United States
Environmental Protection
Agency

Region 10
1200 Sixth Avenue
Seattle WA 98101

Alaska
Idaho
Oregon
Washington

EPA

June 8, 1995

Reply to
Attn of: HW-114

Dan Baskenfield, Environmental Engineer
Tricon Mining, Inc.
P.O. Box 83730
Fairbanks, Alaska 99708

Dear Mr. Baskenfield:

The U.S. Environmental Protection Agency (EPA), through its contractor, Roy F. Weston, Inc., has completed the site investigation (SI) of the Tricon Mining site. A copy of the report is enclosed.

Based on this SI and other pertinent information, EPA does not anticipate further investigation under the Federal Superfund Program. However, EPA strongly recommends that you continue to work closely with state authorities in addressing the environmental concerns associated with this site.

If you have any questions, I can be reached at (206) 553-0323.

Sincerely,

Monica Rolluda

Monica Rolluda
Site Assessment Manager
Superfund Response and Investigations Branch

Enclosure

cc: Rich Cormack, ADEC-Juneau
Ron McCallister, ADEC-Fairbanks (w/o Enclosure)
Peter Nakamura, Div of Public Health-Juneau (Encl w/o appendices)

Site Inspection Report
Tricon Mining
Fairbanks, Alaska

EPA REGION X

Contract No. 68-W9-0046
Work Assignment No. 46-23-0JZZ
Work Order No. 4000-019-006-4100
Document Control No. 4000-019-006-AAAS

June 1995

WESTON
MANAGERS DESIGNERS/CONSULTANTS

SITE INSPECTION REPORT
TRICON MINING
Fairbanks, Alaska
EPA Site Identification Number AKD983067513

Site Name/Address:
Tricon Mining, Inc.
St. Patrick's Road
Fairbanks, Alaska 99708

Site Inspection Participants:
Kata Ritenburg, Site Assessment Manager and Report Author, WESTON, (206) 521-7600
John Livingstone, Field Investigator, WESTON, (206) 521-7600
Joanne Snarski, Field Investigator, WESTON, (206) 521-7600
Karen Stash, Site Manager, WESTON, (206) 521-7600

Principal Site Contacts/Owners:
Edward Armstrong, Vice President
Tricon Mining
P.O. Box 83730
Fairbanks, AK 99708
(907) 479-4366

Al Homenuke, Representative
Silverado Mines, Inc.
Oceanic Plaza
1066 W. Hastings St., Suite 2580
Vancouver, B.C. V6E3X2
(604) 689-1535

Department of Health Contact:
Dr. Peter Nakamura, Director of Division of Public Health
P.O. Box 110610
Juneau, Alaska 99811
(907) 465-3090

State Contact:
Ron McCallister,
Alaska Department of Environmental Conservation
Fairbanks, AK 99708
(907)-451-2142

Dates of Investigation:
Site Reconnaissance: 16 May 1994
Sampling: 19 to 21 July 1994

ARCS QUALITY ASSURANCE CONCURRENCE

SITE INSPECTION REPORT
TRICON MINING
Fairbanks, Alaska

Project Name:	Site Inspection Report
Contract Number:	68-W9-0046
Work Assignment Number:	46-23-0JZZ
Responsible Organization:	Roy F. Weston, Inc. 700 Fifth Avenue, Suite 5700 Seattle, Washington 98104

Concurrences:

Name: Karen M. Stash
Title: Site Manager, Roy F. Weston, Inc.
Signature: _____ Date: 21 Apr 95

Name: Dan Handschin
Title: Deputy QA Manager, Roy F. Weston, Inc.
Signature: _____ Date: 21 APR '95

Name: Frank C. Monahan, PE
Title: ARCS Program Manager, Roy F. Weston, Inc.
Signature: _____ Date: 4/24/95

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Fairbanks, Alaska

Prepared for

U.S. Environmental Protection Agency
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Seattle, Washington 98101

Contract No. 68-W9-0046
Work Assignment No. 46-23-0JZZ
Work Order No. 4000-019-006-4100
Document Control No. 4000-019-006-AAAS

June 1995

Prepared by

Roy F. Weston, Inc.
700 Fifth Avenue
Suite 5700
Seattle, WA 98104-5057

ABSTRACT

A sampling site inspection (SI) of the Tricon Mine, located in Fairbanks, Alaska, was conducted. Tricon Mine, presently inactive, was an operating gold mine for a total of 18 months between 1986 and 1989. Tricon Mining, Inc., used a cyanidization process to recover the gold and disposed of the tailings and cyanide wastewater into an on-site, engineered tailings pond. The tailings pond was constructed with a compacted silt lining and berms to hold processed mine tailings.

The objectives of this SI were to:

- Characterize the tailings pond, a potential source of contamination to the groundwater in the local aquifer.
- Determine if any contaminants have impacted nearby domestic wells.
- Evaluate the potential for contaminant migration to impact human health or the environment.

To achieve these objectives, samples were collected by Roy F. Weston, Inc. (WESTON®) from 19 July to 21 July 1994 to characterize potential contaminant sources. Soil samples from a primary and a secondary tailings pond were collected and analyzed to characterize potential contaminant sources. Groundwater samples from on-site monitoring wells were collected and analyzed to assess the potential for contaminant migration to groundwater. Groundwater samples from downgradient domestic wells were collected to assess the potential for contaminant migration. In addition, soil and groundwater samples were collected from selected locations and wells for the purpose of establishing background conditions.

SECTION 1

INTRODUCTION

Pursuant to United States Environmental Protection Agency (EPA) Contract No. 68-W9-0046, Roy F. Weston, Inc. (WESTON®) conducted a sampling Site Inspection (SI) of the Tricon Mine in Fairbanks, Alaska. This SI was conducted under the authority of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). The SI is intended to document a threat or potential threat to public health or the environment as posed by a site, to identify whether a potential emergency situation exists that may require an immediate response, to document the presence or absence of contained or uncontrolled hazardous substances on a site, and to confirm site characteristics and area receptor information collected during the preliminary assessment. In addition, the SI process is intended to collect sufficient data to enable evaluation of the site's potential for inclusion on the National Priorities List (NPL) and, for those sites determined to be NPL candidates, establish priorities for additional action. The SI process does not include extensive or complete site characterization, contaminant fate determination, or quantitative risk assessment.

A Preliminary Assessment (PA), the first step in the CERCLA/SARA process, was conducted in 1989 to review existing information on the site and its environs to assess the threat, if any, posed by the site to public health, welfare, or the environment and to determine if further investigation (an SI) under CERCLA/SARA was warranted. After reviewing the PA, EPA decided that further investigation of the Tricon Mine would be necessary to more completely evaluate the site using EPA's Revised Hazard Ranking System (HRS) criteria. The HRS assesses the relative threat associated with the actual or potential releases of hazardous substances at a site.

This document presents a summary of the objectives, activities, and results of the Tricon Mining SI, which was performed as a sampling SI. Included are descriptions of site background information (Section 2), sampling activities and analytical requirements (Section 3), a discussion of sample results (Section 4), and conclusions (Section 5).

SECTION 2

BACKGROUND

2.1 OWNERSHIP

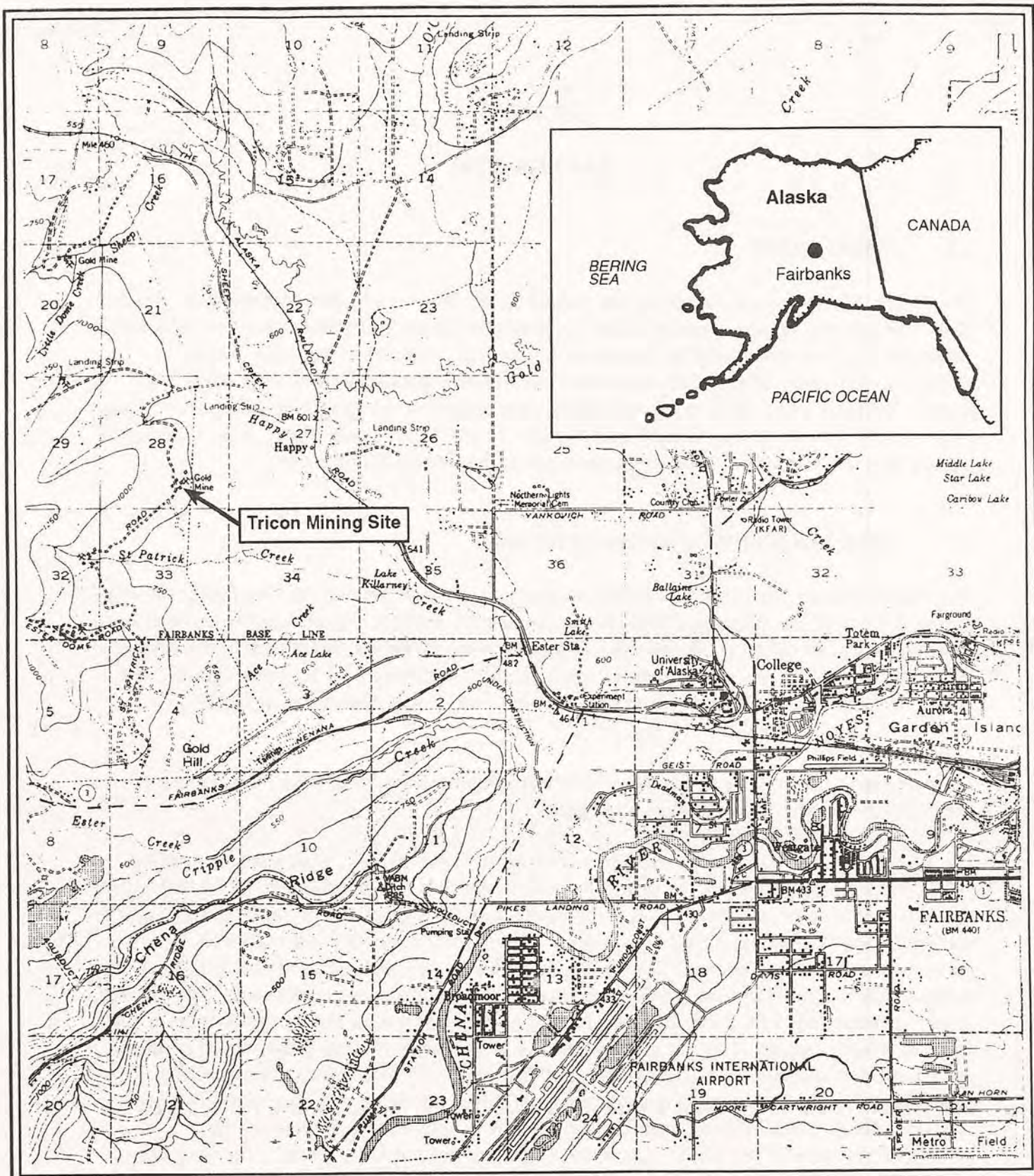
The Tricon Mining site is owned by the United States Bureau of Land Management (BLM). BLM released the mining property rights to Silverado Mines under Federal Claim #F45490. Tricon Mining was contracted by Silverado Mines, Ltd., to conduct the gold mining operation. Silverado Mines, Ltd., controlled the mining operations from 1976 until 1989. From 1989 until 1993, the mining operations were controlled by Silverado Mines, Ltd., in a joint venture with American Copper and Nickel. In 1993, Silverado Mines, Ltd., once again became the sole controller of mining operations at the Tricon Mining site.

2.2 SITE LOCATION AND DESCRIPTION

The Tricon Mining site is located in the southwest quarter of Section 28, Township 1 North, Range 2 West of the Fairbanks Meridian, at latitude 64 degrees, 52 minutes, 54 seconds north and longitude 147 degrees, 57 minutes, 30 seconds west. The site is located on the eastern slope of Ester Dome mountain, approximately 7 miles northwest of Fairbanks, Alaska. The site is accessed via a dirt road (Ester Dome Road) from Sheep Creek Road (Figure 2-1) (USGS, 1954, photo revised 1975).

A site reconnaissance visit on 16 May 1994 was conducted by WESTON to assess the present condition of the site; the following was noted:

The mining facility was located on approximately 10 acres of land, with a primary tailings pond (surface impoundment) occupying approximately 200 feet by 400 feet, or 80,000 square feet and a secondary tailings pond approximately half the size of the primary tailings pond or occupying approximately 40,000 square feet. The primary tailings pond is located approximately 300 feet east and downgradient of the mining facilities and is filled to capacity. It reportedly is dry except for seasonal snow-melt and rainwater accumulations. The tailings pond was surrounded by a locked fence having a small portion on the northwest side of the fence in need of repair, allowing possible access to the pond. Moose prints observed in the pond indicated animals have accessed the tailings pond. The secondary tailings pond, triangular in shape, was located approximately 400 feet northeast and downgradient of the primary tailings pond. Berms approximately 4 feet in height were located on the downgradient sides of the pond. The remaining sides did not have berms. The land was overgrown with saplings and tall grasses. Supporting facilities on-site included a main office, materials storage, and the processing mill (Figure 2-2).



0 1/2 1

Scale in Miles

N

Source: USGS 15' Quadrangle Series - Fairbanks (D-2) Alaska, 1954(PR75)

Site Location Map
Tricon Mining, Fairbanks Alaska

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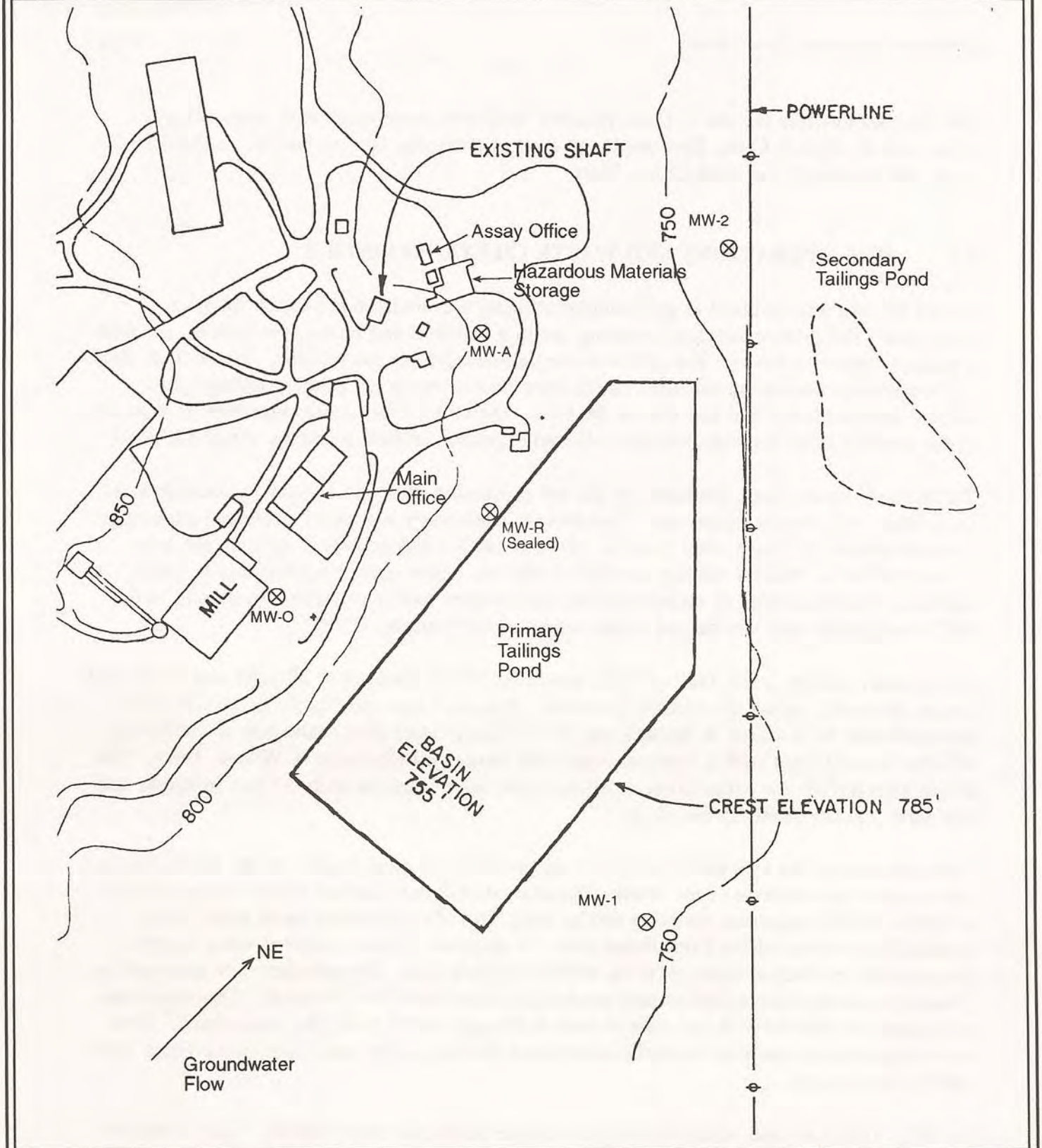
4000-19-06-4100
April 1995

FIGURE
2-1



0 100 200
Scale in Feet

Source:
Tricon Mining Site Plan, (ADEC,1994)

Tricon Mining Site Plan Existing Wells

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4000-19-06-4100
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FIGURE
2-2

The area surrounding the site is predominantly rural with some residential areas. Happy Creek and St. Patrick Creek flow south and east, respectively, approximately 1 and 0.75 mile away and eventually meet the Chena River.

2.3 SITE OPERATIONS AND WASTE CHARACTERISTICS

Tricon Mining was involved in gold mining utilizing a cyanidization process for gold extraction. The process involved crushing ore in a ball mill and mixing the crushed ore with a sodium cyanide solution. The gold was then extracted from the solution. Waste rock, lime, and wastewater containing sodium cyanide were discharged to the primary tailings pond located approximately 300 feet east of the mill. The tailings and wastewater were transported to the primary pond via pipe from the mill and deposited at three locations within the pond.

The primary wastestream generated by the ore processing mill was a slurry containing waste rock, lime, and process wastewater. The process wastewater reportedly contained an average concentration of 5.7 mg/L total cyanide. An estimated 1,948 pounds of cyanide has been discharged to the primary tailings pond since the mill began operation (Armstrong, 1989). In addition, small quantities of sodium sulfide, hydrochloric acid and sodium hydroxide in the mill wastestream were discharged to the tailings pond (Murton, 1989).

The primary tailings pond, built in 1985, was used for the disposal of all solid and liquid mill wastes generated during the time of operation. The pond was constructed to specifications recommended by Shannon & Wilson, Inc., from their geotechnical evaluation of the Tricon Mining site and lined with a layer of compacted natural silt (Shannon & Wilson, 1985). The berms surrounding the entire primary tailings pond were approximately 15 feet in height and the pond was originally 35 feet deep.

The migration of the cyanide from the tailings pond to the groundwater on the Tricon Mining site came to the attention of the Alaska Department of Environmental Conservation (ADEC) in 1988. ADEC requested sampling results from Tricon's monitoring wells when Tricon applied for a rezone of the Ester Dome area. In response, Tricon collected water samples from on-site production wells (MW-A, MW-R) (Figure 2-2). The samples were analyzed by Tricon personnel using a colorimetric method for detection of total cyanide. Concentrations of cyanide in wells MW-A and MW-R were 0.23 mg/L and 0.54 mg/L, respectively. Both concentrations exceeded the federally established drinking water maximum contaminant level (MCL) of 0.2 mg/L.

In 1989, Tricon aerated contaminated groundwater to degrade free cyanide. They withdrew water from groundwater well A (MW-A) and sprinkled it over the primary tailings pond. The result of the aeration process is unknown (E&E, 1989; Armstrong, 1994).

ADEC files and conversations with Tricon representatives indicate that groundwater contamination may have occurred via an abandoned well (MW-R) located under the berm on the west side of the primary tailings pond. Liquid waste containing cyanide likely traveled through the well to the groundwater. The well casing was removed and the well was sealed in 1989 by Tricon Mining (ADEC, 1994).

Two additional wells, MW-1 and MW-2, were installed in 1989 and 1990, respectively, to monitor the cyanide contamination (Figure 2-2). Regular sampling has been and still is conducted in the site wells and cyanide concentrations exceeding the benchmark of 0.2 mg/L were detected in MW-2 on several occasions (Table 2-1) (ADEC, 1994).

Currently, the site is inactive and no additional cyanide or tailings have been added to the tailings pond since operations ceased in 1989. ADEC has instructed Tricon to neutralize and remove the waste in the primary tailings pond prior to further activity (McCallister, 1994).

2.4 INVESTIGATIVE AND REGULATORY HISTORY

In June 1985, a geotechnical investigation was conducted of the Tricon Mining site prior to the construction of the existing tailings pond (Shannon & Wilson, 1985). Seven exploratory borings were drilled on the site and the information was used to develop engineering recommendations for the project.

In November 1988, ADEC requested groundwater sampling results from Tricon Mining as a result of their request for a rezone of the Ester Dome area. The groundwater wells on-site had cyanide concentrations exceeding the MCL benchmark (0.2 mg/L) (ADEC, 1994).

On 6 March 1989, Tricon Mining was issued a Notice of Violation for 46.03.710 Pollution Prohibited, 46.09.010 Report of Hazardous Substance Release and 18 AAC 75.080 Discharge Notification Required (ADEC, 1994).

In 1989, the ADEC office (North Region) collected samples from domestic wells in the Ester Dome area. The samples were collected in response to a growing concern of the effects to groundwater quality from mining activities on Ester Dome. The samples were analyzed for heavy metals and cyanide. None of the samples showed detectable levels of cyanide; however, naturally high levels of arsenic (exceeding 50 ppb) were detected in some of the wells (ADEC, 1994). The naturally occuring levels of arsenic in the groundwater were attributable to the arsenic found in the local water-bearing rock units (Hawkins, 1994) The results indicated that off-site wells have not been affected by documented on-site groundwater contamination.

In 1989, a preliminary assessment (PA) of the Tricon facility was conducted for the EPA, which did not include sampling (E&E, 1989). It was suggested that a more extensive search for drinking water wells (beyond the scope of the PA) in the site vicinity was necessary.

In 1989, ADEC requested that Tricon Mining install additional groundwater wells to monitor cyanide contamination. Monitoring wells MW-1 and MW-2 were installed in 1989 and 1990, respectively. Tricon has sampled three wells on-site (MW-A, MW-1, and MW-2) since installation of the additional wells (Table 2-1).

Table 2-1—Previous Groundwater Sampling Results for Cyanide (mg/L), Tricon Mining

Date	MW-A	MW-1	MW-2	MW-O	MW-R
01/15/88	0.01	--	--	NS	NS
11/29/88	0.14	--	--	NS	0.91
12/29/88	**0.23**	--	--	0.13	**0.54**
01/05/89	NS	--	--	NS	**0.52**
04/11/89	NS	--	--	0.02	--
05/03/89	**1.26**	--	--	NS	--
07/10/89	**1.27**	--	--	NS	--
08/15/89	**0.35**	--	--	NS	--
10/18/89	NS	0	NS	NS	--
10/20/89	**0.31**	NS	NS	NS	--
06/26/90	0.13	0	NS	NS	--
08/13/90	NS	NS	0	NS	--
10/15/90	NS	0	0.02	NS	--
10/25/90	0.10	NS	NS	NS	--
10/25/90	0.08	NS	NS	NS	--
11/01/90	NS	NS	0.08	NS	--
11/28/90	**0.20**	0	0.06	NS	--
11/28/90	**0.24**	0.01	0.09	NS	--
01/04/91	0.16	0	0.12	NS	--
02/06/91	NS	0	0.09	NS	--

Table 2-1—Previous Groundwater Sampling Results for Cyanide (mg/L), Tricon Mining

Date	MW-A	MW-1	MW-2	MW-O	MW-R
04/09/91	0.10	0	0	NS	--
06/05/91	0.07	0	0.09	NS	--
08/12/91	0.03	0	0.08	NS	--
10/24/91	0.04	0	0.16	NS	--
12/17/91	0.03	0	0.19	NS	--
03/09/92	0.02	0	0.16	NS	--
06/05/92	0.02	0	0.01	NS	--
07/16/92	0.02	0	0.15	NS	--
10/14/92	0.03	0	**0.27**	NS	--
11/13/92	NS	NS	0.04	NS	--
11/13/92	NS	NS	0.15	NS	--
11/13/92	NS	NS	0.11	NS	--
11/13/92	NS	NS	0.14	NS	--
11/13/92	NS	NS	0.10	NS	--
11/13/92	NS	NS	0.10	NS	--
11/13/92	NS	NS	0.11	NS	--
11/13/92	NS	NS	**0.22**	NS	--
11/13/92	NS	NS	**0.22**	NS	--
02/22/93	NS	0	NS	NS	--
02/22/93	NS	0	NS	NS	--
02/22/93	NS	NS	**0.20**	NS	--
02/22/93	NS	NS	**0.20**	NS	--
03/08/93	NS	NS	0.16	NS	--
03/08/93	NS	0	0.15	NS	--
06/23/93	0.01	0	0.16	NS	--
10/01/93	0.04	0	0.17	NS	--
02/03/94	0	0	0.10	NS	--

Table 2-1—Previous Groundwater Sampling Results for Cyanide (mg/L), Tricon Mining

Date	MW-A	MW-1	MW-2	MW-O	MW-R
02/22/94	0	NS	NS	NS	--
02/22/94	0	NS	NS	NS	--
04/05/94	0	0	**0.23**	NS	--
04/05/94	0	0	0.19	NS	--

Note:
Detection limit = 0.01 mg/L
bold = concentrations equal or exceed the MCL. (MCL = 0.20 mg/L)
-- = nonexisting well
0 = concentrations below detection limit
NS = not sampled

2.5 POTENTIAL CONTAMINANT TRANSPORT PATHWAYS AND RECEPTORS

2.5.1 Groundwater Pathway

2.5.1.1 Hydrogeology

The soils on-site consist of well-drained silty loams of the Fairbanks Series. These soils have an estimated maximum permeability of 0.0004 cm/sec (USDA, 1968). The soils in the site area are estimated to extend to a depth of 400 to 600 feet below ground surface (bgs). The bedrock underlying the soils in the Ester Dome area consists of quartzite and micaceous schist which are metamorphosed sedimentary rocks with extensive fracturing (USGS, 1963).

The groundwater occurring in these metamorphic formations is interconnected due to extensive fracturing and is hydraulically connected with the groundwater reservoir of the Tanana River plain. No confining layers have been documented in these deposits. Consequently, all wells within 4 miles of the site are assumed to be drawing water from a single water bearing unit (USGS, 1963). The average static water level in the on-site wells is approximately 196 feet bgs.

In general, groundwater flows from Ester Dome to the surrounding stream valleys. In the site area, groundwater flows north to northeast with a hydraulic gradient estimated to be on the order of 0.003 to 0.004 ft/ft (Figure 2-2) (Walther, 1987). The principal source of inflow to the aquifer is by local infiltration of precipitation.

The Fairbanks area is underlain by discontinuous permafrost. In the site area, permafrost is common on the north-facing slopes. Permafrost is virtually impervious, though significant quantities of water may flow upward through thawed conduits.

2.5.1.2 Groundwater Usages in the Area

Groundwater is used as a primary drinking source for private homes and public supplies within 4 miles of the site. Well log information from United States Geological Survey (USGS) and Alaska Department of Natural Resources (DNR) databases indicate that approximately 275 private wells are within 4 miles of the site (DNR, 1994; USGS, 1994). These wells serve 759 persons, estimated based on the average number of people per Fairbanks household from the 1990 census (USDC, 1990). In addition, a community well for the town of Ester, approximately 3.5 miles away, serves approximately 40 persons with drinking water on a permanent basis.

It is difficult, however, to estimate the number of people who drink from these private wells. Many homes which the USGS and DNR indicate as having groundwater wells do not drink from their wells. They have water brought in via truck from areas greater than 4 miles away. Many individual well owners choose not to use the groundwater in the Ester Dome area due to high background levels of arsenic, excessive mineralization, and poor taste (Hawkins, 1994).

2.5.2 Surface Water Pathway

2.5.2.1 Surface Hydrology

The surface water closest to the site is Happy Creek, approximately 1 mile to the east and St. Patrick Creek, approximately 0.75 mile to the southeast. St. Patrick Creek enters Happy Creek, which is then directed into a manmade drainage ditch which ultimately enters the Chena River. The Chena River then flows into the Tanana River. The average annual flow of St. Patrick and Happy creeks is estimated to be less than 500 cubic feet per second (cfs) and the average annual flow for the Chena and Tanana Rivers, respectively, is approximately 1,487 and 20,320 cfs (USGS, 1992). Upon investigation of the area downgradient of the tailings pond, topographic barriers exist that would inhibit surface water flow reaching the above-mentioned surface water bodies.

The drainage area of the site is approximately 1 square mile, or 640 acres. The soil in the site area is a very fine silty loam. Infiltration rates are slow, increasing the likelihood of surface water runoff from the site, and a rapid spring snow thaw may introduce quantities of water greater than the infiltration rates of the soil. However, the contaminated soil is contained in the primary tailings pond, with approximately 10- to 15-foot berms on all sides, and in the secondary tailings pond, by 4-foot berms in the downgradient sides.

2.5.2.2 Surface Water Uses in the Area

There are no drinking water intakes within 15 miles downstream of the site in the above-mentioned surface water bodies.

The Chena and Tanana rivers support large populations of both anadromous and resident freshwater species of fish. Anadromous fish found in the Chena River include chinook and chum salmon. The Chena is also used for spawning and rearing of these salmon species. Resident fish species include burbot, arctic grayling, round whitefish, humpback whitefish, least cisco, longnose sucker, northern pike, arctic lamprey, and slimy sculpin. Resident species rear throughout the Chena and some spawning by most of these species probably occurs here. None of the species found in the Chena River are endangered or threatened (Viavant, 1994).

The Chena and Tanana rivers are used for sport fishing. Production in the Chena and Tanana rivers are approximately 22,252 lbs. per year and 3,144 lbs. per year, respectively, based on documented harvest numbers (Viavant, 1994).

Wetlands frontage along St. Patrick and Happy creeks and the Chena and Tanana rivers is approximately 21.50 miles within 15 miles of the site (USDI, 1992).

2.5.3 Soil Exposure Pathway

The primary tailings pond is enclosed in a fence, limiting access; the secondary tailings pond is overgrown with vegetation. The site is approximately 8 miles outside of downtown Fairbanks and is accessed via dirt road.

2.5.3.1 Soil Exposure Targets

No resident population lives on the site and within 200 feet of the contamination. Three workers work regularly on-site, one of whom works within 200 feet of the primary tailings pond.

2.5.3.2 Nearby Population

The population within 1 mile of the site is 47 people; the closest person to the site lives approximately 0.13 mile away. There are no schools or daycare centers within 1 mile.

2.5.4 Air Pathway

2.5.4.1 Atmospheric Conditions

The Fairbanks area experiences an arid climate with warm, dry summers and cold winters. Snow cover usually remains on the ground from October to April. Total annual precipitation averages approximately 12 inches, with a potential evapotranspiration rate of 18 inches per year (-6 inches net precipitation). About 60 percent of the precipitation falls as rain; the remainder falls as snow. The 2-year, 24-hour rainfall for Fairbanks is approximately 1.75 inches (USDA, 1968; USDC, 1963; USGS, 1978).

2.5.4.2 Air Targets

There are few activities on the site in both tailings ponds to resuspend particulates. The primary tailings pond is surrounded by a maintained fence; the secondary tailings pond is overgrown with vegetation. There is no resident population on the site; there are three workers who work on the site regularly (one of whom works within 200 feet of the primary tailings pond) but none come in contact with the tailings ponds. No schools or daycare centers are within a 1-mile radius of the site. Estimated populations around the site (from the EPA GIS Population database) are as follows:

Distance From Site (miles)	Population
0 - 1/8	1
1/8 - 1/4	1
1/4 - 1/2	5
1/2 - 1	40
1 - 2	381
2 - 3	958
3 - 4	3116
Total 0 - 4	4502

There are approximately 6,420 acres of wetlands within 4 miles of the site, based on the National Inventory Wetlands Map (USDI, 1992).