract with an independent contractor to supply all manpower, equipment, and materials necessary to perform all aspects of site closure, reclamation, and post-closure activities. Therefore, the plan analysis incorporates verifiable price quotes from vendors located in the Anchorage area that are representative of what would be required to mobilize and transport all equipment, men, and materials to the site for full execution of plan requirements, followed by demobilization and return transport to Anchorage. In addition, the plan analysis incorporates a provision for a 30-year post-closure monitoring period.

The evaluation of closure and reclamation requirements at the Nixon Fork Mine suggests that the estimated total closure and reclamation costs (exclusive of post-closure monitoring and maintenance) are $2,412,000. See Table 5-1 and 5-2. When taking expenditure scheduling and post-closure monitoring costs into consideration, the resulting net present value (in mid-2005 dollars) of the estimated overall closure, reclamation, and post-closure expenditures is $1,991,000. A complete discussion of reclamation activities and cost is contained in the document, *Reclamation Plan and Cost Estimate, Nixon Fork Mine Project, McGrath Alaska* dated September 2005 and it is incorporated by reference in this Plan of Operations. A copy of the reclamation plan is transmitted with the Plan of Operations.

J. M. Beck & Associates believes the Reclamation Plan and Cost Estimate to be representative of what would be required to close and reclaim the site, as described, in general accordance with those requirements put forth in 43 CFR 3809.

Table 5-1

Closure and Reclamation Cost Summary

| Item | Amount ($) |
|---|---|
| Capital Equipment | 636,059 |
| Equipment Operation and Maintenance | 190,610 |
| Manpower | 639,495 |
| Manpower Support | 158,000 |
| Revegetation Requirements | 18,667 |
| Materials, Supplies and Other | 149,000 |
| | |
| **Subtotal Operating and Maintenance Cost** | **$1,791,831** |
| | |
| Engineering, Design, and Construction Plans (4% O&M) | 71,673 |
| Contingency ($% O&M) | 71,673 |
| Contractor Profit (10% O&M) | 179,183 |
| Liability Insurance (1.5% Manpower) | 9,592 |
| Payment and Performance Bond (3% O&M) | 53,755 |
| BLM Contract Administration (10% O&M) | 179,183 |
| ADNR Contract Administration (1% O&M) | 17,918 |
| BLM Indirect Costs (21% BLM Contract Administration) | 37,628 |
| | |
| **Subtotal Administration** | **$620,607** |
| | |
| **Total** | **$2,412,438** |
| | |
| This table was extracted from Table 2.7(a) – Closure and Reclamation Costs Summary – "Reclamation Plan and Cost Estimate – Nixon Fork Mine Project" – J.M. Beck & Associates, Lakewood CO. September 2005 | |

Table 5-2

Component Cost Breakdown

| Reclamation Component | Direct Costs ($) | Indirect Cost ($) | Total ($) |
|---|---|---|---|
| | | | |
| North Area | | | |
| Mystery Portal | 2,919 | 3,608 | 6,527 |
| Mystery Development Rock Dump | 13,615 | 16,827 | 30,442 |
| Infiltration Gallery and Pump House | 1,752 | 2,165 | 3,917 |
| Mystery Ventilation Raise | 14,845 | 18,347 | 33,192 |
| Utility Corridor | 1,751 | 2,164 | 3,915 |
| Central Operations Area | | | |
| Multi-use Complex (Camp Facility) | 16,045 | 19,830 | 35,875 |
| Miscellaneous Outbuildings (MU Complex) | 2,811 | 3,474 | 6,285 |
| Water Treatment Plant | 2,783 | 3,440 | 6,223 |
| Water Storage Plant | 2,783 | 3,440 | 6,223 |
| Office/Dry Complex | 18,560 | 22,939 | 41,499 |
| Maintenance Shop | 14,251 | 17,613 | 31,864 |
| Mill Complex | 147,716 | 182,566 | 330,282 |
| Leach Tank Building | 8,735 | 10,796 | 19,531 |
| Miscellaneous Outbuildings (Mill Complex) | 4,395 | 5,432 | 9,827 |
| Filter Building (Proposed) | 4,422 | 5,465 | 9,887 |
| Generator Set Enclosure (Power Plant) | 5,581 | 6,898 | 12,479 |
| Crystal Portal | 7,054 | 8,718 | 15,772 |
| Crystal Development Rock Dump | 35,180 | 43,480 | 78,660 |
| Crystal Ventilation Raise | 14,845 | 18,347 | 33,192 |
| Tailings Impoundment and Pipelines | 326,200 | 403,160 | 729,360 |
| Filtered Tailings Disposal Site | 20,919 | 25,854 | 46,773 |
| Meteorology Station | 1,491 | 1,843 | 3,334 |
| Explosives Magazines | 3,210 | 3,967 | 7,177 |
| Fuel Depot | 16,537 | 20,439 | 36,976 |
| South and Outlying Areas | | | |
| Hercules Airstrip Embankment Cut | 7,597 | 9,389 | 16,986 |
| DC-6 Crash Debris | 2,397 | 2,963 | 5,360 |
| Sand Borrow Pit | 2,630 | 3,250 | 85,880 |
| Tailings Dam Borrow Area (Proposed Expansion) | 3,044 | 3,762 | 6,806 |
| Solid Waste Landfill | 11,235 | 13,886 | 25,121 |
| Rock Quarry | 9,601 | 11,866 | 21,467 |
| Old Exploration Camp (South Camp Area) | 5,157 | 6,374 | 11,531 |
| Unbounded Areas | | | |
| Underground Workings | 35,830 | 44,283 | 80,113 |
| Site Roadways | 21,241 | 26,252 | 47,493 |
| Exploration Sites | 14,249 | 17,611 | 31,860 |
| | | | |
| **Total** | **801,381** | **990,450** | **1,791,831** |
| | | | |
| This table was extracted from Table 2.7(b): Component Cost Breakdown – "Reclamation Plan and Cost Estimate, Nixon Fork Mine Project", J>M> Beck and Associates, Lakewood CO, September 2005 | | | |

# Chapter 6

## RECLAMATION MONITORING

MCRI retained the services of Golder Associates to prepare a comprehensive monitoring plan for the Nixon Fork Mine site. Golder Associates is an international ground engineering and environmental services consultant.

MCRI, BLM, ADNR and ADEC will monitor the success of reclamation actions following the monitoring plan. Post-reclamation monitoring will begin as soon as reclamation activities occur.

Monitoring of concurrent reclamation associated with the ongoing exploration program and FTDS will occur annually by MCRI personnel and agency representatives during their annual field inspections.

Following final reclamation activities for major components, e.g., mill site, tailings impoundment, MCRI will schedule an annual visit contemporaneously with BLM, ADEC, and ADNR representatives to jointly examine the sites. This will be done in years 1, 3, 5, 10, 20, and 30.

The document, *Mystery Creek Resources Inc., Nixon Fork Mine Monitoring Plan* dated September 2005, prepared by Golder Associates is incorporated by reference in this Plan of Operations.

# Chapter 7

## APPLICANT ACCEPTANCE OF RESPONSIBILITY

Mystery Creek Resources, Inc. assumes all responsibility for completing the reclamation work described in the *Reclamation Plan and Cost Estimate*, for meeting the requirements of this plan, and for returning the site to a safe and stable condition consistent with approved post-mining land use. In the event a new operator assumes control of the Nixon Fork project, the new operator will agree to assume responsibility for the reclamation and maintenance of any affected land and structures that are the subject of this plan or existing permits.

# 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 tailing 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 head moving against a fixed head. Material is crushed between the movable and fixed head. The material is fed by gravity through the crusher. Crushers reduce rock from the size of a small vehicle to 2 inches. Shorthead cone crushers, or roll 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.

**Concentrates** – Material produced by the gravity or flotation process which contains gold, silver and other metals in free gold or sulfide forms. This is the normal product of the mill containing the economic product of the process.

**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.

**Dore´**—A metal alloy composed of gold and other precious metals. Typically the final product from a precious metals mine.

**Gram** – Metric unit of weight for precious metals (gold, silver, platinum) – one gram equals 0.032151 troy ounces.

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

# GLOSSARY, ABBREVIATIONS, AND ACRONYMS

## Glossary (con't)

**Hydrometallurgy** – Methods 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 gravity, flotation or leach 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.

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

**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.

**Tonne** – Metric unit of weight – one metric tonne equals 2204.6 pounds

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

**Weak Acid Dissociable** - analytical method to determine free cyanide, simple cyanides and weak-acid dissociable metallocyanides

**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 |
| ADFG | Alaska Department of Fish & Game |
| ADEC | Alaska Department of Environmental Conservation |
| ADNR | Alaska Department of Natural Resources |
| ANFO | ammonium nitrate/fuel oil |
| ATV | all terrain vehicle |
| BLM | Bureau of Land Management |
| $CaCl_2$ | calcium chloride |
| $CaCO_3$ | calcium carbonate |
| 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 |
| dBA | decibel A-weighted |
| EA | environmental assessment |
| EPA | U.S. Environmental Protection Agency |
| EMS$^{TM}$ | Engineered Membrane Separation |
| ft | feet/foot |
| g | grams (32.151 grams per troy ounce) |
| g/t | grams per tonne (1 troy ounce per ton equals 31.068 grams per/tonne) |
| gal | gallons |
| gpm | gallons per minute |
| HDPE | high density polyethylene |
| in | inch |
| KRM | Kateel River Meridian |
| kw | kilowatts |
| MCL | maximum contaminant levels |
| MCRI | Mystery Creek Resources, Inc. |
| MFP | management framework plan |
| $MgCl_2$ | magnesium chloride |
| mg/L | milligrams per liter |
| mi | mile |

# GLOSSARY, ABBREVIATIONS, AND ACRONYMS

## Abbreviations and Acronyms (con't)

| | |
|---|---|
| MSHA | Mining Safety and Health Administration |
| MWMP | Meteoric Water Modeling Procedure |
| NAAQS | National Ambient Air Quality Standards |
| NEPA | National Environmental Policy Act (1969) |
| NGI | Nevada Goldfields, Inc. |
| $NO_2$ | nitrogen dioxide |
| $O_3$ | ozone |
| oz | ounce (for gold use troy ounces – 12 troy ounces per pound) |
| PM | particulate matter |
| Pb | lead |
| 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 |
| stn | station |
| t | Tonne (metric ton – 2204.622 pounds) |
| TCLP | toxicity characteristic leaching procedure |
| tds | total dissolved solids |
| tpd | tonnes per day |
| tpy | tonnes per year |
| T&E | threatened and endangered |
| TSP | total suspended particulates |
| URA | unit resource analysis |
| USFWS | U.S. Fish and Wildlife Service |
| VRM | visual resource management program, |
| VLDPE | very low-density polyethylene |
| WAD | weak acid dissociable |
| $yd^3$ | cubic yard |

# LITERATURE CITED

Alaska Department of Natural Resources (ADNR). 1988. Kuskokwim Area plan for State lands. Anchorage.

Bureau of Land Management (BLM). 1995. Nixon Fork Mine Environmental Assessment. Anchorage, AK.

Denver Mineral Engineers, Inc. 1995. Constituent bulk sample metallurgical test work. Nixon Fork Project, McGrath, Alaska. Denver.

Golder Associates, Inc. 1990. Nixon Fork hydrology, Summer 1990. 109 pp.

________ 2004. Water Chemistry Results Summary. January 27, 2004. 15 pp.

________2004. Periodic Safety Inspection of Nixon Fork Tailings Dam (draft). March 2, 2004. 20 pp.

Hazen Research, Inc. 1993, Nixon Fork Metallurgical Testing. Golden, CO.

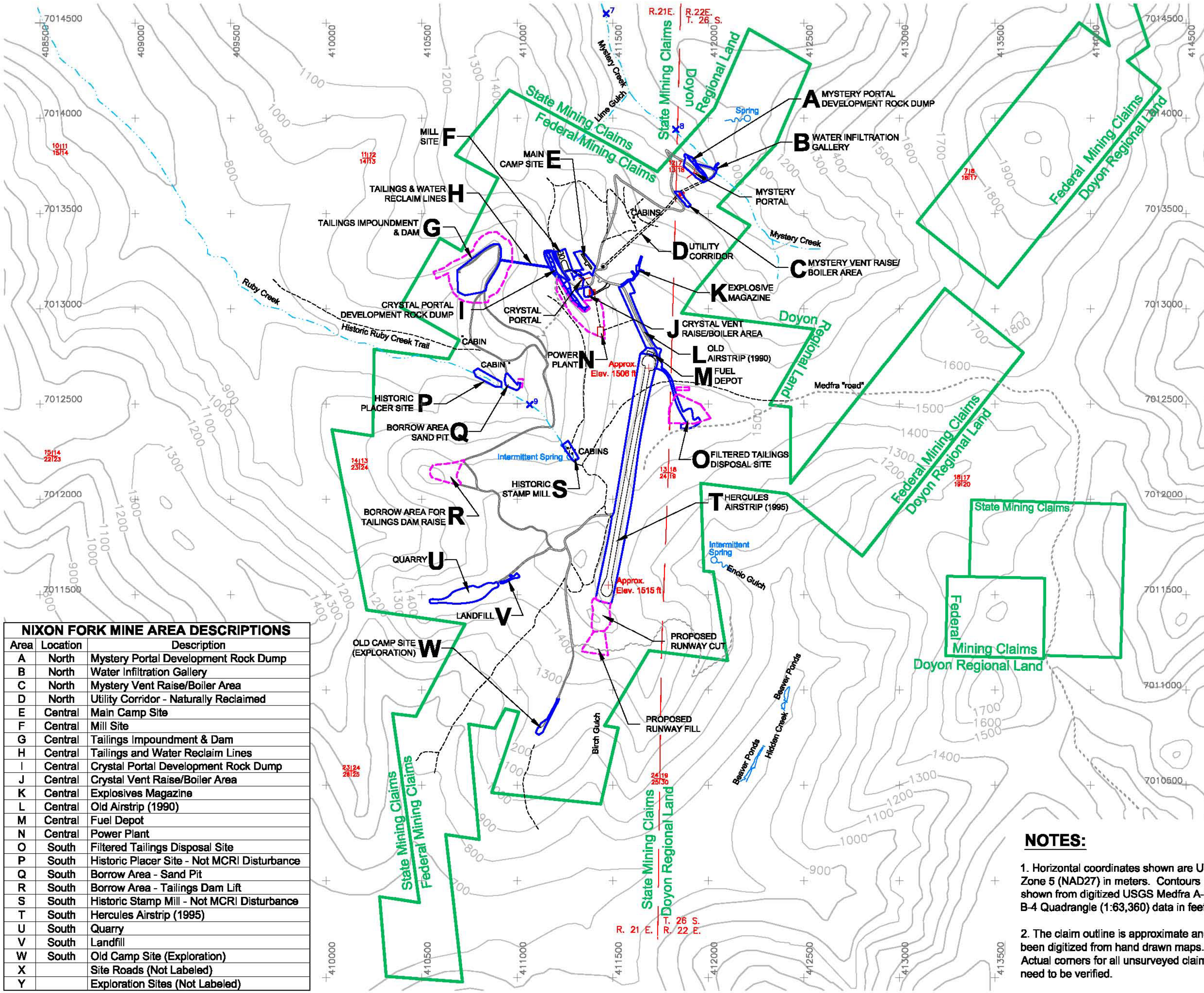
Nevada Goldfields, Inc. (NGI) 1995. Nixon Fork Mine Plan of Operations and Reclamation Plan. Denver, CO.

Rieger, S., D. B. Schoephorster, and C. E. Furbush. 1979. Exploratory soil survey of Alaska. U.S.D.A. Soil Conservation Service. 213 pp.

Selkregg, L. L. [Ed.]. 1975. Alaska regional profiles. Southwest region. University of Alaska, Arctic Environmental Information and Data Center. 313 pp.

SGS Environmental, Inc. 2004. Certificate of Analysis, Final Report. CA3300-Feb04. 2 pp.

U.S. Department of Commerce. 2002. Climatological Data Annual Summary Alaska. vol. 88, no. 13.




## NIXON FORK MINE AREA DESCRIPTIONS

| Area | Location | Description |
|---|---|---|
| A | North | Mystery Portal Development Rock Dump |
| B | North | Water Infiltration Gallery |
| C | North | Mystery Vent Raise/Boiler Area |
| D | North | Utility Corridor - Naturally Reclaimed |
| E | Central | Main Camp Site |
| F | Central | Mill Site |
| G | Central | Tailings Impoundment & Dam |
| H | Central | Tailings and Water Reclaim Lines |
| I | Central | Crystal Portal Development Rock Dump |
| J | Central | Crystal Vent Raise/Boiler Area |
| K | Central | Explosives Magazine |
| L | Central | Old Airstrip (1990) |
| M | Central | Fuel Depot |
| N | Central | Power Plant |
| O | South | Filtered Tailings Disposal Site |
| P | South | Historic Placer Site - Not MCRI Disturbance |
| Q | South | Borrow Area - Sand Pit |
| R | South | Borrow Area - Tailings Dam Lift |
| S | South | Historic Stamp Mill - Not MCRI Disturbance |
| T | South | Hercules Airstrip (1995) |
| U | South | Quarry |
| V | South | Landfill |
| W | South | Old Camp Site (Exploration) |
| X | | Site Roads (Not Labeled) |
| Y | | Exploration Sites (Not Labeled) |

## LEGEND:

- Former Stream Gauge (approx. location and number from 1990 Project)
- Spring and Flow Direction (approx. location)
- Active Mine Portal
- Active Ventilation Shaft
- Historic Cabin/Building
- Existing Disturbance
- Proposed Disturbance
- Federal or State Claims (unsurveyed)
- Existing Road
- Existing Road or Track
- Existing Trail

## NOTES:

1. Horizontal coordinates shown are UTM Zone 5 (NAD27) in meters. Contours shown from digitized USGS Medfra A-4 and B-4 Quadrangle (1:63,360) data in feet.

2. The claim outline is approximate and has been digitized from hand drawn maps. Actual corners for all unsurveyed claims need to be verified.

400 0 400
SCALE METERS

Mystery Creek Resources, Inc.
Nixon Fork Mine

**EXISTING AND PROPOSED AREA IMPROVEMENTS**

Scale: As Shown | Figure 1-4

Figure1-4_GAI.dwg 8/29/2005 10:22 AM