680662

Fairfield Minerals Ltd.

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SIWASH GOLD DEPOSIT

PROSPECTUS FOR

UNDERGROUND MINING AND MILLING OPERATIONS

45 Kilmetres Southeast of Merritt, B.C.

NTS: 92H/16W; Lat. 49° 51'N, Long 120° 19'W

Prepared By:

J.D. Rowe, P.Geo.

February, 1995

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1.0 EXECUTIVE SUMMARY

The Siwash North Gold Deposit is a high grade, gold-bearing vein system located 45 kilometres southeast of Merritt in southern British Columbia. Fairfield Minerals Ltd. owns the mineral rights to the deposit and is proposing to mine and mill an estimated 156,000 tonnes of vein material, to be followed by reclamation of the disturbed sites. Concentrate will be shipped off-site for refining. Current drill indicated reserves of 172,000 tons (156,000 tonnes) averaging 1.066 oz/ton gold may be economically mineable by underground methods.

The Siwash North deposit was discovered in 1988 by Fairfield and explored by trenching and diamond drilling from 1988 through 1991. The vein system is hosted by granitic rocks near the margin of a major batholithic intrusion in contact with basaltic volcanic rocks. The vein system has been traced by drilling for a strike length of 950 metres, down dip to 300 metres, and remains open to further expansion. Gold-bearing veins are narrow but consistent and very high grade. A number of gold-rich shoots have been defined within the Siwash North structure. The main shoot has been named the "Mother Shoot" and it is the focus of the existing open pit and underground development.

The configuration of the Mother Shoot consists of a thin vein sheet, averaging 0.45m thick, with an east-west dimension of 150 to 200m and extending at least 300m down dip to the south. The upper 100m of dip length from surface has an average slope of 25 degrees making it amenable to open pit mining techniques. The lower 200m has a 65 degree dip, more favourable for underground mining.

In 1992, 1993 and 1994 open pit exeavation was undertaken to recover 14,800 tonnes of vein material from the upper segment of the Mother Shoot to a vertical depth of 40 metres. Approximately 480,000 cubic metres (1.25 million tonnes) of waste rock was removed from the vein hangingwall and placed into two waste rock dumps adjacent to the north side of the pit. Also in 1993 and 1994 underground exploration and test mining in the Mother Shoot produced 1,580 tonnes of ore.

Currently, 750 metres of decline are in place providing access to the upper portion of the Mother Shoot. Vein drifts have been driven on four levels and various methods of stoping have been tested. The basic mine plan for the Mother Shoot involves approximately 1300 metres of decline spiraling downward in the vein footwall. An estimated 1000 metres of additional footwall access may be required for drill testing and development to the deepest drill intercept, approximately 300 metres down-dip from surface.

The eastern part of the Siwash deposit, which has been only broadly defined by drilling, may be accessed by a second decline collared about 250 metres east of the existing portal. An estimated 1500 metres of decline may be required to explore and develop this area.

Mining development headings, including drifts, raises, crosscuts and drawpoints are expected to total 5000 linear metres. Various mining methods will be employed, including shrinkage, resuing, cut-and-fill and possibly longholing. Production of 140 to 160 tonnes per day, yielding about 50,000 tonnes per year is anticipated.

Ore beneficiation testwork has been undertaken on a number of small shipments of bulk sample material sent to commercial laboratories and operating milling and smelting facilities. Larger shipments, totalling 12,370 tonnes were sent to two smelters to test marketability and smeltability of the ore, which was used as flux, owing to its high silica content and lack of impurities. These shipments contained 38,300 ounces of gold and a similar quantity of silver. Approximately 3,970 tonnes of vein material is currently stockpiled on the property and is expected to be sold to a smelter.

A small gravity-flotation mill capable of processing up to 250 tons (225 tonnes) per day is proposed for the Siwash Mine site to beneficiate the remainder of the minable ore reserve . It is expected that 40 to 50% of the gold can be recovered in a gravity concentrate and refined on site. Flotation concentration at a ratio of 25:1 should produce about 10 tons per day of concentrate to be trucked off-site for smelting.

A tailings impoundment encompassing approximately 8 hectares is proposed in an area 1.3 km north of the mill. A low dam, from one to 5 m high, is required on two sides of the site to produce a pond with capacity for up to 400,000 tons of tailings. Depending on mining methods employed, up to 30 percent of the mill tailings may be used for underground backfill.

Water for mill operations will be recycled from the tailings pond, drawn from underground workings and pumped from a fresh water well as required. The mill is estimated to require 275,000 litres of water per day.

Acid-base accounting tests have been conducted on representative samples of waste rock. The bulk of the underground waste material will be from development headings in fresh to weakly altered granodiorite which shows high net neutralization potential. A few percent of the waste rock will comprise strongly altered, pyritic material from the wallrock immediately adjacent to the vein. This rock has higher potential acidity but is expected to be neutralized when encapsulated by much larger volumes of fresh rock in the dumps. In addition, proposed reclamation of the dumps by capping the slopes with low permeable soil layers will help prevent surface waters from contacting the pyritic rock in the piles.

Acid-base accounting and humidity cell testwork has been conducted on samples of flotation tailings. The samples showed a weakly positive net neutralization potential but in the humidity cell became slightly acidic after 21 weeks. In milling operations a small amount of quicklime added continuously to the tailings line would ensure that tailings solids would not turn acidic after abandonment.

The mill building will be constructed on concrete foundations and generator power will be utilized. Office, dry and shop trailers will be set up on site and removed upon completion. Personnel will be housed off site and commute to work daily. It is projected that the mining and milling operation will be ongoing for a minimum 3 year period and may continue as reserves dictate.

Water quality sampling and hydrology monitoring have been undertaken on a regular basis since October, 1991. Water quality downstream from the site has shown little affect from open pit operations in 1992, 1993 and 1994. Water samples from the pit floor and from adjacent to the waste rock dump have given elevated nitrogen values which may be attributable to explosives used for blasting waste rock in the pit. Nitrogen values have remained at normal levels in water samples at the monitoring site one km downstream and at all other sites. There has been no evidence of increasing acidity in any of the sites downstream from the work site.

The proposed mining and milling operations involve a relatively small area and are expected to have little or no impact on wildlife or free-range cattle in the area. Water courses will not be affected and water quality is expected to be maintained, therefore fisheries will not be impacted. Processing and tailing circuits will be designed for zero water discharge. Sensitive ecological areas around Siwash Lake and Siwash Creek will not be disturbed. A good quality, 2.5 kilometer access road is in place from highway 97C. It is adequately ditched and culverted at stream crossings. Part of the road is joint-use with logging operations which are planned for areas to the west of the site. Access to the site is closed to non-authorized personnel, however, older established roads to the east and south are still available for recreational use.

Reclamation work will be undertaken upon completion of the mining program. Waste dump slopes will be flattened to 2:1 (26 degrees) gradient and capped with a layer of soil. Grasses and ground cover will be planted on the slopes to limit soil erosion. Runoff water will be channeled by ditches surrounding the waste dumps to collection sumps where water quality will be regularly monitored. The underground accesses will be blocked upon abandonment and warning signs posted to prevent inadvertent access. Runoff water from the portal will also be sampled regularly to test for any change in water quality. When ore stockpile areas are no longer required, the upper layer of soil, with intermixed fragments of ore, will be stripped and processed in the mill. All temporary structures will be removed from the site upon completion and work areas will be scarified and grass seeded. Tailings, covering an area of approximately 80,000 m^2 will be covered with a layer of soil and seeded with ground cover plants. Roads which are no longer required after the mining program will all be reclaimed.

Siwash Mine Site - Looking West

Figure 1-1

2.0 INTRODUCTION

Fairfield Minerals Ltd. is proposing to mine and mill an estimated 156,000 tonnes of gold-bearing vein material containing an estimated 183,600 ounces of gold from the Siwash North vein system. Mining will involve the removal of an estimated 70,000 cubic metres (185,000 tonnes) of waste rock which will be placed adjacent to the existing waste rock dumps which currently contain 480,000 cubic metres (1,270,000 tonnes) of material. Ore will be processed on site, in a simple gravity-flotation system and coneentrate trucked off-site for refining. An estimated 30% of tailings may be used for underground fill and the remainder placed in a shallow pond built one km north of the mill. The program will be completed within a three year period, proposed to begin in mid 1996 and finish in 1999.

Personnel will be housed off-site and commute to work daily from nearby communities.

Reclamation of waste dumps and the tailings impound will be undertaken following the mining program. Upon completion, all equipment and structures will be removed.

Environmental studies and testwork have indicated that the proposed waste rock dump and tailings pond will have minimal impact on water quality, fisheries, wildlife or forest resources in the area.

2.1 Siwash North Gold Deposit - Project Fact Sheet

<u>Owner:</u>	Fairfield Minerals Ltd. 1980 - 1055 West Hastings St. Vancouver, B.C. V6E 2E9	
	Telephone:	669-3398
	Fax:	669-3308
	Contact:	Mr. J. W. Stollery, President
<u>Project Manager:</u>	Mr. J. D. Rowe	
	Telephone:	669-3398
	Fax:	669-3308
<u>Location:</u>	55 road-kilometres southeast of Merritt, B.C. via highway 97C, near Elkhart Exit. Similkameen Mining Division, NTS 92H/16W, Lat. 49 deg. 51'North, Long. 120 deg. 19'W.	

Commodities:	Gold, silver
Proposed Mining Method:	Underground
Estimated Production:	156,000 tonnes (172,000 tons)
Estimated Waste Rock:	185,000 tonnes (204,000 tons)
Estimated Tailings Pond Area:	8 hectares
Proposed Mining Rate:	50,000 tonnes per year

Mineral Reserves	Tons	Gold Grade (oz/ton)	Contained Gold (ounces)
Open Pit to Date	16,260	2.858	46,470
Underground to Date	1,740	2.155	3,750
Additional Drill Indicted (Possibly Underground Mineable)	172,000	1.066	183,350
Total Inventory	190,000	1.229	233,570

Access: 2.5 kilometres south by gravel road from Elkhart exit ramp, highway 97C. Merritt is 55 km northwest and Westbank is 55 km east. Railway loadout is at Ashcroft, 165 km northwest via Merritt and Spences Bridge.

Drill Information:

Diamond Drilling:	1989-91	107 holes	12,529 m
Reverse Circulation:	1992-93	90 holes	3,625 m
U/G Diamond Drilling:	1994	84 holes	2,414 m

Mineral Processing: 250 TPD Gravity-Flotation Mill proposed on site

Workforce:

Mine workers:	25
Mill Workers:	12
Management and support staff:	8
	45

Housing and Services: Workers commute daily from Merritt or Westbank areas

On-Site Facilities: Temporary trailers providing office, mine dry, first aid room, lunchroom, assay lab, repair/maintenance shop and storage area. Mill building (90' x 60') and backfill plant will be concrete structures.

Mining Lease:	No 474 (308695), Lot No. 6315, 150 hectares.
Mining Division:	Similkameen
Forest District:	Merritt
Ministry of Environment:	Southern Interior Region
Ministry of Transportation:	Nicola Highways District

2.2 Location (Figure 2-1)

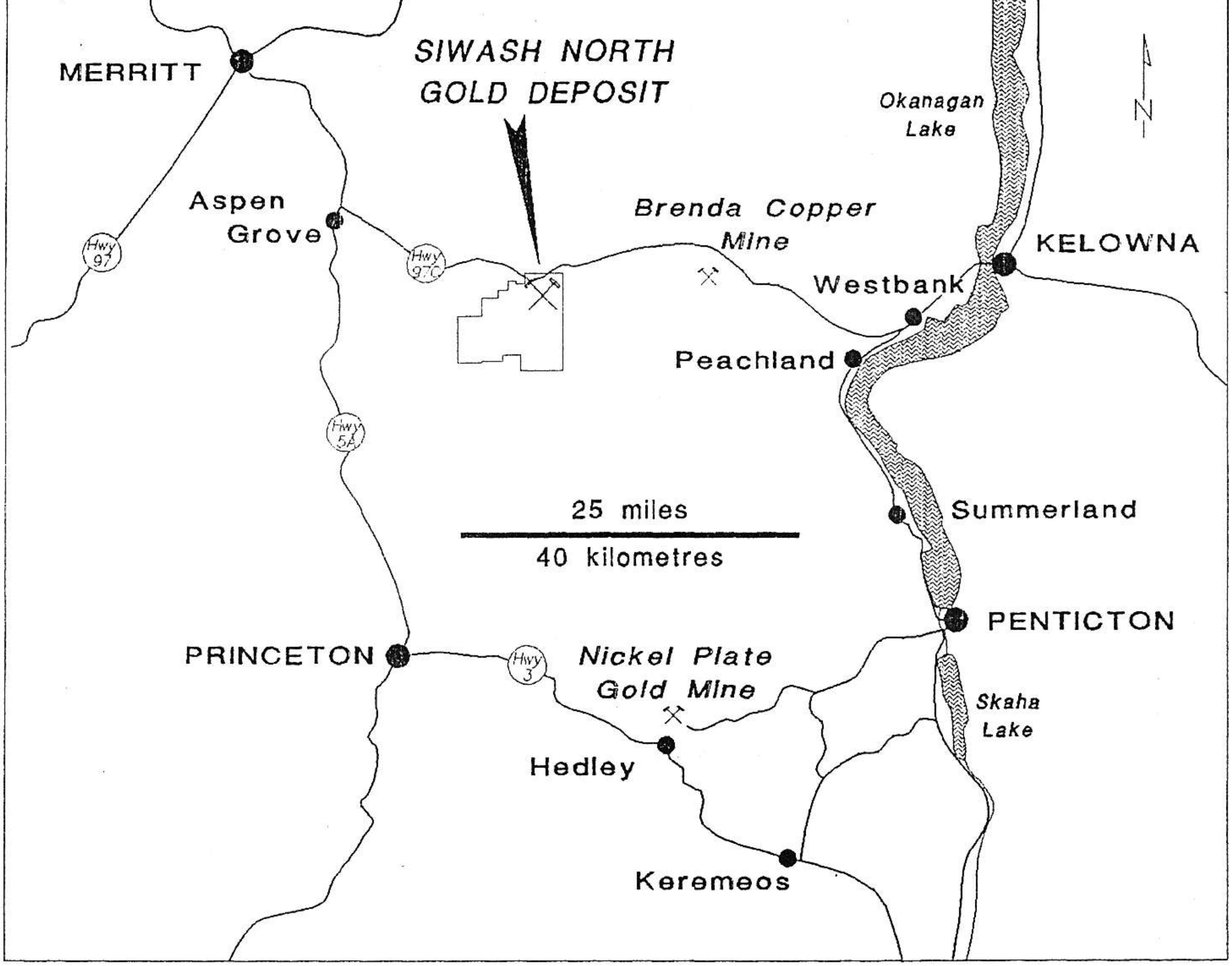
The Siwash North Gold Deposit is located 45 kilometres southeast of Merritt in south-central British Columbia, at latitude 49 deg. 51'N and longitude 120 deg 19'W. It is within the Similkameen Mining Division in NTS Map area 92H/16W.

Access is via divided, four lane highway number 97C which extends between Merritt and Westbank. The project is mid-way between the two towns, 55 road-kilometres southeast from Merritt or 55 kilometres west from Westbank. It is 325 kilometres by highway to the port of Vancouver or 165 kilometres northwest to the town of Ashcroft, where rail loading facilities for Canadian Pacific and Canadian National Railways are located. The nearest airstrip is at Merritt, where chartered flights can be arranged. Scheduled commercial flights are available from the Kelowna airport located 85 kilometres to the east.

2.3 History of Development (Figure 2-2)

The Siwash North Gold Deposit is a new discovery made in 1988 by Fairfield's exploration consultant, Cordilleran Engineering Ltd. The area had been previously staked and explored by a number of companies in the 1960's and 70's using soil geochemistry and prospecting, in search of copper mineralization during the development of the nearby Brenda copper-molybdenum deposit, 22 kilometres to the east. Copper, with lead, zinc and silver, was found in an area 9 kilometres south of Siwash North. Follow-up programs of soil sampling, geophysics, trenching and drilling were conducted, revealing large areas of intense alteration, but generally sparse economic mineralization. A few short adits in the area of alteration had been previously excavated in the early 1900's exploring narrow veins containing local masses of sulfide minerals, with some high silver values but generally little gold. Placer gold has been intermittently recovered in small amounts from Siwash Creek in the area of the old adits. The source of this placer gold has not been determined but it may consist of undiscovered veins in an area of strong gold soil geochemistry located 2 to 4 kilometres south of the Siwash North deposit. Small streams cutting this anomalous area flow into Siwash Creek upstream from the placer deposit.

Fairfield staked the initial Elk claims in 1986 to cover two gold-bearing vein occurrences, named the North and South Showings, discovered by prospecting in clear-cut logged areas (Figure 2-2). In 1987, soil geochemistry, geophysical test surveys and trenching in the two areas revealed significant, gold-bearing vein structures of several hundred metres strike length. In 1988, preliminary trenching of gold geochemical anomalies 2 kilometres north, in the Siwash North area, revealed moderate gold values across narrow widths of quartz vein, up to 0.68 oz/ton gold over 1.0 metre. In 1989, fill-in trenches confirmed and extended the Siwash North zone. Some sections were stripped between trenches to give continuous strike exposure of the vein. Panel samples were collected from the vein at 10 metre intervals for assaying. Twelve diamond drill holes totalling 754 metres were drilled in 1989 to test down dip continuity below areas of the best surface grades. Results were very encouraging with values of up to 5.53 oz/ton gold over 0.26 metre (DDH 89-1).

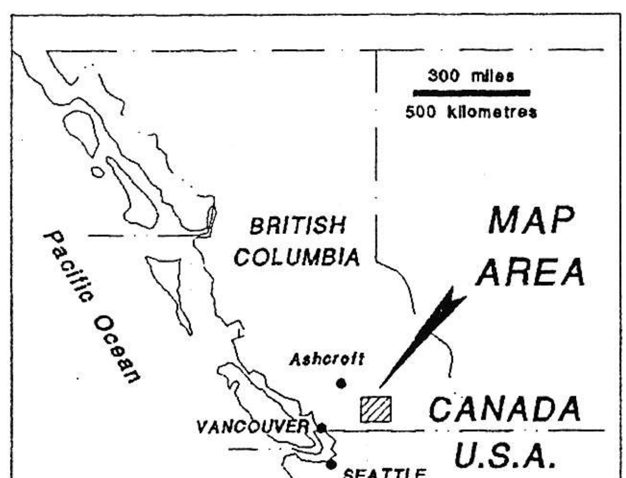


Fairfield Minerals Ltd.

SIWASH NORTH GOLD DEPOSIT

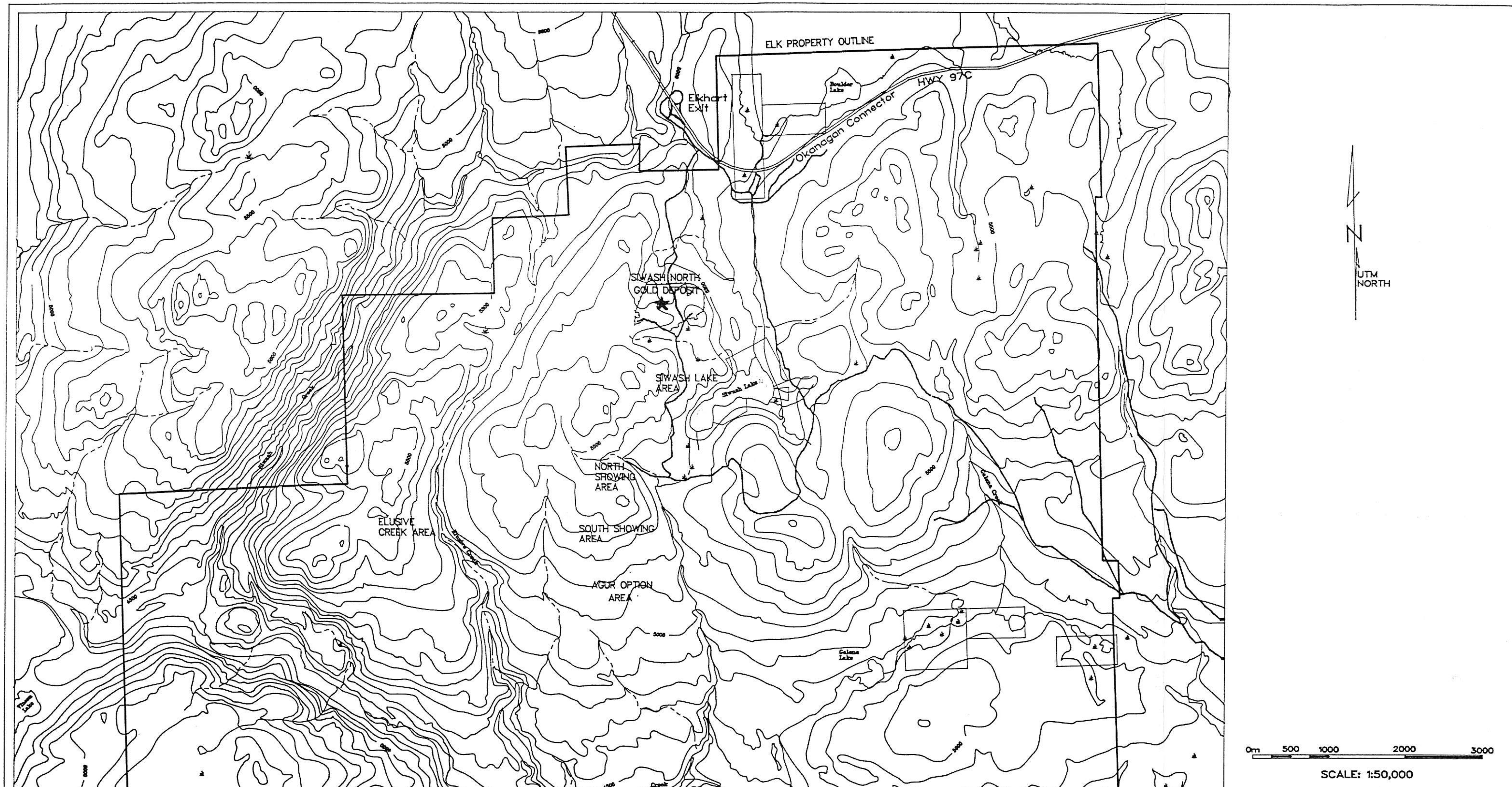
Okanagan Area,
Southern British Columbia, Canada

Fairfield
Minerals Ltd.



Location Map
Figure 2-1

March, 1994



FAIRFIELD MINERALS LTD.

ELK PROPERTY

SIMILKAMEEN MINING DIVISION, BRITISH COLUMBIA
NTS 92H 16W

TOPOGRAPHY AND MINERALIZED AREAS

CORDILLERAN ENGINEERING LTD.
1980 - 1055 WEST HASTINGS STREET
VANCOUVER, BRITISH COLUMBIA V6E 2E9

DATE : JAN. 1993

Figure 2-2

In 1990, additional stripping exposed the Siwash North vein system over much of its currently known 950 metre strike length. The entire length was panel sampled at 5 metre intervals revealing several areas of high grade gold with one section of 200 metres averaging 3.54 oz/ton gold over 0.45 metre true width. Diamond drilling of 58 holes totalling 5169 metres on 50 by 50 metre spacings tested to an average depth of 175 metres down dip. Several gold shoots were identified and, in some areas, stacked, parallel veins were encountered. The area underlying the high grade surface zone showed excellent potential with several drill intercepts of greater than 2.00 oz/ton gold over widths of 0.3 to 0.5 metre.

In 1991, 37 diamond drill holes totalling 6608 mctres expanded the 50 by 50 metre drill grid down dip on most of the gold shoots. Reserves were increased, and the main high grade area (Mother Shoot) was defined. One of the drill holes returned 26.74 oz/ton across 0.38 metre at 250 metres down dip in this shoot.

In 1992 an open pit was excavated on a near-surface portion of the Mother Shoot to recover 2040 tonnes of bulk sample vein material. Approximately 58,000 cubic metres of waste rock was removed to nearby waste dumps. The stripping ratio of waste to ore was 75 to 1. Vein material was mined and placed in individual stockpiles of about 20 tonnes each. Samples of up to 250 kilograms were collected from each pile, crushed and split in the on-site sample plant and representative portions of about 5 kilograms each sent to a laboratory for assaying. Selected bulk sample material totalling 1845 tonnes was transported to the Horne smelter in Noranda, Quebec for smeltability tests. Also in 1992, 79 reverse circulation holes totalling 2683 metres were drilled to test continuity and grade of the near surface portion of the vein system to determine the feasibility of expanding the open pit to extract additional vein material.

In 1993 the open pit was extended to the west removing 85,000 cubic metres of waste rock and 3400 tonnes of vein material at a stripping ratio of 66 to 1. The vein material was stockpiled and sampled on site and a selected shipment totalling 1995 tonnes was transported to a smelter in E. Helena, Montana to determine marketing and sales conditions and to test compatibility of the material as a smelter flux. Also in 1993, 11 reverse circulation holes totalling 942 metres were drilled to define an area of the vein proposed for underground investigation. Later in 1993 a decline was collared and driven 425 metres in the vein footwall. Two, 40-metre drifts explored the vein on two levels and test stoping up dip from the upper level recovered 200 tonnes of vein material averaging 2.46 oz/ton gold.

In the spring of 1994 underground work was continued to recover ore from the area of test stoping begun in 1993. This was a section of flat-dipping (17 degrees) vein containing high gold values located immediately down-dip from the proposed open pit expansion. The rationale for mining this area was to prevent sterilization of ore due to fracturing of the ground by blasting in the pit. An area measuring approximately 45m by 18m was stoped at an average width of 0.55m yielding about 1,170 tonnes containing 2,950 ounces of gold.

Upon completion of the underground work in May, 1994 a program of open pit expansion commenced, to allow extraction of down-dip ore. Waste rock totalling 336,000 m^3 was removed and 9,340 tonnes of ore mined at a stripping ratio of 95 to 1.

All of the underground ore and some of the open pit ore was sold to the ASARCO smelter in E. Helena, Montana. A total of 8,500 tonnes was delivered in three shipments in 1994. Approximately 3,970 tonnes of ore remains in stockpiles on site. Table 2.1 lists yearly production and sales from 1992 through 1994.

Also in 1994, 2,414 metres of underground diamond drilling was undertaken in 84 holes to detail a portion of the Mother Shoot at 10m by 10m spacings. This drilling helped identify shoots of higher gold grade in the vein structure which will allow localized mining plans to be designed. Two small areas were selected for mining tests utilizing shrinkage and longhole techniques. These tests are currently underway, in addition to 600m of decline extension, which will provide access for further definition drilling.

Table 2-1

SUMMARY OF GOLD PRODUCTION AND SALES TO OCTOBER 31, 1994

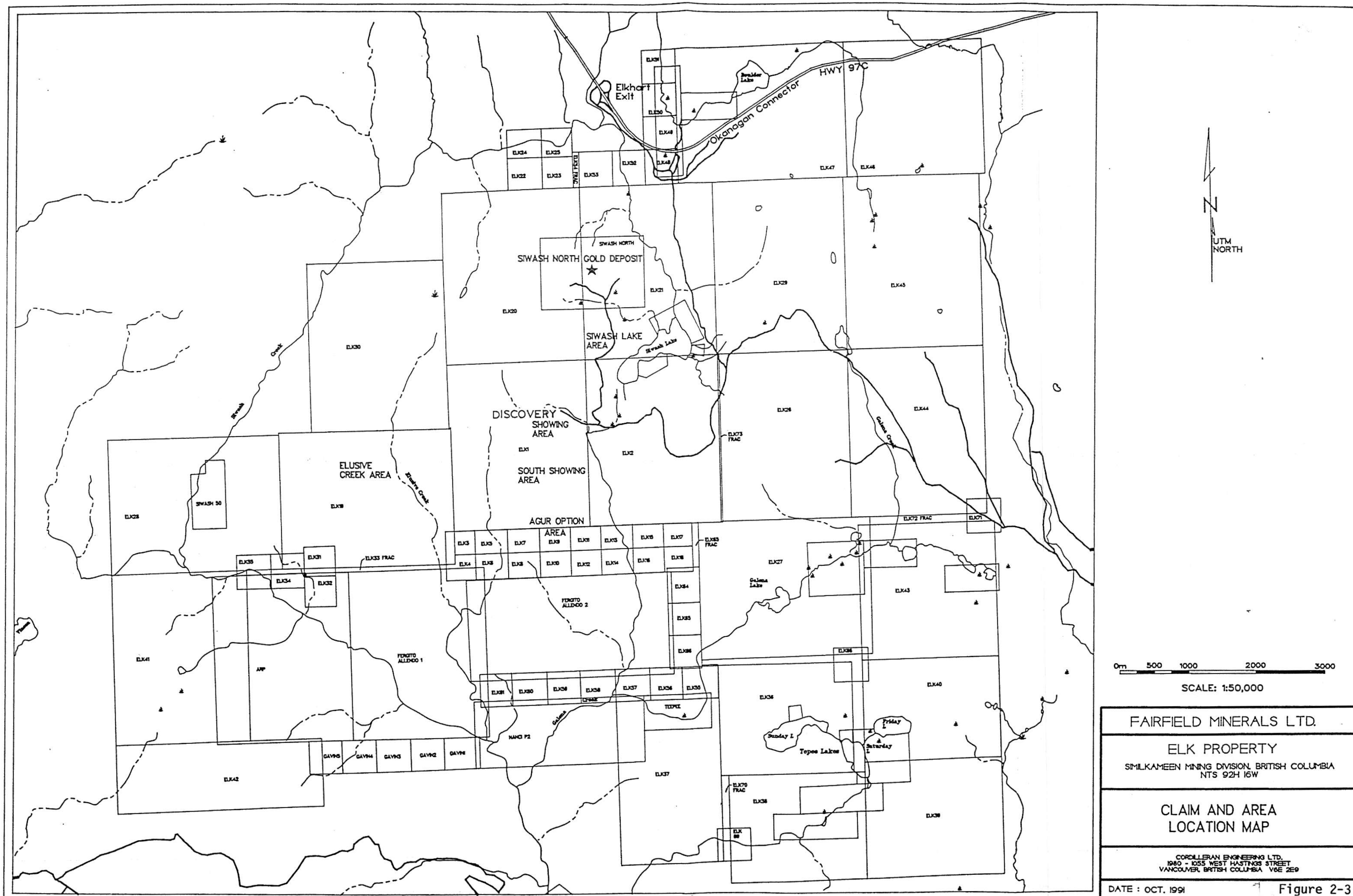
	Production		Sales		Inventory	
	SDT	**OZ**	**SDT**	**OZ**	**SDT**	**OZ**
1992 Open Pit	2,250	9,000	2,035	8,700	215	300
	2,250	9,000	2,035	8,700	215	300
1993 Open Pit	3,735	11,500	2,200	6,500	1,750	5,300
Underground	450	800	-	-	450	800
	4,185	12,300	2,200	6,500	2,200	6,100
1994 Open Pit	10,290	25,970	7,660	19,350	4,380	11,920
Underground	1,290	2,950	1,740	3,750	-	-
	11,580	28,920	9,400	23,100	4,380	11,920
Open Pit Total	16,275	46,470	11,895	34,550	4,380	11,920
Underground Total	1,740	3,750	1,740	3,750	-	-
Grand Total	**18,015**	**50,220**	**13,635**	**38,300**	**4,380**	**11,920**

2.4 Land Tenure (Figure 2-3 & Appendix 2-1)

The Siwash North gold deposit is centered within Lot No. 6315, Mining Lease number 474 (308695) which was granted to Fairfield Minerals Ltd. in September, 1992. The 150 hectare Lot measures 1.5 km east-west and 1.0 km north-south. It is surrounded by 523 units of the Elk mineral claims which are held 100% by Fairfield.

The majority of the land in the area is Crown-owned. A 64 hectare lot (No. 4531) located 2.0 km northeast of Siwash North is owned by Mr. J. Creighton and occupied by farm buildings, a restaurant, a 12-unit motel, a gas station, a highways maintenance equipment yard and a large storage building. Two kilometres southeast of Siwash North is a recreational lease (Lot No. 5877) covering about 3 hectares which has been issued to Mr. J. Creighton. Four small cabins occupy the lot. Adjacent to the southeast corner of Mining Lease 474, along the north shore of Siwash Lake, is a reserved area of about 20 hectares designated UREP File 0232905. This recreational reserve is unsurveyed, but does not appear to cover any part of the Mining Lease.

Timber harvesting rights have been granted by the Crown to Weyerhaeuser Canada Ltd. in areas to the north and west of the Mining Lease boundary.



Elkhart Exit
HWY 97C
Okanagan Connector
SIWASH NORTH GOLD DEPOSIT
SIWASH LAKE AREA
DISCOVERY SHOWING AREA
SOUTH SHOWING AREA
AGUR OPTION AREA
ELUSIVE CREEK AREA
N
UTM NORTH
0m 500 1000 2000 3000
SCALE: 1:50,000
FAIRFIELD MINERALS LTD.
ELK PROPERTY
SIMILKAMEEN MINING DIVISION, BRITISH COLUMBIA
NTS 92H 16W
CLAIM AND AREA LOCATION MAP
CORDILLERAN ENGINEERING LTD.
1980 - 1055 WEST HASTINGS STREET
VANCOUVER, BRITISH COLUMBIA V6E 2E9
DATE : OCT. 1991

Figure 2-3

Appendix 2-1

Annual rental $ 1,500.00

Map No. 92H089

Area (hectares) 150

Province of British Columbia

Ministry of Energy, Mines and Petroleum Resources

Mineral Tenure Act

Section 37

MINING LEASE No. 474(308695)

Mining Division Similkameen

Land District K.D.Y.D.

Date of Lease September 14/92

Lessee Fairfield Minerals Ltd.

Address 1980-1055 West Hastings Street, Vancouver, B.C. V6E 2E9

The lessor, in accordance with and subject to the provisions of the *Mineral Tenure Act*, hereby demises unto the lessee, for a term of 30 years from the date first above written, all Crown minerals available under the terms of the *Mineral Tenure Act* within and under the leasehold together with the rights the lessee held as the holder of the claim or claims herein described.

Name of claim(s) Siwash North

Title No(s). 307935

Lot No(s). 6315

The lessee shall save harmless and keep the lessor indemnified against all actions, claims, and demands that may be brought or made against the lessor by reason of anything done by the lessee, his servants, workmen, or agents in the exercise or purported exercise of the rights, powers, and privileges hereby granted.

The lessee hereby covenants and agrees at all times to perform, observe, and comply with the provisions of the *Mineral Tenure Act*, and the *Mines Act* and amendments made thereto from time to time, and the provisions of any regulations which may from time to time be made under authority thereof, as to the same apply to the said leasehold, and all such amendments or regulations as are from time to time made shall be deemed to be incorporated into these presents and shall bind the lessee in the same manner and to the same extent as if the same as made, or amended, were set out herein as covenants on the part of the lessee.

The lessee shall make application for an extension of the term of this lease prior to the expiry of the current term.

PROVISOS Subject to all prior rights.

IN WITNESS WHEREOF, the lessor and lessee have hereunto set their hands and seals as of the day and year first above written.

Witness	Lessee
Witness	Lessee
Bill Bayer Witness	Anne Edwards *Minister of Energy, Mines and Petroleum Resources, Lessor*

MTL 130 REV. 88/07

3.0 GEOLOGY AND MINERALIZATION

3.1 Regional Geology (Figure 3-1)

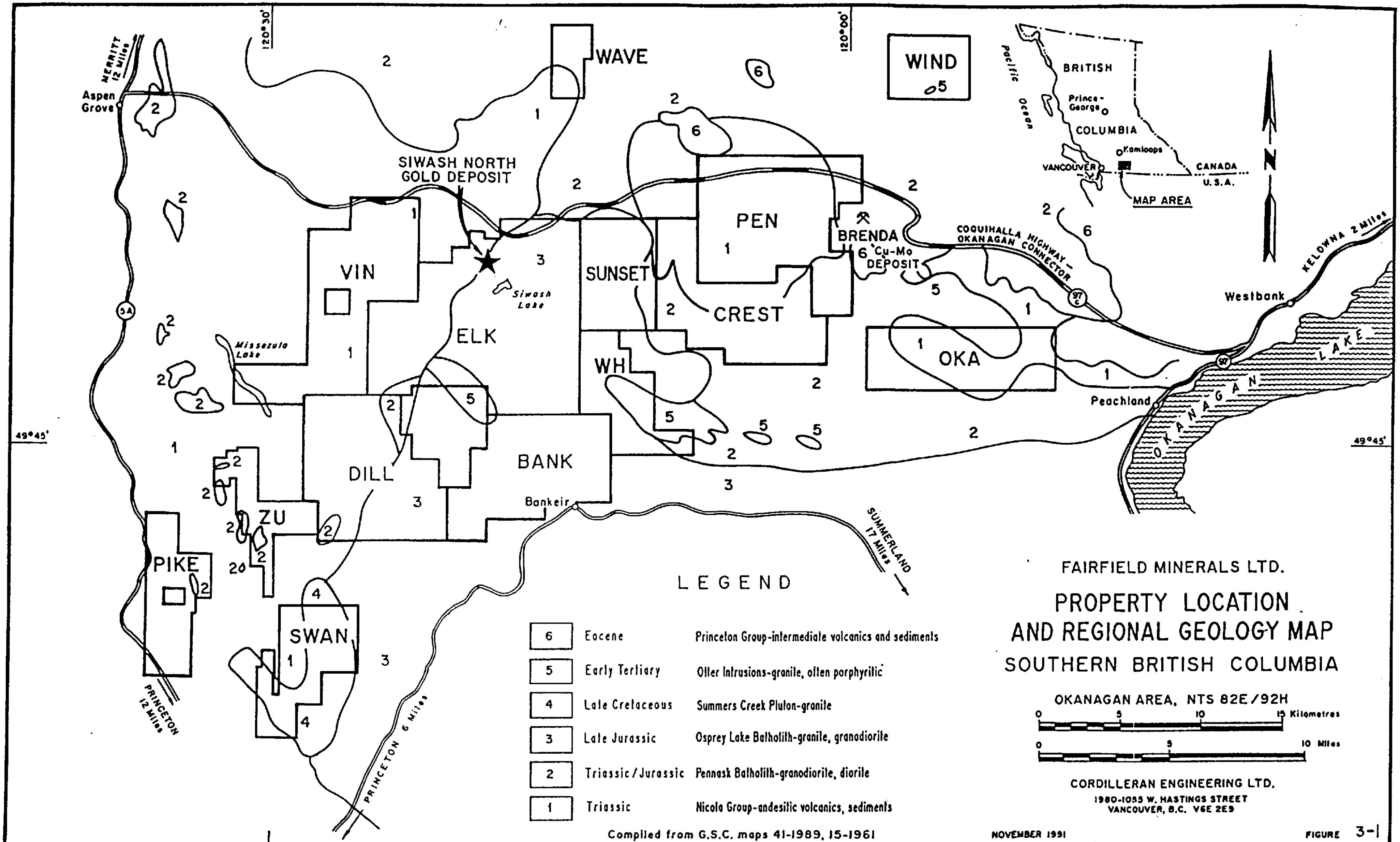
The Siwash North gold deposit is located in the Intermontane tectonic belt of south-central B.C. The area is underlain by Upper Triassic volcanics and sediments of the Nicola Group and by Jurassic granites and granodiorites of the Osprey Lake Batholith. The contact between these units trends northeasterly across the deposit area. Early Tertiary feldspar porphyry stocks and dykes of the Otter Intrusions occur throughout the area and one such large stock, to the south of the deposit is spatially associated with many known narrow vein showings of copper, lead, zinc and silver.

3.2 Property Geology

The area west of the Siwash North deposit is underlain by steeply west-dipping andesitic to basaltic flows, agglomerates, tuffs and minor siltstone and limestone units of the Upper Triassic Nicola Group. The eastern area is underlain by Jurassic granitic rocks of the Osprey Lake Batholith. The contact between these two assemblages trends approximately north-northeast. Upper Cretaceous to Tertiary feldspar porphyry and quartz-feldspar porphyry stocks and dykes of the Otter Intrusions cut both of the above. Breccias containing rounded volcanic, dioritic and granitic fragments in a granitic matrix crosscut Nicola Group rocks as well as Osprey Lake and Otter Intrusions. Andesite dykes are the youngest units mapped, post dating all of the above. Mineralization appears to be spatially associated with these Tertiary(?) andesite dykes which are locally cut by quartz veins.

The Nicola Group lithologies mapped on the Elk property consist of dark greyish green, massive basaltic andesite; some porphyritic containing pyroxene and/or amphibole phenocrysts; some containing 0.5 mm laminae of sand-sized black grains; pale grey-green siliceous laminated tuff; and brownish-green to pale green agglomerates containing fragments from 5 to 50 cm in size. Nicola Group rocks are occasionally silicified, carbonatized or epidote altered. Iron oxide staining and finely disseminated pyrite are common.

The Osprey Lake granitic rocks on the Elk property are pinkish grey, medium- to coarse-grained, equigranular, and contain quartz, orthoclase, plagioclase and biotite. Petrographic analyses indicate the composition varies from quartz monzonite to granodiorite. Pink, sugary textured aplite and pegmatite dykes cut the quartz monzonite and were probably a late phase of the intrusive event. Quartz diorite related to the batholith is far less common and occurs as stocks. It is pale grey, generally medium to fine grained and contains visible quartz, plagioclase, biotite and amphiboles. Dykes of quartz monzonite and hornblende-biotite quartz monzonite have also been mapped. They are medium greenish-grey, medium grained and contain feldspar and occasionally hornblende phenocrysts. Alteration assemblages include weak to strong propylitic, argillic, phyllic and silicic, noted predominantly in the trenched areas where these recessively weathering features have been exposed.



FAIRFIELD MINERALS LTD.
PROPERTY LOCATION AND REGIONAL GEOLOGY MAP
SOUTHERN BRITISH COLUMBIA
OKANAGAN AREA, NTS 82E/92H
0 5 10 15 Kilometres
0 5 10 Miles
CORDILLERAN ENGINEERING LTD.
1980-1055 W. HASTINGS STREET
VANCOUVER, B.C. V6E 2E9
NOVEMBER 1991
FIGURE 3-1
LEGEND
6 Eocene Princeton Group-intermediate volcanics and sediments
5 Early Tertiary Otter Intrusions-granite, often porphyritic
4 Late Cretaceous Summers Creek Pluton-granite
3 Late Jurassic Osprey Lake Batholith-granite, granodiorite
2 Triassic/Jurassic Pennask Batholith-granodiorite, diorite
1 Triassic Nicola Group-andesitic volcanics, sediments
Compiled from G.S.C. maps 41-1989, 15-1961
SIWASH NORTH GOLD DEPOSIT
BRENDA Cu-Mo DEPOSIT
WAVE
WIND
PEN
VIN
ELK
SUNSET
CREST
WH
OKA
DILL
BANK
ZU
PIKE
SWAN
Siwash Lake
Missezula Lake
Aspen Grove
MERRITT 12 Miles
PRINCETON 12 Miles
PRINCETON 6 Miles
SUMMERLAND 17 Miles
KELOWNA 2 Miles
Bankeir
Westbank
Peachland
OKANAGAN LAKE
COQUIHALLA HIGHWAY - OKANAGAN CONNECTOR
5A
97
97C
120°30'
120°00'
49°45'
BRITISH COLUMBIA
Pacific Ocean
Prince George
Kamloops
VANCOUVER
CANADA
U.S.A.
MAP AREA
N

The Otter Intrusions comprise quartz-feldspar porphyry, feldspar porphyry and quartz-biotite-feldspar porphyry dykes and stocks. Quartz-feldspar porphyry is extensively clay altered and contains feldspar phenocrysts up to five cm, averaging about five mm. The altered groundmass is beige in colour and extremely friable. Feldspar porphyry rocks range from medium grey to red and contain feldspar phenocrysts 2 to 5 mm in size that vary in quantity from 3 to 40 percent. Petrographic examination of the red, medium packed feldspar porphyry indicated that it is syenitic in composition. Quartz-biotite-feldspar porphyry is greyish beige and is typified by small biotite grains with equal quantities of fine quartz and feldspar phenocrysts.

The breccias noted on the property have granitic matrices and contain rounded to sub-rounded granite, diorite and andesite clasts varying in size from 5 to 25 cm. The elongate breccia bodies vary in width from 5 to 30 metres and trend northeasterly. These zones may be portions of major fault structures, but displacement, if any, is not readily apparent.

Andesite dykes are dark greyish-green, fine grained and vary in thickness from 30 cm to 5 metres. They are commonly muscovite altered and brown weathering. Strong clay alteration in orange and blue colours has also been noted in these rocks.

3.3 Structural Geology

Nicola Group rocks on the west side of the property dip approximately 60 degrees to the west forming the east limb of a syncline. The syncline trends roughly north-south and its axis passes about five km west of the claims.

The property topography reflects several linear structures, the most prominent being the north to northeast trending features occupied by Siwash Creek, Elusive Creek and a parallel creek 2.5 kilometres to the east. Subtle east-northeast trends are evident on aerial photographs and are commonly associated with vein structures.

Structural deformation in the deposit area appears to be minimal.

3.4 Mineralization (Figure 2-2)

Gold mineralization has been identified at five locations on the property, hosted primarily by quartz veins and stringers in altered granitic and, less frequently, volcanic rocks. Cross-cutting relationships indicate that the veins are Tertiary in age possibly related to Tertiary Otter intrusions.

In the Siwash North area, gold occurs in veins measuring less than 5cm to over 70cm thick, hosted by a zone of strongly sericitic- to phyllic-altered granitic and, in the west, volcanic rocks. In general, the mineralized zone trends east-northeast with southerly dips from 15° to 70° and appears to be related to minor shearing. In the eastern parts of the area, up to six sub-parallel veins occur. Five of these are consistent enough to be labelled the A to E zones. Mineralization in the west has been identified in one and locally two zones (B and C zones).

At surface, most of the sulfides have been leached out of the quartz leaving only minor pyrite and chalcopyrite. Mineralization occurs primarily as native gold, occasionally as spectacular aggregates of fine flakes, in frothy quartz (strong pyrite boxwork) or in fractures in the vein. The majority of the gold is fine grained, predominantly less that 50 microns in diameter.

At depth, mineralization has not been affected by supergene processes. Gold is strongly associated with pyrite and with a blue-grey mineral. Photomicrographs show the gold commonly in contact with this mineral, which may be an Au-Bi alloy (maldonite?) or a Cu-Bi-Sb sulfosalt. Au-Cu, Au-Bi, and Cu-Bi relationships have been indicated by statistical determinations. Metallic minerals in the vein include pyrite, chalcopyrite, sphalerite, galena, tetrahedrite, maldonite(?), pyrrhotite, and native gold (in order of decreasing abundance).

Gangue mineralogy consists primarily of quartz and altered wall-rock fragments. Ankerite is occasionally present, with lesser amounts of calcite. Minor barite is also present. Fluorite was noted in one vein as very small zoned purple cubes scattered in the quartz.

In the Lake Zone, 800 metres south of Siwash North, mineralization occurs mainly in quartz stringers and veins up to 35cm thick, hosted by strongly argillic- to phyllic-altered granitic rocks, closely associated with an andesite dyke. The zone trends east-west and dips about 50° to the south. At surface and in drill core, the gold is associated with pyrite, chalcopyrite, and locally high concentrations of galena and sphalerite. Tetrahedrite and maldonite(?) are also locally present. Silver values are much higher than in Siwash North, probably associated with the greater galena content of the veins. The gangue mineralogy is similar to Siwash North.

Mineralization near the southwest end of Siwash Lake, known as the End Zone, is similar to that in the Lake Zone, but trends approximately northeast dipping about 55° to the south. The quartz veins are 1 to 20cm in thickness and are hosted in strongly to moderately altered quartz monzonite. The dominant sulphide minerals noted in the quartz veins were pyrite, galena, sphalerite, chalcopyrite, tetrahedrite and arsenopyrite. Silver to gold ratios were also elevated, similar to the Lake Zone.

The North Showing is the original gold discovery which led to staking of the mineral claims. It is located in a clear-cut area 2.0km south of Siwash North. An irregular northeast-trending quartz vein ranging from 10 to 80 cm thick contains up to 20% pyrite and local minor chalcopyrite and galena. Sampling has returned up to 1.32 oz/ton gold across 27 cm. The vein is spatially associated with an andesite dyke which cuts granitic hostrock and an irregular body of clay-altered feldspar porphyry. The vein structure has been traced by trenching for a length of 200m.

In the South Showing area, 2.7 km south of Siwash North, mineralization occurs mainly in quartz stringers in altered granitic rocks in association with breccia or with intensely argillized andesite dykes. Gold is rarely visible and is associated with pyrite and base-metal sulfides. The highest grade sample interval is from a zone of quartz stringers paralleling the breccia, within weak sericitic alteration. A strong, consistent shear structure containing the local veining and breccia has been traced by trenching over a length of 800m.

In the Elusive Creek area, 4.5 km southwest of Siwash North, wide-spaced trenches exposed northeast-trending, altered granitic dykes cutting volcanic rocks. Siliceous alteration and quartz vein masses returned local gold values of up to 0.17 oz/ton.

The Agur Option area, 3.7 km south of Siwash North, is an extensive gold soil geochemical anomaly which has yet to be evaluated by trenching or follow-up work. Minimal exploration has been conducted on these six targets outside the Siwash North area and very good potential exists for discovery of new ore reserves by exploration drilling.

3.5 Alteration

In the mineralized structures stronger alteration generally accompanies higher grade gold values.

Seven main types of alteration were recognized throughout the property: Propylitic, argillic, sericitic, K-spar stable phyllic, phyllic, advanced argillic and silicic. Locally, potassic alteration, skarnification, and silicification were noted, but were relatively minor and did not appear to be related to mineralization. The following descriptions refer to granitic rocks except as noted.

propylitic: Generally light green with biotite and hornblende altered to chlorite and plagioclase is saussuritized. In volcanics, colour is generally olive-green, and rock is soft.

argillic: Rock is bleached, with plagioclase white and clay-altered; K-spar is slightly altered. Volcanics are bleached to light green or grey.

sericitic: Typically pale green with a micaceous sheen, with plagioclase altered to sericite; trace disseminated pyrite may be present. Often associated with quartz veins, and appears to be the lowest grade alteration associated with gold mineralization. Not recognized in volcanics.

K-spar stable phyllic: Light pink, green, or yellowish with K-spar fresh and pink and blocky. Plagioclase and mafic minerals are altered to fine-grained quartz-sericite-pyrite. Often occurs with veins and associated with gold mineralization. Not recognized in volcanics.

phyllic: Generally grey, fine-grained quartz-sericite-pyrite alteration. Usually associated with veins often gradational to quartz and often auriferous.

advanced argillic: Most or all of feldspar is destroyed, quartz is "free-floating"; often sheared, white in colour. Volcanics are white or blue coloured. Often associated with quartz veins.

silicic: Quartz veining or replacement. Hard with moderate conchoidal fracture. Textures may be blurred.

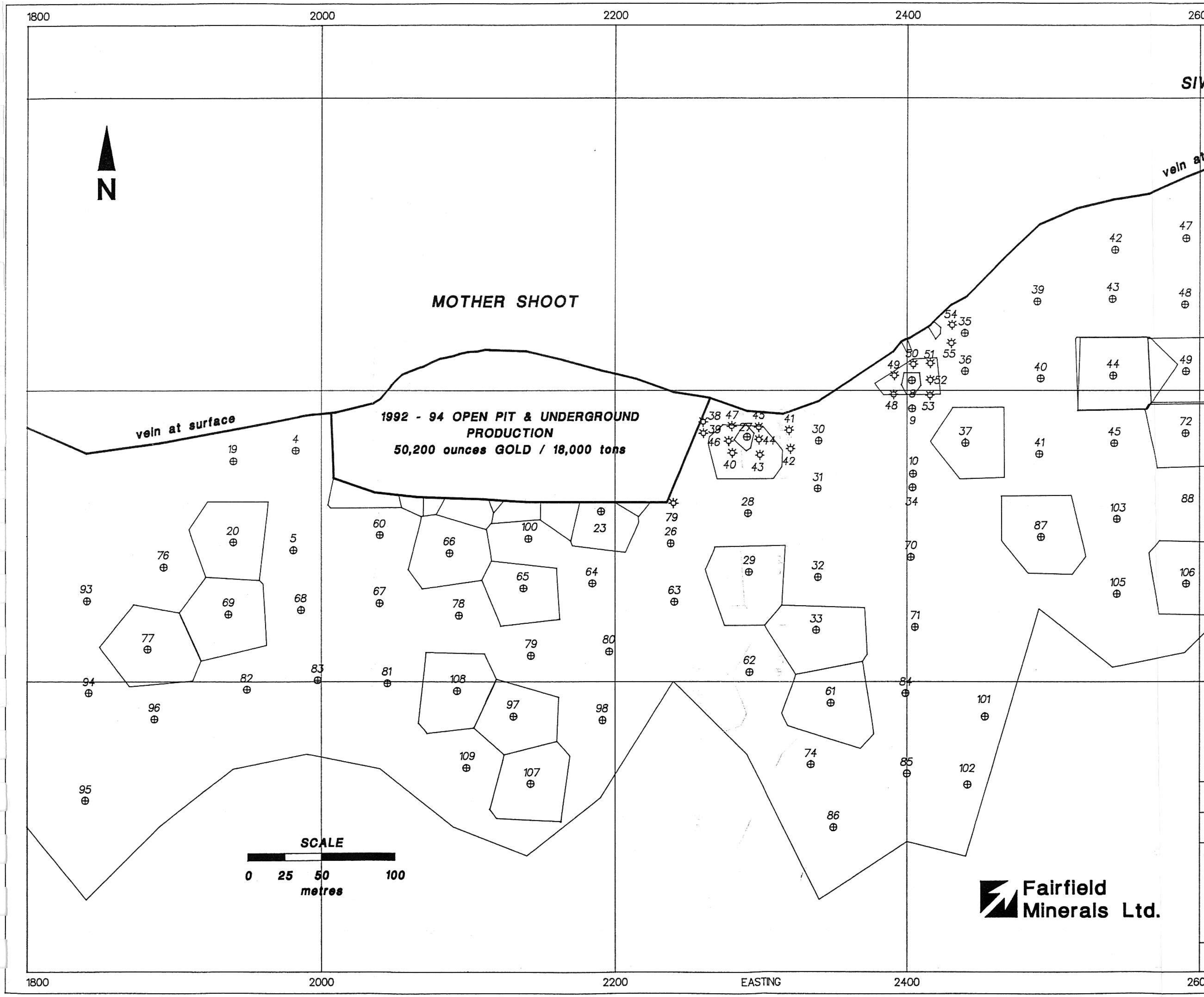
There is a strong symmetrical zoning of alteration around the quartz veins:

Vein - Advanced Argillic - Phyllic - K-Spar Stable Phyllic - Argillic - Propylitic

Secondary bands and zones of alteration may be present, and any of the alterations may be missing.

3.6 Mineral Reserves (Figure 3-2, Table 3-1)

The Siwash North Gold Deposit, excluding the mined out open pit area, has an indicated reserve of 172,224 tons grading 1.066 oz/ton Au containing approximately 183,600 ounces of gold and a similar quantity of silver. This reserve is based predominately on the results of 100 diamond drill holes at 50 by 50 metre spacings. Only vein intercepts grading greater than 0.30 oz/ton (10 gm/tonne) Au over widths of 0.6 to 0.8m were included in the calculations (Table 3-1). A large program of surface and underground diamond drilling is planned for 1995 to confirm and better define the existing reserve. There is good potential to significantly increase this reserve by additional drilling down dip and along strike on the vein system. The bulk of these reserves will require mining by underground development and a large portion will be accessible from extensions to the existing decline in the Mother Shoot area.



CORDILLERAN ENGINEERING LTD.

SIWASH GOLD MINE

LONGITUDINAL SECTION WITH RESERVE POLYGONS

SCALE 1 : 2500

February, 1995 | Figure 3-2

Table 3-1

Jan 9, 95 SIWASH NORTH TOTAL RESERVE SUMMARY 1995

HOLE	ZONE	SECTN	SHOOT	AREAm2	SG	AU oz/t	AVG IN	AU/INT	TONNES	AU/1.0m	TNES/1.0m	AU grams
90- 20	B	1940E	B1	2366.26	2.75	0.743	0.60	25.49	3904.33	15.29	6507.22	99521.35
90- 69	B	1940E	B1	2594.89	2.75	2.457	0.60	58.89	4281.57	35.33	7135.95	252141.57
91- 77	B	1890E	B1	2716.99	2.75	0.972	0.60	33.33	4483.03	20.00	7471.72	149419.51
										23.73	21114.89	501082.42
90- 65	B	2140E	B2	1876.6	2.75	1.411	0.60	48.38	3096.39	29.03	5160.65	149803.35
90- 66	B	2090E	B2	2188.7	2.75	7.974	0.60	146.39	3611.36	87.83	6018.93	528666.26
91- 97	B	2140E	B2	2093.31	2.75	26.738	0.60	171.43	3453.96	102.86	5756.60	592112.62
91- 107	B	2140E	B2	2326.61	2.75	2.480	0.60	57.70	3838.91	34.62	6398.18	221504.91
91- 108	B	2090E	B2	2344.65	2.75	2.670	0.60	60.42	3868.67	36.25	6447.79	233745.19
C92- 14	Ba	2080E	B2	142.485	2.75	0.422	0.60	11.44	235.10	6.86	391.83	2689.55
C92- 76	B	2180E	B2	7.84	2.75	4.481	0.60	152.46	12.94	91.48	21.56	1972.22
T89- 12	B	2010E	B2	61.19	2.50	0.226	0.40	16.66	61.19	6.66	152.98	1019.43
T89- 12	B	2015E	B2	19.56	2.50	0.321	0.40	12.65	19.56	5.06	48.90	247.43
T89- 12	B	2020E	B2	303.21	2.50	0.048	0.40	2.71	303.21	1.08	758.03	821.70
										55.61	31155.44	1732582.65
90- 27	B	2290E	B3	141.99	2.75	1.555	0.80	31.19	312.38	24.95	390.47	9743.07
90- 29	B	2290E	B3	2512.62	2.75	1.752	0.60	46.01	4145.82	27.61	6909.71	190749.32
90- 33	B	2340E	B3	2586.91	2.75	5.117	0.60	143.92	4268.40	86.35	7114.00	614308.34
90- 61	B	2340E	B3	2650.53	2.75	1.791	0.80	50.46	5831.17	40.37	7288.96	294240.64
C92- 42	Bb	2320E	B3	518.08	2.75	0.289	0.80	6.71	1139.78	5.37	1424.72	7647.90
										48.28	23127.86	1116689.26
89- 8	B	2405E	B4	163.698	2.75	1.174	0.80	26.74	360.14	21.39	450.17	9630.03
T90- 3	B	2400E	B4	36.19	2.50	11.952	0.40	409.79	36.19	163.92	90.48	14830.30
T90- 3	B	2415E	B4	59.51	2.50	2.468	0.40	84.62	59.51	33.85	148.78	5035.74
										42.78	689.42	29496.06
91- 87	B	2490E	B5	2596.05	2.75	1.981	0.80	42.31	5711.31	33.85	7139.14	241645.53
90- 44	B	2540E	B6	2467.54	2.75	1.291	0.80	26.61	5426.59	21.29	6785.74	144454.73
90- 49	B	2590E	B6	2332.63	2.75	3.809	0.80	77.96	5131.79	62.37	6414.73	400074.04
91- 90	B	2690E	B6	2306.68	2.75	3.155	0.80	66.75	5074.70	53.40	6343.37	338735.96
91- 111	B	2740E	B6	2430.01	2.75	1.925	0.80	39.48	5346.02	31.58	6682.53	211060.95
										41.73	26226.37	1094325.67
90- 37	C	2440E	C1	1999.97	2.75	1.523	0.80	29.66	4399.93	23.73	5499.92	130502.04
90- 44	C	2540E	C1	2860.66	2.75	1.050	0.80	22.27	6293.45	17.82	7866.82	140155.18
										20.25	13366.73	270657.22
91- 106	C	2590E	C2	2433.38	2.75	1.231	0.80	25.89	5353.44	20.71	6691.80	138600.46
89- 7	C	2640E	C3	2479.5	2.75	2.256	0.80	42.40	5454.90	33.92	6818.63	231287.76
90- 72	D	2590E	D	2130.69	2.75	0.694	0.80	25.36	4687.52	20.29	5859.40	118875.46
90- 50	E2	2640E	E	2510.2	2.75	0.904	0.80	19.55	5522.44	15.64	6903.05	107963.70
90- 73	E2	2640E	E	2599.27	2.75	1.034	0.80	22.18	5718.39	17.74	7147.99	126833.98
										16.71	14051.04	234797.68
								metric	TOT RSRV	36.55	156240.69	5710040.17
								english		1.066	172224.12	183602.58

4.0 CONCEPTUAL MINE PLAN

4.1 Existing Mine Development (Figures 1-1, 4-1 & 4-2)

Bulk sampling of vein material in Siwash North was undertaken in 1992 and 1993 by open pit excavation. In 1992, 58,000 cubic metres (154,000 tonnes) of waste rock was removed and 2040 tonnes of bulk sample was excavated, stockpiled and sampled. The pit had approximate dimensions of 150 metres by 50 metres with a maximum depth of 25 metres, shallowing towards the east where it daylighted to surface. The vein, which dipped on average 20 degrees to the south, was removed from the north wall of the pit leaving the footwall rock which formed a smooth, unbenched, stable slope. The south and west walls, in hangingwall rocks, were benched at 5 metre elevations, attaining overall pit slopes of 52 degrees.

In 1993, the pit was extended west along the vein strike, with the removal of 85,000 cubic metres (225,000 tonnes) of waste rock from an area measuring approximately 90 metres by 60 metres by 25 metres deep. Vein bulk sample totalling 3400 tonnes was extracted down to the same floor elevation as the 1992 pit. South and west walls were benched at 10 metre elevations giving an average wall slope of 55 degrees. The north footwall slope steepened toward the west, from 20 to 35 degrees, and the east end of the pit remained open to surface.

In 1994 the pit was expanded to the south to access down-dip ore. Waste rock totalling 336,000 cubic metres (890,000 tonnes) was removed, enlarging the pit to approximately 240m by 110m by 40m deep. Ore totalling 9,335 tonnes was extracted to a depth 15m below the previous floor elevation. The vein was peeled from the north slope of the pit which ranged from 15 degrees to 40 degrees in dip, steepening to the west. The south and the end walls were benched at 10m and 30m depths giving an average wall slope of 46 degrees. A ramp was built from the east entry road, angling down the north slope at 15% grade to access the pit bottom. The toe of the backwall broke through to the underground stope in two locations. One breakthrough is now utilized as an escapeway from the underground to surface and the second is used for auxiliary ventilation.

Waste rock from the open pit, totalling 479,000 cubic metres, has been placed in two dumps of approximately equal volumes located northeast and northwest of the pit. The dumps are stable, sitting on level to gently sloping topography. The dump tops are flat and the slopes have been reduced to an angle of about 25 degrees, topped with soil and grass seeded.

Vein material from the open pit has been stockpiled in two levelled and compacted landings totalling 8000 square metres located about 250 metres east of the pit. A 50 ton truck scale installed near the landings was used to weigh vein material as it was trucked to the stockpiles. A sample plant set up in the same area was used to crush and split samples of up to 250 kg from the ore piles to allow accurate grade calculations.

In 1993 a portal site was established 80 metres north of the pit and a 3.6 by 3.0m decline was driven in the footwall of the vein for 425m at -15% to 1566m elevation. Two cresscuts were driven from the decline to intersect the vein at 1611m and 1570m elevations.

The 1611 ore drift was driven timbered at 3.0m high by 2.5m wide for a length of 47m. The vein was resued (mined separately from adjacent wallrock) and stockpiled on surface in individual rounds. Three raises, at 5m centers were driven up dip 13m on the vein, which was also resued. Raises were inclined at about 18 degrees, measured 1.5m wide by 2.0m high and required no support. Upon completion of the raises, vein material was slashed from between raises using 2m longholes producing an average stope width of 0.55m. Support stulls were wedged into the stope at approximately 1.0m centres and timber caps were installed across the span of the raise openings. Stoped ore was slushed to the ore drift, loaded into a scooptram bucket and hauled to surface stockpiles. An estimated 310 tonnes averaging 1.99 oz/ton gold were recovered from the 1611 drifting, raising and stoping.

The 1570 ore drift was driven 42m at 3.0 by 3.0m in the vein hangingwall utilizing heavy timber, spiling, shotcreting and local steel sets. The vein was resued successfully from the drift wall, recovering approximately 120 tonnes averaging 1.21 oz/ton gold. A hangingwall fault parallel to the vein and blocky unstable ground necessitated expensive ground support requirements. From the east end of this drift a 4-metre long slusher drift with dimensions of 1.2m wide by 2.0m high advanced in the vein footwall without support. The vein was resued successfully. The 1570 drift was then backfilled with cemented rock fill.

In early 1994 raising and stoping were continued from the 1611 drift. The three raises were lengthened and an additional six raises were driven to allow stoping of an area measuring approximately 18m by 45m which yielded 1170 tonnes of ore averaging 2.287 oz/ton gold.

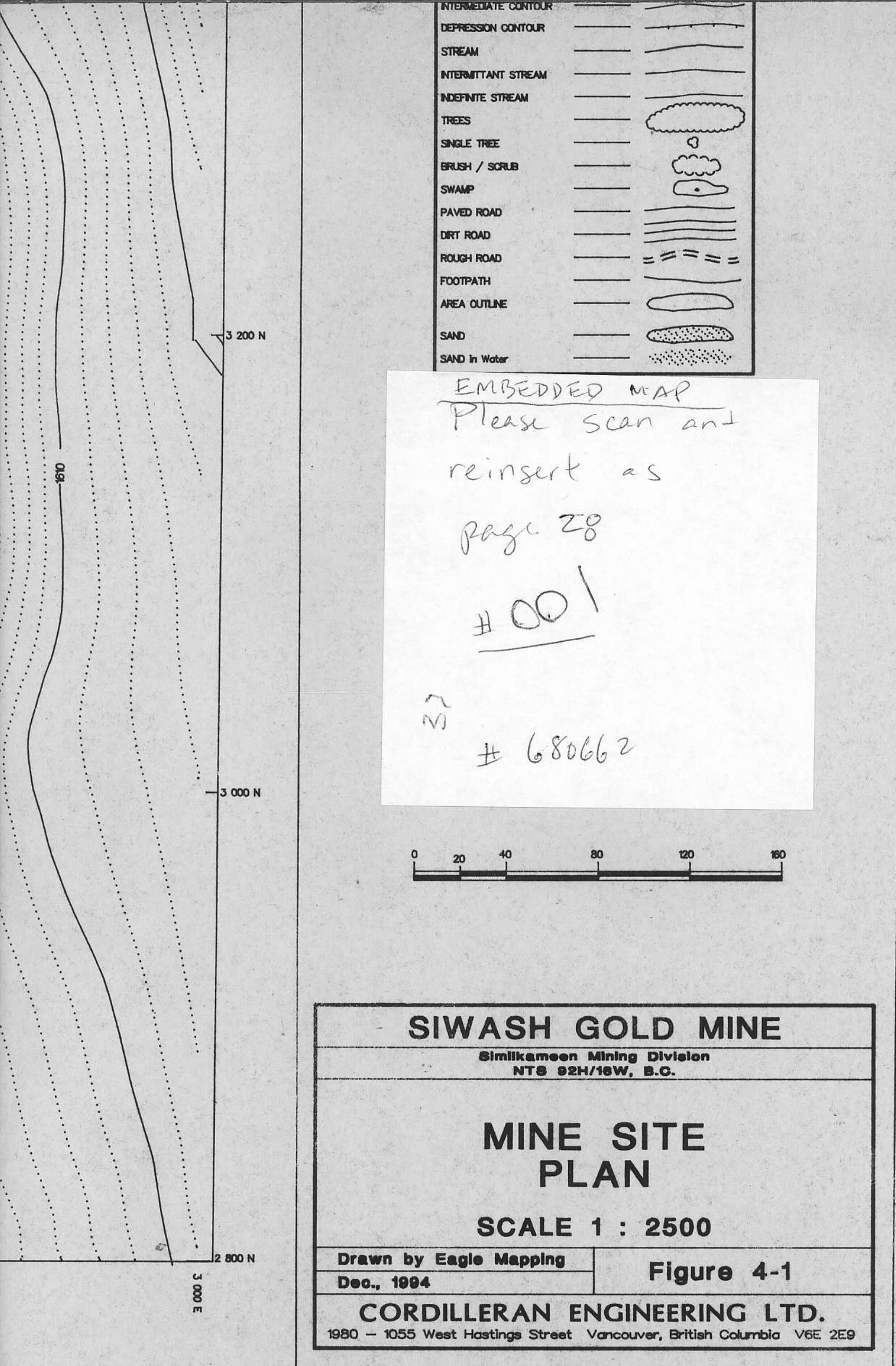
Following completion of the open pit in October, 1994 underground work continued. Advance resumed on the main decline at -15%, proposed to extend 400m to 1510 elevation. As well, work is underway to drive a decline 170m easterly at -15% from 1592 elevation in the main ramp. When completed these headings will provide access for underground diamond drilling which will better define ore reserves and aid in designing mine plans.

A shrinkage mining test was undertaken in a small area between 1589 and 1596 elevations. A narrow slusher drift, averaging 1.2m wide, was driven on the vein and vein footwall for a length of 32m. Walls of the drift were shotcreted as it advanced to provide support of altered wallrock. The 1591 and 1593 levels were breasted by jackleg and excess swell was removed by slusher to provide working space on top of the broken muck. Shotcrete and occasional wooden cross braces were used on the stope walls to provide support. The shrinkage stope ranges from 0.7m to 1.8m wide, averaging about 1.1m. The floor of the stope is 32m long and the top, at 1596 elevation, is about 15m long. An estimated 350 tonnes of broken muck remains in the stope and approximately 150 tonnes have been hauled to stockpiles on surface.

A longhole mining test is underway in a second area between 1584 and 1604 elevations. Initially a 32m slusher drift was driven on the vein but continuous timber sets and lagging were required for support. Footwall access drifts were then driven on the 1584 and 1594 levels, each with two cross-cuts to the vein 14m apart. Two raises were driven on the vein between upper and lower cross-cuts. A longhole drill was used to drill 2 inch diameter holes in a fan pattern from one of the upper cross-cuts to 1604 elevation. Longholes were drilled horizontally from each of the raises between 1584 and 1594 elevations. The holes range from 6m to 12m in length and are in two rows approximately 0.3m apart, along each side ef the vein. The stope will be blasted from the bottom up, breaking downward into the undercut drift. Swell will be drawn out through drawpoints on the 1584 level. The test stope is expected to measure approximately 600 cubic metres yielding 1600 tonnes.

Waste rock from the decline and from the ore drifts was placed against the west side of the east dump and bulk sample vein material was stockpiled on a levelled surface of the east dump.

A settling sump (Sump U) with 200,000 litres capacity, located north of the portal, is used to contain groundwater pumped from underground which is then recycled for use in the underground mining. Site access roads, equipment landings and existing infrastructure of the work site are largely sufficient for proposed future work in the Siwash deposit.



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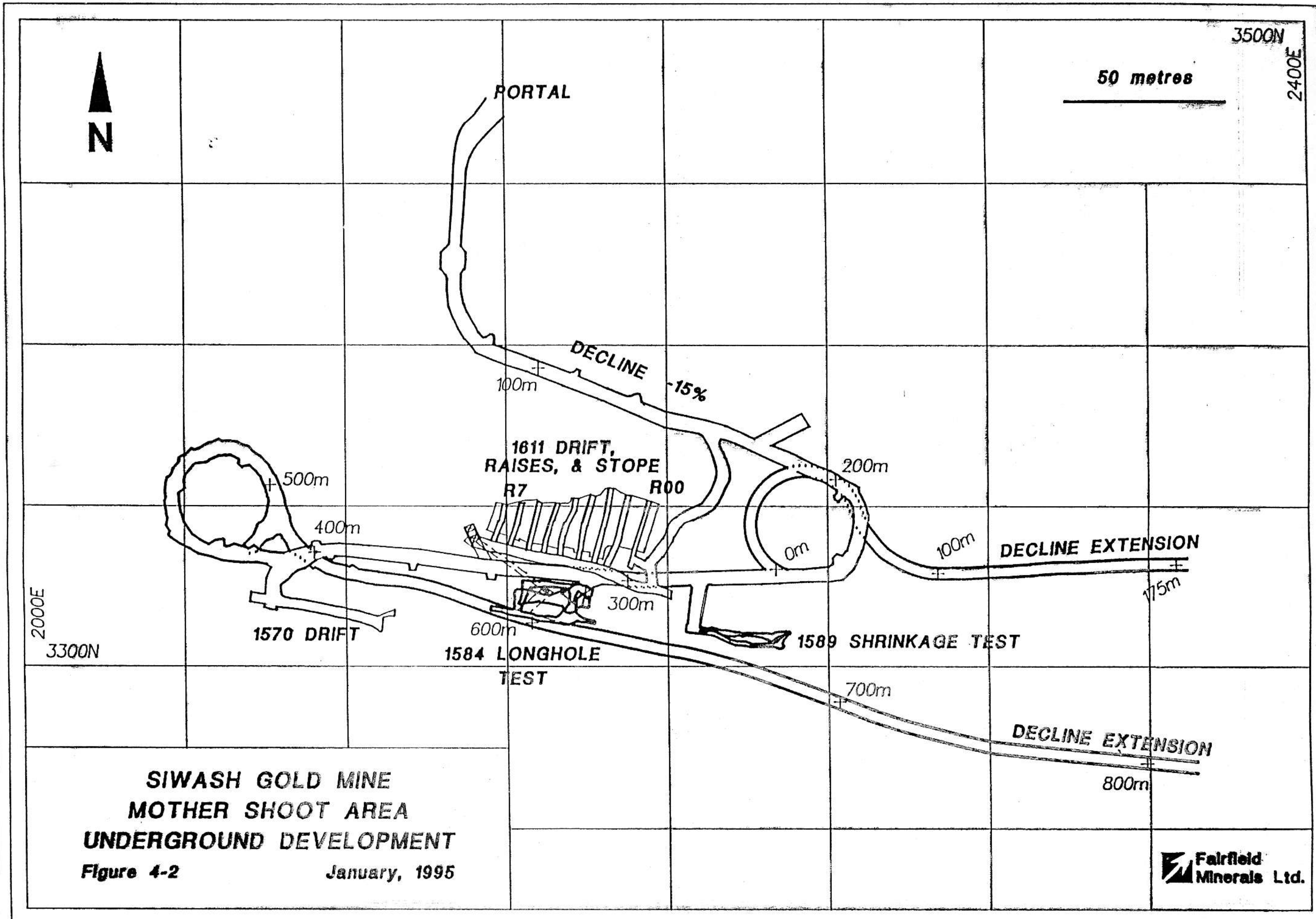


SIWASH GOLD MINE
MOTHER SHOOT AREA
UNDERGROUND DEVELOPMENT

Figure 4-2 January, 1995

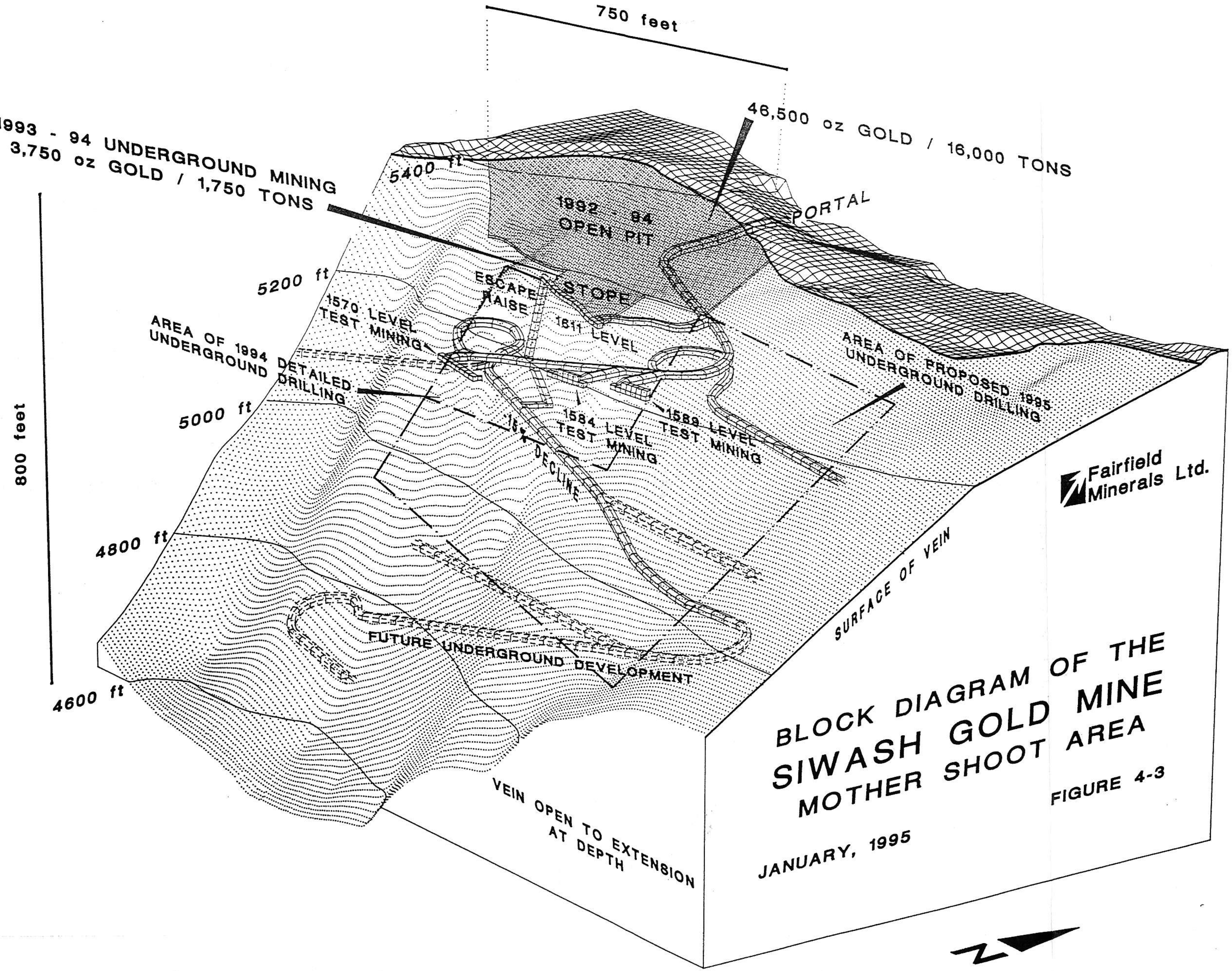
4.2 Mine Design (Figure 4-3)

Underground mine design is very preliminary at this time and contingent upon the results of further definition drilling and test stoping. The basic design for the Mother Shoot area consists of a main decline spiraling downward at -15 percent and positioned 15 metres in the footwall of the vein (Figure 4-3). This allows drill testing of the vein with short holes from set-ups located at 10 metre intervals along the decline. Areas of proposed stoping can be accessed by short cross-cuts from the decline. The current plan has the decline extending a total length of 1270 metres to the deepest drilled vein intercept at 1440m elevation The reserves remain open to depth and the design allows continuation of the decline as required. The present program will extend the main ramp to a length of 800 metres reaching 1510 elevation by March, 1995. Additional footwall drifts will be driven from the main ramp to provide access for drill definition and development of other indicated satellite reserves. An estimated 1000 metres of additional access drifts may be required. An escape raise with ladderway extends between spirals of the decline and to the upper stope area (1611 level) which is open into the bottom of the pit. As the decline is advanced to depth additional legs of the escape raise will be driven and connected together.

The eastern part of the Siwash deposit is expected to be developed by a separate decline. A site approximately 250 metres east of the existing portal is the preferred location for a second decline to spiral down in the footwall of flat-lying veins in that area. Additional surface drilling will be undertaken in 1995 to better define reserves prior to committing to this decline. An estimated 1500 metres of access ramp may be eventually required to develop the Siwash East area. Therefore, possible additional decline construction for exploration and mining of the Siwash Deposit is estimated at 1500 metres for the Mother Shoot and 1500 metres for Siwash East, totalling 3000 metres with dimensions of 3.0 x 3.6 m producing 32,400 cubic metres of waste rock.

Mining will require development in the vein footwall consisting of scram drifts, drawpoints, raises and cross-cuts. The amount of this development will vary according to the mining method used. Estimated mining development for the Mother Shoot is 3000 metres and for Siwash East is 2000 metres, totalling 5000 metres with dimensions of 2.5 x 3.0 m producing 37,500 cubic metres of waste rock.

It is anticipated that various mining methods will be employed throughout the deposit. Encouraging results have been returned from shrinkage mining testwork and resuing techniques. As well, cut-and-fill and longhole methods may be applied in some parts of the deposit. Mining procedures will be tailored to specific ground conditions, ore configuration, cost considerations and grade requirements. It is expected that flat-dipping (<20°) ore will be mined by the same method utilized successfully in the 1611 stope (see Section 4.1). The Siwash East reserves are contained within very flat-dipping veins and a portion of the Mother Shoot above 1600 elevation is flat-dipping. Mining of steeper-dipping (45° - 70°) ore is largely influenced by the competency of the vein hangingwall. It has been learned that shotcreting can be very effective in supporting the hangingwall if it is applied immediately behind the advancing face. In all cases it is important to limit the width of openings on the vein and to drive with the vein on the hangingwall side. It is anticipated that most of the ore drifts and stopes will be restricted to widths of less that 1.5m. Accordingly, equipment used for drilling, blasting and mucking will be of small size and therefore production rates will be limited. The recent shrinkage test indicated a production rate of about 25 tonnes per day from a single stope. It is anticipated that there will be sufficient stopes developed to produce 140 to 160 tonnes per day yielding about 50,000 tonnes per year.


750 feet
46,500 oz GOLD / 16,000 TONS
1993 - 94 UNDERGROUND MINING
3,750 oz GOLD / 1,750 TONS
5400 ft
1992 - 94
OPEN PIT
PORTAL
5200 ft
ESCAPE RAISE
STOPE
1570 LEVEL
TEST MINING
1611 LEVEL
AREA OF 1994 DETAILED
UNDERGROUND DRILLING
AREA OF PROPOSED 1995
UNDERGROUND DRILLING
5000 ft
1584 LEVEL
TEST MINING
1589 LEVEL
TEST MINING
DECLINE
800 feet
Fairfield Minerals Ltd.
4800 ft
SURFACE OF VEIN
FUTURE UNDERGROUND DEVELOPMENT
4600 ft
BLOCK DIAGRAM OF THE
SIWASH GOLD MINE
MOTHER SHOOT AREA
FIGURE 4-3
VEIN OPEN TO EXTENSION
AT DEPTH
JANUARY, 1995
N

4.3 Waste Rock Characterization (Table 4-1)

Representative samples of various waste rock types have been subjected to acid-base accounting tests. Ten drill core samples were selected from five drill holes which were located within, or near, the area of open pit excavation (Table 4-1). Most of the samples were granodiorite which showed various intensities of alteration, from unaltered to strong phyllic. Strongly altered hostrocks occur adjacent to the ore vein, extending 10 to 50 centimetres into both the hangingwall and footwall rock. The degree of alteration diminishes rapidly away from the vein grading into fresh to weakly altered at a distance of about 1.5 metres. Additional narrow zones (<0.5 m) of moderately to strongly altered granodiorite or andesite dykes are locally associated with separate structures in the hangingwall several metres above the ore vein. Narrow quartz veins are sometimes located along these structures.

Estimates based on studies of drill core and existing underground excavations indicate that over 95% of the waste rock from declines and footwall development headings will comprise fresh or weakly altered grandiorite. Samples of these rock types all showed low maximum potential acidity and high net neutralization potentials of 31.7 to 39.4. These numbers indicate considerable capacity for the bulk of the waste rock to neutralize any small volume of acid producing rock which may be excavated and mixed into the waste piles. Samples of strongly altered hostrocks, which typically contain 1 to 5 percent disseminated pyrite, gave higher potential acidity values but with their inherent neutralization potential largely balancing the acidity they show little potential for causing any acid generation.

4.4 Waste Rock Disposal Plan (Figure 4-1)

Existing waste rock dumps in the Siwash North area are comprised of approximately 480,000 banked cubic metres from the 1992-94 open pit excavation and 7000 banked cubic metres from 1993-94 underground test mining, predominantly from the 425 metre-long decline.

The present dumps cover an area of about 60,000 square metres, located to the northwest and northeast of the existing pit (Figure 4-1). The west dump covers approximately 25,000 square metres, lies on a moderately-dipping north slope and has a maximum height, at its north edge, of 22 metres. Slopes are at approximately 25° and larger boulders are concentrated at the toe of slope. The top of the dump is sloped gently to the south from 1658 m elevation. Access to the west dump surface is via a road traversing the eastern slope or from around the west end of the pit.

The east dump covers approximately 35,000 square metres, sits upon flat to gently north-sloping ground and has a maximum height of 24 metres at the north end. The bulk of the dump is composed of rock from the open pit and waste rock from underground is being placed against the western slope. The top of the dump slopes gently south from 1642m elevation and the north and east faces have been flattened to about 25°. The west slope remains at the natural angle of repose (35 degrees).

The east dump is accessed by road from the south side or from the portal via ramp to the west slope. Currently the west part of the dump provides storage for a number of small stockpiles of vein bulk sample material which was mined from two levels underground in 1994.

The proposed underground mining is expected to produce 70,000 banked cubic metres of waste rock. Proposed dump expansions will be adjacent to the existing east dump and may increase the dump area by up to 10,000 square metres.

Dump stability is not expected to be a concern. The south end of the west dump lies on a hillside sloping at up to 12 degrees but the bulk of the waste rock on the north side sits on nearly level ground. The east dump lies on an area of flat ground and the proposed extension area to the west slopes gently at up to 6 degrees. There have been no occurrences of slumping or slope instability on the dumps from 1992 to 1994.

Table 4-1

SIWASH NORTH GOLD DEPOSIT
SUMMARY OF DRILL CORE ACID-BASE ACCOUNTING SAMPLES

Sample #	Rock Code	Description	Total S(%)	Paste pH	Neutr. Potential	Max. Pot. Acidity	Net Neutr. Potential
89-1-1	P2GD	Hanging wall 1m above vein. Mod propylitic alt Granodiorite.	0.03	8.6	33.60	0.94	32.7
90-13-10	GD	Hanging wall 5m above vein. Fresh Granodiorite.	0.05	9.1	39.80	1.56	38.2
90-16-1	P1GD	Hanging wall 7m above vein. Weak propylitic & minor sericitic alt Granodiorite.	0.02	9.1	32.30	0.63	31.7
90-21-18	GD	Footwall 20m below vein. Fresh Granodiorite.	0.01	8.7	39.70	0.31	39.4
90-21-2	P4GD	Hanging wall 5m above vein. Strong propylitic alt Granodiorite.	0.01	8.3	20.00	0.31	19.7
90-21-3	F4GD	Hanging wall 6m above vein. Weak propylitic & strong phyllic alt Granodiorite.	0.94	7.9	34.60	29.40	5.2
90-21-8	A4GD	Footwall 2m below vein. Strong argillic alt Granodiorite.	0.33	7.5	7.68	10.30	-2.6
91-99-4	F4GD	Hanging wall 7m above vein. Strong phyllic alt Granodiorite with 2 cm qtz vn.	2.20	8.2	69.50	68.80	0.8
AB13-11	P3AD	Footwall 19m below vein. Typical clay alt andesite dyke.	0.05	8.0	62.60	1.56	61.0
AB16-9	AV	Footwall 23m below vein. Fresh andesitic volc, some qtz-carb strgrs.	0.12	9.1	47.80	3.75	44.1

Summary of Alterations

Propylitic: generally light green with biotite and hornblende altered to chlorite and saussuritized plagioclase.

Argillic: bleached, with plagioclase white and clay altered; K-spar is slighlty altered.

Sericitic: pale green with a micaceous sheen, with plagioclase altered to sericite; trace disseminated pyrite may be present. Often associated with veins.

Phyllic: generally grey, fine grained quartz-sericite-pyrite alteration. Usually associated with veins and often gradational to quartz.

4.5 Ore Stockpiling (Figures 1-1 & 4-1)

Two levelled and compacted landings, encompassing 8000 square metres, have been built approximately 250 metres east of the open pit. Vein material mined from the pit in 1992-1994 has been stockpiled in individual piles ranging from 5 to 40 tonnes on these landings. Each individual pile represents a block of the vein structure which has been mapped to determine geological features and location within the vein system.

Some of the open pit bulk sample material was crushed on site to -3 inch diameter with a portable jaw crusher to facilitate handling for a smelter test shipment. Stockpiles were selected, based on gold grades, to be crushed and blended into larger piles of known gold content and chemical composition to be used for test marketing and processing.

Future mining is anticipated to produce vein material grading from 0.2 oz/ton to over 3.0 oz/ton gold. Some of this material may be stockpiled on site in various piles, based on grade categories, prior to feeding to the mill. The existing landings on the east side of the site will continue to be utilized for ore storage.

A 50 ton truck scale owned by the Company is currently set up near the ore landings. It will be used to weigh concentrate trucks as they depart the site.

4.6 Mine Water

Currently the pit floor is at 1620m elevation and a portion of the floor is broken through to the mined-out 1611 stope area. This allows pit water to drain into the underground workings and collect in a sump located in the decline. From there it is pumped to a surface sump near the portal (Sump U). Currently, groundwater flow rate into the underground sump is about 15 litres per minute. Groundwater seepage into the pit is minimal however surface runoff is highly variable based on the rate of precipitation, and has the largest inflow during spring thawing of snow accumulated in the pit.

Upon completion of mining and cessation of pumping from the underground sump the decline will fill with water to the portal, at 1628m elevation. It is anticipated that the bottom of the pit will also flood to that elevation which is 8 metres above the floor. This level is 5 metres below the pit exit ramp at 1633m. Therefore surface water entering the pit will continue to circulate through the 1611 stope and up the decline, exiting via the portal into Sump U.

4.7 Mining Equipment and Structures

The proposed underground mining program is expected to utilize a contract mining company to provide all the equipment and operating personnel required. The project is of relatively short duration so the Contractor will utilize trailer facilities. Facilities will include a workshop, fuel tanks, storage for parts and supplies, office, changeroom, lunchroom, first aid room and toilets. No housing or food preparation facilities are required since workers will commute daily from nearby communities.

Equipment expected to be used for the underground mining includes a multi-boom Jumbo drill, 1 to 3.5 yd^3 scooptrams, 16 ton trucks, jacklegs, slushers, shotcrete machine and various pumps and fans. Explosives magazines will be set up on the east side of the site at the permitted location utilized in 1993 and 1994.

Upon completion of the underground mining all equipment, structures and materials will be removed from the site and the contractor's equipment yard will be reclaimed.

4.8 Explosives

The predominant explosive product to be used for underground blasting will be a mixture of ammonium nitrate and fuel oil (Anfo). Cartridges of packaged explosives will be used as primers, which will initiate the bulk product in each hole or, in some instance, will be used in place of bulk explosive if excessive water is encountered. Packaged products will consist predominantly of ammonium nitrate or trinitrotoluene (TNT). Packaged explosives will be stored in permitted magazines located on the east side of the site, well away from the work site. Small quantities of explosives will be stored underground in designated, well marked steel boxes.

Explosives will be detonated by non-electric down-hole delay detonators. Detonators will be stored in a separate magazine in the same area as the explosives magazine.

5.0 CONCEPTUAL MILL PLAN

Construction of a 250 ton per day gravity-flotation mill is proposed at the Siwash North mine. A site has been selected 350 metres southeast of the Mother Shoot portal (Figure 4-1) which is also easily accessible from a potential second decline in the Siwash East area. A tailings impoundment encompassing approximately 8 hectares is proposed in an area 1.3 km north of the mill. This impound can be constructed by erecting a dam along the east and south sides and ditching along the west side to divert runoff water from entering the pond. A tailings slurry line, along with a water reclaim line, will extend between the mill and pond along the existing access road for a length of 1.6 km. A portion of the mill tailings may be used underground for cemented backfill in stopes. A backfill plant is included in the mill design.

5.1 Mill Process Flowsheet (Figure 5-1)

Coarse Ore Storage, Crushing, Fine Ore Storage

The design calls for a 40-live-ton coarse ore bin into which trucks dump. A steel grizzly with 14 inch opening covers the bin which discharges onto a 12 ft. long x 24 inch wide apron feeder feeding an overhead eccentric type. 18 inch x 30 inch jaw crusher. The jaw crushed ore is conveyed via two 24 inch conveyors to a 4 ft. x 10 ft. double deck screen over a 300-live-ton capacity modular steel fine ore bin. Screen undersize falls into the bin and screen oversize falls via rubber lined chute to a 3 ft. standard cone crusher which discharges onto the jaw discharge belt.

Grinding and Classification

Crushed ore (minus 1/2 inch) is drawn from a slot feeder belt under the fine ore bin using a 36 inch wide conveyor and is monitored using a belt weigh scale. This conveyor feeds a 6 foot x 12 foot ball mill with a 200 HP motor which is in closed circuit with a 10 inch cyclone.

Gravity Concentration

Testwork indicates 40 - 50 % of the gold can be recovered and smelted on-site from a gravity concentrate. Ball mill discharge passes over a Yuba jig which continuously discharges to a holding tank. A full size shaking table processes this concentrate which is cleaned up to 30 - 50 % gold, suitable for refining.

Flotation and Concentrate Dewatering

A recleaned gold flotation concentrate is produced by a bank of eight #24 Denver cells with concentrate cleaning and recleaning by two #24 cells. Flotation concentrate flows to a 12' thickener from where it is pumped to a 24 hour storage tank prior to filtering on day shift by a 6' diameter x 3' disc filter.

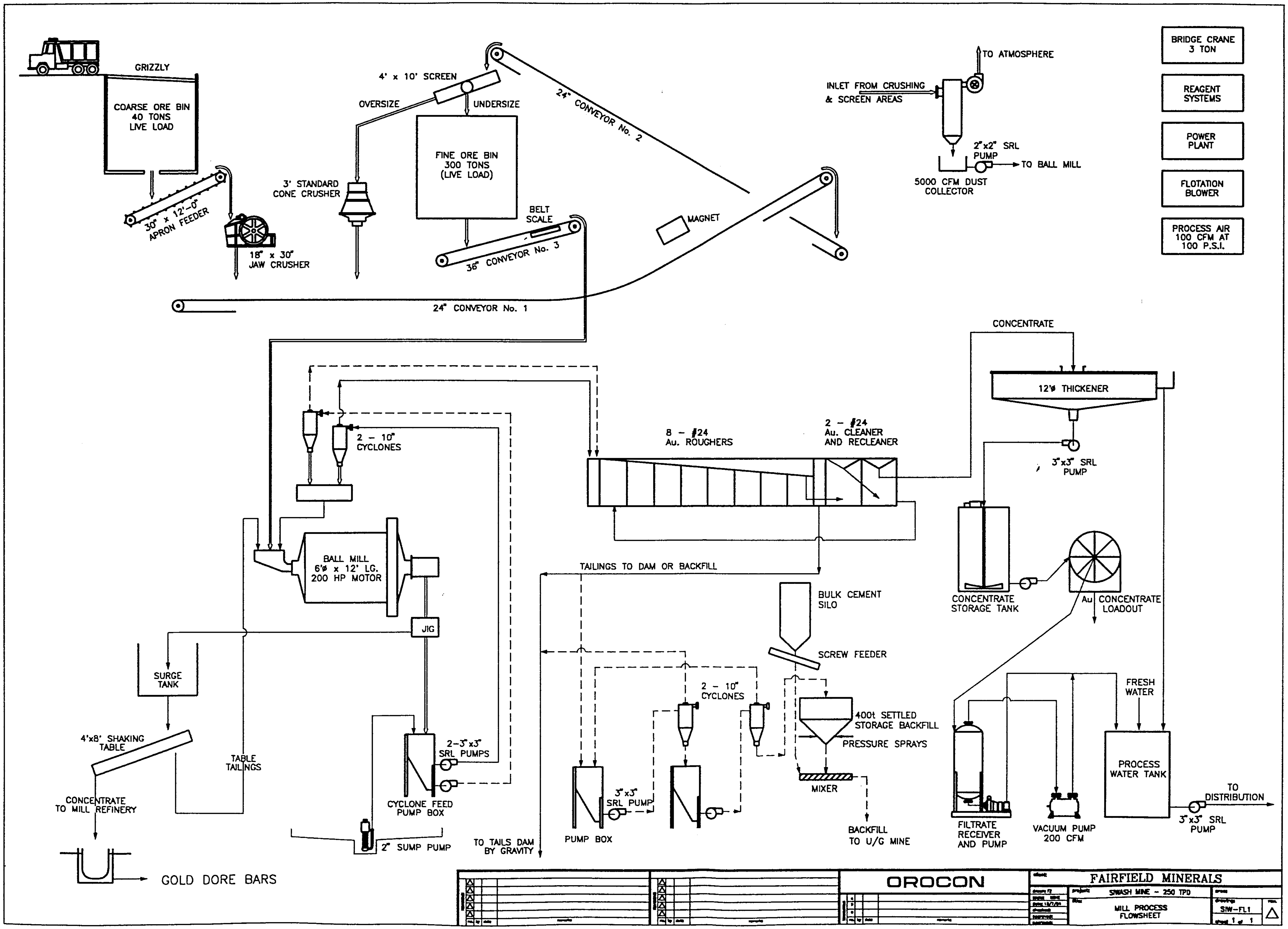

GRIZZLY
COARSE ORE BIN 40 TONS LIVE LOAD
30" x 12'-0" APRON FEEDER
18" x 30" JAW CRUSHER
4' x 10' SCREEN
OVERSIZE
UNDERSIZE
3' STANDARD CONE CRUSHER
FINE ORE BIN 300 TONS (LIVE LOAD)
BELT SCALE
36" CONVEYOR No. 3
24" CONVEYOR No. 2
MAGNET
24" CONVEYOR No. 1
TO ATMOSPHERE
INLET FROM CRUSHING & SCREEN AREAS
2"x2" SRL PUMP
TO BALL MILL
5000 CFM DUST COLLECTOR
BRIDGE CRANE 3 TON
REAGENT SYSTEMS
POWER PLANT
FLOTATION BLOWER
PROCESS AIR 100 CFM AT 100 P.S.I.
2 - 10" CYCLONES
BALL MILL 6'ø x 12' LG. 200 HP MOTOR
JIG
SURGE TANK
4'x8' SHAKING TABLE
TABLE TAILINGS
CONCENTRATE TO MILL REFINERY
GOLD DORE BARS
2-3"x3" SRL PUMPS
CYCLONE FEED PUMP BOX
2" SUMP PUMP
8 - #24 Au. ROUGHERS
2 - #24 Au. CLEANER AND RECLEANER
CONCENTRATE
12'ø THICKENER
3"x3" SRL PUMP
TAILINGS TO DAM OR BACKFILL
BULK CEMENT SILO
SCREW FEEDER
2 - 10" CYCLONES
400t SETTLED STORAGE BACKFILL
PRESSURE SPRAYS
MIXER
BACKFILL TO U/G MINE
3"x3" SRL PUMP
PUMP BOX
TO TAILS DAM BY GRAVITY
CONCENTRATE STORAGE TANK
Au CONCENTRATE LOADOUT
FRESH WATER
PROCESS WATER TANK
FILTRATE RECEIVER AND PUMP
VACUUM PUMP 200 CFM
3"x3" SRL PUMP
TO DISTRIBUTION
OROCON
FAIRFIELD MINERALS
SWASH MINE - 250 TPD
MILL PROCESS FLOWSHEET
SW-FL1

Figure 5-1

Concentrate Loadout

It is envisaged that flotation concentrate will drop into an end dump, 20 ton truck parked under the filter which will go to the smelter. A concentration ratio of 25:1 would result in about 10 tpd of concentrate produced. The existing on-site scale would be used to weigh concentrate trucks.

Backfill Plant

It is possible that the mining method at Siwash will require cemented backfill. The mill tailings could conservatively produce 65% of the mill feed tonnage as good quality backfill using a two stage cyclone system. Backfill would be stored in settled form in a conical steel tank and used when required. Cement would be added prior to flowing underground by gravity.

5.2 Additional Mill Facilities

Power Supply

A 600 KW diesel generator will supply the Mill and ancillary surface equipment power which is expected to require 500 KW at peak demand. A jacket water heat recovery system is proposed for the diesel engines. This would provide heat for the mill, mine dry and office.

Assay Office

A basic fire assay office treating about 25 samples per day is to be located in the mill building. Water and environmental analyses would be performed off site.

Fresh Water Supply

A water well close to the mill site should supply adequate process and potable water. As most of the process water consists of reclaimed tails pond water, fresh water supply is estimated to be 19 - 25 m³/day on average, but will be higher at start-up and during the summer months.

5.3 Tailings Dam (Figure 4-1)

A favourable 8 hectare tailings impoundment area exists 1.3 km north of the mine/mill site. A low dam ranging from 1m to 5m high along 700m of the east and south sides would be required and could probably be constructed from the glacial till within the dam site area using scrapers.

A test drilling program is required to define:
- a) the suitability of the soils for dam building
- b) the porosity of the soils in the dam basin and particularly under the dam itself.

The area appears to have capacity for about 350,000 tons of tailings using a maximum 5m high dam and could be built in stages to accommodate a lower capacity (say 200,000 tons) initially.

A decant tower and reclaim pump would be located in the lowest point of the dam area.

Assuming a zero net precipitation amount (precipitation = evaporation) a zero water discharge could be maintained for the tailing system.

5.4 Water Balances (Figures 5-2, 5-3)

Two water balance diagrams are shown for average conditions - one without use of backfill underground and the other using 30% of the mill feed as backfill (Figures 5-2 & 5-3).

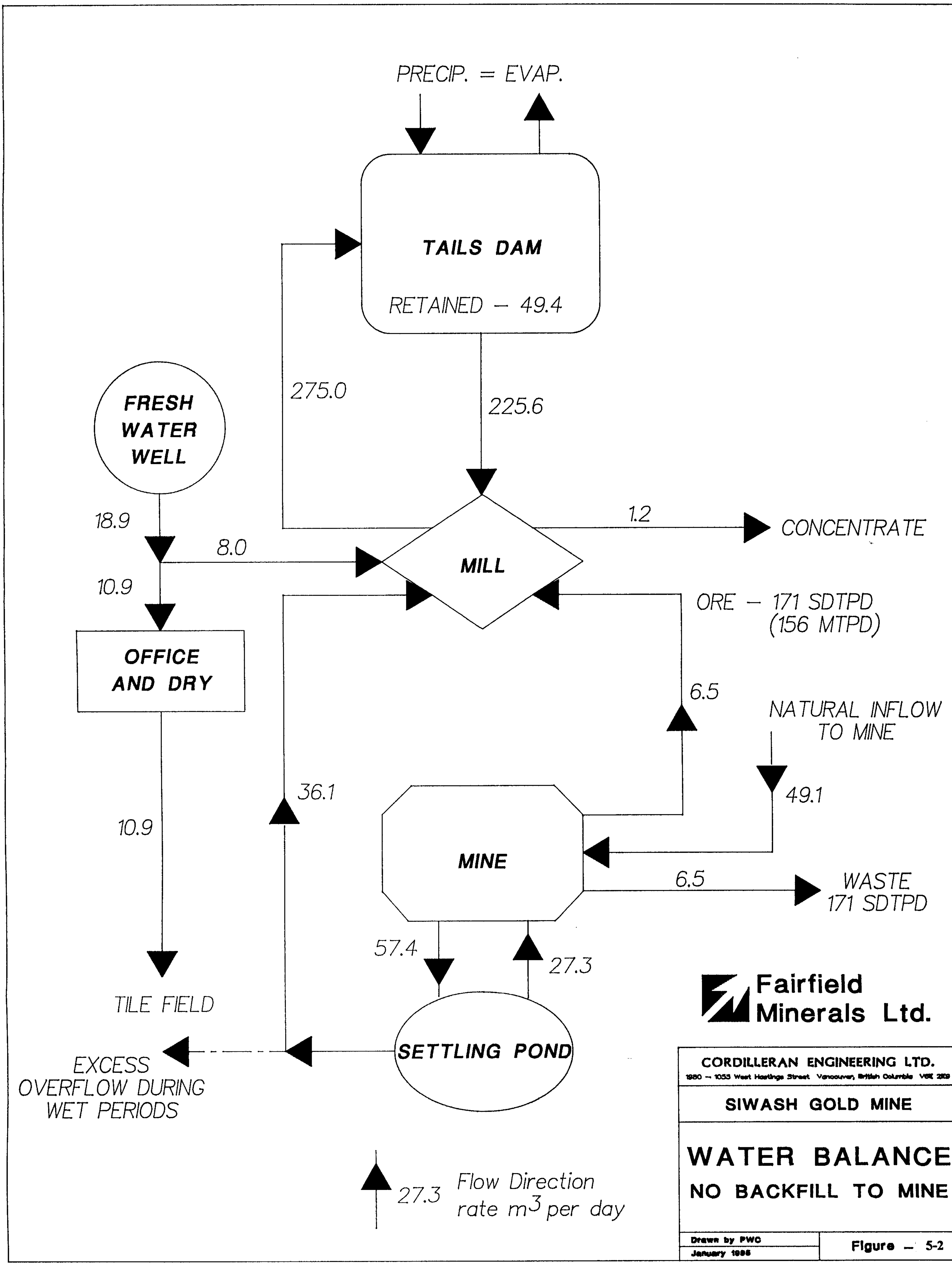
Both balances show a net requirement of fresh water of 19 to 25 m^3 per day and complete use of mine water (natural inflow of 49 m^3 per day). However, because the open pit connects to the upper underground workings some release of mine water will occur during wet periods. This situation requires the use of two settling ponds for the upper and lower parts of the mine when using backfill underground in order to eliminate any possible discharge of water from the backfill to the environment.

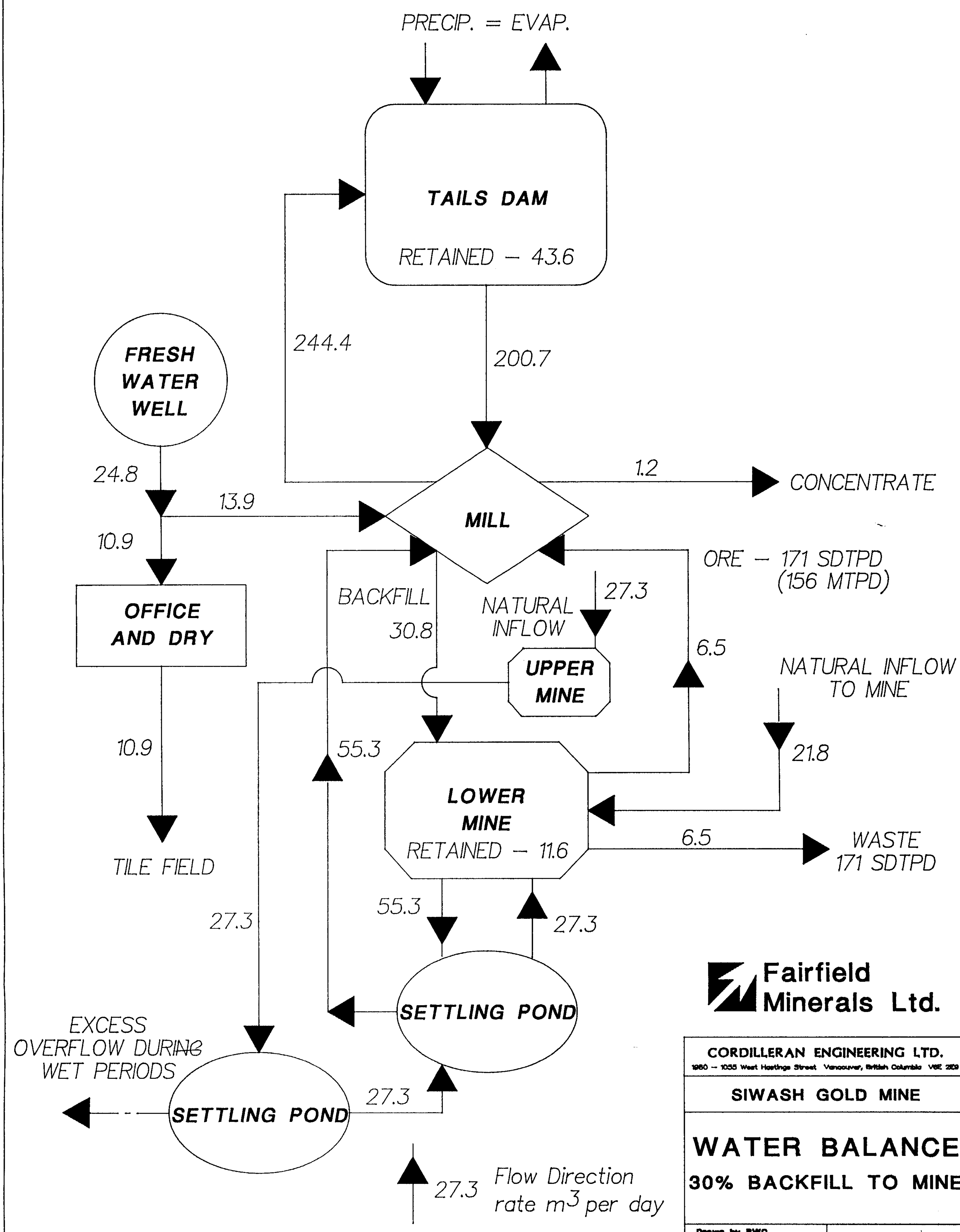
Parameters used in water balance calculations are listed below

- Precipitation into Tails dam area = evaporation from the area
- Mill tails at an average 163 SDTPD at 35% solids
- Settled whole tailings at 75% solids
- Settled slime fraction tails: 112 SDTPD at 70% solids
- Water build-up and inventory in the pool of the tailing pond is ignored for the purpose of these calculations
- Backfill: 51 tpd at 60% solids from the mill which settle to 80% solids in the mine (with cement)
- Slime fraction of tailings leaving the mill for the tails dam is 112 tpd at 29.4% solids
- Total natural average inflow to the mine is 49.1 m^3/day (34 litres per min)
- Ore and waste leave the mine containing 4% moisture
- Concentrate from the mill at 8.6 SDTPD at 12% moisture
- Annual ore production rate: 62,500 tons, 1,250 tons per week, 5 mill operating days/week, 50 weeks per year

5.5 Reagents used in the Mill and Refinery

Type	Name/Formula	Purpose	Usage - lb./ton milled
A350	Sodium Amyl Xanthate	gold/sulphide collector	0.2
A208	Mixed surfactant	gold/sulphide collector and frother	0.07
MIBC	Methyl - isobuty carbinol	frother	0.02
	Sodium nitrate	flux	0.06
	Sodium borate	flux	0.08
	Sodium Bicarbonate	flux	0.06
Lime	CaO	tails pH regulator	0.2 - 0.4


PRECIP. = EVAP.
TAILS DAM
RETAINED – 49.4
275.0
225.6
FRESH WATER WELL
18.9
8.0
10.9
MILL
1.2
CONCENTRATE
ORE – 171 SDTPD (156 MTPD)
OFFICE AND DRY
6.5
NATURAL INFLOW TO MINE
49.1
36.1
10.9
MINE
6.5
WASTE 171 SDTPD
57.4
27.3
TILE FIELD
SETTLING POND
EXCESS OVERFLOW DURING WET PERIODS
27.3
Flow Direction rate m3 per day
Fairfield Minerals Ltd.
CORDILLERAN ENGINEERING LTD.
SIWASH GOLD MINE
WATER BALANCE
NO BACKFILL TO MINE
Drawn by PWC
January 1995
Figure – 5-2



CORDILLERAN ENGINEERING LTD.
1980 – 1055 West Hastings Street Vancouver, British Columbia V6E 2E9

SIWASH GOLD MINE

WATER BALANCE
30% BACKFILL TO MINE

Drawn by PWO
January 1995

Figure – 5-3

5.6 Metallurgical Testwork (Appendix 5-1)

Much of the testwork done on the Siwash property has been performed on oxidized or partially oxidized near surface ore. However, testwork by Bacon Donaldson in 1992 utilized samples from diamond drill core, which is representative of future mine production, although the gold grades are considerably higher that those expected in production. A copy of the report is attached in Appendix 5-1 along with other analyses performed by ASL.

Analyses of Ore, Flotation Concentrate and Tailings

	Assays - % unless noted		
	Head	**Tailings**	**Concentrate**
Si02	66.4	-	-
Al	0.4	0.6	0.4
Ca	0.5	0.5	0.3
Mg	0.2	0.2	0.1
Fe	5.5	2.5	35.1
Cu	0.07	0.005	0.5
As	0.08	0.006	0.6
Hg	6.0 ppm	8.0 ppm	< 1 ppm
Mn	0.08	0.08	0.06
Zn	0.02	0.009	0.1
Au	1.0 oz/t	0.03 oz/t	11.4
Ag	1.0 oz/t	0.05	16.0
Pb	0.02	0.007	0.2
% + 100 mesh		15 - 20%	5.0%
% - 200 mesh		55 - 60%	85.0%

Expected Metallurgical Balance and On-Site Refining

		Assays - O.P.T.		% Recovery	
Product	% WT	Au	Ag	Au	Ag
Gravity Conc.	-	-	-	40.0	15.0
Flotation Conc.	5.0	11.44	16.04	57.2	80.2
Tailings	95.0	0.03	0.05	2.8	4.8
Feed	100.0	1.00	1.00	100.0	100.0

About 85 lbs. per week of gravity concentrate assaying about 40% Gold, 15% Silver and 45% pyrite with minor chalcopyrite and galena will be directly refined on site using a Wabi type furnace. The refining process will consist of roasting the concentrate to drive off the sulphur prior to adding flux and melting.

Drill Core Composite

Metallurgical Test Sample

In February, 1992 a composite sample consisting of 2-metre diluted vein intercepts from three drill holes was prepared for metallurgical testing. Intersections of the "Mother Shoot" vein in holes 97, 107 and 108 were used. These were located 230 to 300 metres downdip on the vein from the surface. True width of vein sample for each of these holes was 0.88 m, 0.41 m and 0.39 m respectively. Each was diluted to represent a 2.0 m true width by adding the appropriate quantities of material from adjacent samples in the vein hangingwall and footwall. The enclosed table shows the calculated amounts of sample rejects combined to produce each 2.0 m intercept which were, in turn, combined to give the composite sample weighing approximately 14 kg.

Based on geological descriptions of the drill core the composite sample is estimated to consist of 18% vein quartz, 77% altered granitic wallrock, 4% pyrite, and <1/2% combined chalcopyrite, sphalerite and galena.

The calculated average grade of the composite based on metallics fire assays of the drill core samples is 74.39 gm/tonne Au (2.17 oz/ton) and 70.29 gm/tonne Ag (2.05 oz/ton).

Location of the drill intercepts in the "Mother Shoot" portion of the vein and a detailed make-up of the composite sample can be seen in the attached graphics.

MILL TEST FROM DRILL CORE REJECTS

March 1992

Sample #	True Width (m)	Sample Weight gm	Metallics Fire Analysis Assay Au gm/t	Ag gm/t	% Qtz Vein	% Altered Wallrock	% Unaltered Wallrock	% Pyrite	% Chalcopy	% Galena	% Sphal
SND9197-17	.35	876	.03	.03		71	29				
SND9197-18	.50	1,230	3.87	7.20	60	34		6	Trace		
SND9197-19	.38	951	916.74	686.60	50	38		12	Trace		
SND9197-20	.97	1,927	.03	.03		37	63	Trace			
SND91107-16	.78	1,494	.03	.03			100				
SND91107-17	.41	785	85.03	61.70	54	26	12	8	Trace	Trace	.50
SND91107-18	.81	1,520	.03	.03			100				
SND91108-12	.39	1,068	12.89	27.00	36	27	30	6	Trace	Trace	1
SND91108-13	.62	1,698	.89	3.70		93		7			
SND91108-14	.39	1,068	3.22	16.10	12	83		5	Trace		
SND91108-15	.39	1,070	91.54	224.10	45	46		9	Trace		
SND91108-16	.21	575	1.23	.03		99		1			
BULK TOTAL:					18	43	34	4			0

Total Weight(gm):	14,262
Cal Avg Au Grade (gm/t):	74.39
Cal Avg Ag Grade (gm/t):	70.29

BACON
DONALDSON
& ASSOCIATES LTD.

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PRELIMINARY METALLURGICAL TESTING OF SIWASH NORTH GOLD DEPOSIT

Prepared for:

CORDILLERAN ENGINEERING LTD.
1980 Guinness Tower
1055 West Hastings Street
Vancouver, B.C.
V6E 2E9

File Number: MN2-041
April 6, 1992
WIP\MN\MN2041R1.MB

Dr. M.J.V. Beattie, P.Eng.

1.0 SUMMARY

Preliminary metallurgical test work has been conducted on a composite sample of Siwash North ore containing 130 g/t Au.

Gold recovery to a gravity concentrate was 63%, producing a very high grade concentrate.

Combined gravity/flotation resulted in 99% gold recovery, while combined gravity/cyanidation resulted in 98% gold recovery. The ore is readily amenable to processing by either process.

The work index of the sample was determined to be 10.9 (kwh/ton).

2.0 INTRODUCTION

Preliminary metallurgical test work has been conducted on a composite sample of drill core rejects from the Siwash North gold deposit. The test program was conducted at the request of Mr. Jeffrey Rowe of Cordilleran Engineering. The scope of the program was to test both a gravity/flotation and a gravity/cyanidation circuit for gold recovery. Various of the test products were to be analyzed for environmental purposes. The results of these environmental analyses are included in a separate report.

Subsequent to the initial instructions for the program, modified procedures were provided by Mr. Rod Samuels of R.M. Samuels Consulting Inc. The progress of the program was discussed with Mr. Samuels as the test work proceeded.

3.0 DISCUSSION

3.1 Sample Description

The sample provided by Cordilleran for the test program consisted of approximately 15 kg of crushed drill core rejects. The sample was described as a composite sample of quartz vein and granite host rock.

The crushed rejects were blended and then split into individual test samples. The total sample was utilized for the test work. The sample was assayed to contain 130 g/t Au and 99 g/t Ag. In addition, a whole rock analysis and multi-element ICP analysis were conducted on the sample. The results of these analyses are included in the Appendix of test details as "T1 Head".

3.2 Gravity/Flotation (Test F1)

One portion of the composite was ground to approximately 54% minus 200 mesh prior to being jigged. The jig concentrate was further concentrated by hand panning to simulate tabling of the jig concentrate in commercial operation. The pan tailings were combined with the jig tailings and subjected to a bulk flotation stage. The test details are appended and are summarized as follows:

Product	Weight %	Au g/t	Ag g/t	Distribution, %	
				Au	Ag
Gravity Conc.	0.05	155,000	48,000	62.7	25.3
Float Conc.	11.9	404	612	36.8	73.5

Multi-element analyses of the flotation concentrate and tailings are included with the test details.

A microscopic examination of the concentrate revealed it to be primarily composed of pyrite and gangue with trace concentrations (<1%) of galena, arsenopyrite, chalcopyrite, sphalerite, and pyrrhotite. Free gold was noted as particles from 1 to 50 microns in diameter. It appeared that a cleaner flotation stage could be beneficial in producing a higher grade concentrate. Similarly, a gold-selective collector should be investigated in future test work.

3.3 Gravity/Cyanidation (Test C1)

One portion of the composite was ground to 55% minus 200 mesh prior to being jigged. The jig concentrate was hand panned with the concentrate being assayed and the pan tails combined with the jig tails for cyanidation. The overall results can be summarized as follows:

Stage	% Extraction	
	Au	Ag
Gravity Concentration	63.2	30.0
Cyanidation	35.1	61.6

The above extraction was achieved after 48 hours cyanidation. Most of the gold leaching was achieved within the first 6 hours of leaching.

The cyanide consumption in this test was 1.07 kg/t with a final cyanide concentration of 0.51 g/L NaCN. A lower consumption could be achieved by allowing the concentration to drop to 100-200 ppm NaCN by the end of leaching. Confirmation will be required in subsequent test work that low residual cyanide will not result in gold or silver precipitation.

It should be noted that the high head grade of the sample resulted in a high grade pregnant solution suitable for Merritt Crowe precipitation.

The slurry had a very low (0.3 ppm) dissolved oxygen content and required one hour agitation before the oxygen content was high enough for cyanidation.

The final tailings from cyanidation would not settle to produce a clear supernatant. Lime was added to increase the pH from 10.5 to 11.5 and this resulted in a clear supernatant but negligibly slow settling rates.

3.4 Work Index

The ball mill work index of the sample has been determined by the comparative grinding method. Following are the test results for an ore of known work index and the Siwash North sample:

Known:	Wi	=	11.5 (kwh/ton)
	F_{80}	=	10 mesh (1651 microns)
	P_{80}	=	157 microns
Siwash North:	F_{80}	=	1651 microns
	P_{80}	=	146 microns

$$Wi = \frac{11.5\left(\frac{10}{\sqrt{157}} - \frac{10}{\sqrt{1651}}\right)}{\left(\frac{10}{\sqrt{146}} - \frac{10}{\sqrt{1651}}\right)}$$

= 10.9 (kwh/ton)

APPENDIX

Test Details

Chemex Labs Ltd.

Analytical Chemists * Geochemists * Registered Assayers
212 Brooksbank Ave., North Vancouver
British Columbia, Canada V7J 2C1
PHONE: 604-984-0221

To: BACON, DONALDSON & ASSOCIATES LTD.,
12271 HORSESHOE WAY
RICHMOND, BC
V7A 4Z1

Project : MN2-041
Comments: ATTN: RON WILLIAMS

Certificate Date: 13-MAR-92
Invoice No. :19211989
P.O. Number :MA 58793
Account :ID

CERTIFICATE OF ANALYSIS A9211989

SAMPLE	PREP CODE		Al_2O_3 %	BaO %	CaO %	Fe_2O_3 %	K_2O %	MgO %	MnO %	Na_2O %	P_2O_5 %	SiO_2 %	TiO_2 %	LOI %	TOTAL %
MN2-041 T1 HEAD	225	200	12.97	0.11	1.18	7.73	3.80	0.66	0.10	1.80	0.22	66.36	0.40	4.64	99.97

CERTIFICATION: Thai D Ma

Chemex Labs Ltd.

Analytical Chemists * Geochemists * Registered Assayers
212 Brooksbank Ave., North Vancouver
British Columbia, Canada V7J 2C1
PHONE: 604-984-0221

To: BACON, DONALDSON & ASSOCIATES LTD.,

12271 HORSESHOE WAY
RICHMOND, BC
V7A 4Z1

Project : MN2-041
Comments: ATTN: RON WILLIAMS

Page Number :1-A
Total Pages :1
Certificate Date: 17-MAR-92
Invoice No. : I9211991
P.O. Number : MA 58793
Account : ID

CERTIFICATE OF ANALYSIS A9211991

SAMPLE	PREP CODE		Ag ppm	Al %	As ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Mo ppm
MN2-041 T1 HEAD	299	233	69.4	0.37	810	40	< 0.5	46	0.45	3.5	13	12	675	5.53	< 10	6	0.21	10	0.19	780	1

CERTIFICATION: Thai D Ma

Chemex Labs Ltd.

Analytical Chemists * Geochemists * Registered Assayers
212 Brooksbank Ave., North Vancouver
British Columbia, Canada V7J 2C1
PHONE: 604-984-0221

To: BACON, DONALDSON & ASSOCIATES LTD.,

12271 HORSESHOE WAY
RICHMOND, BC
V7A 4Z1

Project : MN2-041
Comments: ATTN: RON WILLIAMS

Certificate Date: 17-MAR-92
Invoice No. :I9211991
P.O. Number :MA 58793
Account :ID

CERTIFICATE OF ANALYSIS A9211991

SAMPLE	PREP CODE		Na %	Ni ppm	P ppm	Pb ppm	Sb ppm	Sc ppm	Sr ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Zn ppm
MN2-041 T1 HEAD	299	233	0.01	1	570	230	5	3	13	0.02	< 10	10	16	< 10	232

CERTIFICATION: Hart Bichler

TESTWORK PROCEDURE

Test No: MN2-041 Date: 3-Mar-92

Purpose: Initial bench scale flotation scoping test

STAGE	TIME (Minutes)	ADDITIONS g/tonne	ADDITIONS REAGENT	
Grind	11			
Gravity concentration			8 kg	
Jig				
Pan (Jig concentrate)				
Flotation				
Condition (Jig tails and pan tails)	2	50.0 25.0	A350 A208	
Rougher float	3			pH=7.4
Scavenger float	2	25.0 12.5	A350 A208	Final pH=8.0

TEST NUMBER: MN2-041 F1

PRODUCT	WEIGHT GMS	WEIGHT %	ASSAYS Au g/tonne	Ag g/tonne	% DIST Au	Ag
Jig pan conc	4.1	0.05	155168.2	47609.5	62.71	25.31
Ro conc	916.0	11.90	404.2	612.5	36.85	73.47
Final tails	6778.0	88.05	0.7	1.4	0.44	1.22
LC HEAD	7698.1	100.0	130.5	99.2	100.00	100.00
ASSAY HEAD						

SIZE DISTRIBUTION

SAMPLE NO:MN2-041 F1 Head

Size Fraction (mesh)		Individual Percentage Retained	Cumulative Percentage Passing
	+ 65	1.2	98.8
- 65	+100	8.3	90.5
-100	+150	19.5	71.0
-150	+200	17.1	53.9
- 200	+270	6.0	47.9
-270	+325	11.2	36.7
-325	+400	1.9	34.8
-400		34.8	

Chemex Labs Ltd.

Analytical Chemists * Geochemists * Registered Assayers
212 Brooksbank Ave., North Vancouver
British Columbia, Canada V7J 2C1
PHONE: 604-984-0221

To: BACON, DONALDSON & ASSOCIATES LTD.,
12271 HORSESHOE WAY
RICHMOND, BC
V7A 4Z1

Project : MN2-041
Comments:

Page Number :1-A
Total Pages :1
Certificate Date: 17-MAR-92
Invoice No. :19212070
P.O. Number :MA 58797
Account :ID

CERTIFICATE OF ANALYSIS A9212070

SAMPLE	PREP CODE		Ag ppm	Al %	As ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Mo ppm
MN2-041 B RO CON	225	233	>200	0.39	6140	40	< 0.5	402	0.28	25.5	45	25	5200	>15.00	< 10	< 1	0.26	< 10	0.13	580	13
MN2-041 C RO TL	225	233	1.8	0.55	55	60	< 0.5	8	0.47	< 0.5	2	22	45	2.54	< 10	8	0.28	10	0.21	845	1

CERTIFICATION: Thai D'Ma

Chemex Labs Ltd.

Analytical Chemists * Geochemists * Registered Assayers
212 Brooksbank Ave., North Vancouver
British Columbia, Canada V7J 2C1
PHONE: 604-984-0221

To: BACON, DONALDSON & ASSOCIATES LTD.,

12271 HORSESHOE WAY
RICHMOND, BC
V7A 4Z1

Project : MN2-041
Comments:

Page Number :1-B
Total Pages :1
Certificate Date: 17-MAR-92
Invoice No. :19212070
P.O. Number :MA 58797
Account :ID

CERTIFICATE OF ANALYSIS A9212070

SAMPLE	PREP CODE		Na %	Ni ppm	P ppm	Pb ppm	Sb ppm	Sc ppm	Sr ppm	Ti %	Tl ppm	U ppm	V ppm	W ppm	Zn ppm
MN2-041 B RO CON	225	233	< 0.01	2	460	1985	20	3	9	0.01	< 10	< 10	10	< 50	1380
MN2-041 C RO TL	225	233	0.01	3	710	70	< 5	3	14	0.02	< 10	< 10	19	< 10	92

CERTIFICATION: Hai D Ma

CYANIDATION REPORT

File No :MN2-041   Start Date :18 MAR 92
Test No :C1

Starting Conditions :

5500.0 dry g of feed   Feed Description:ORE
8250.0 ml of water
40.0 % solids   Grind Time (min) :11
1.0 g/l NaCN
10.5 target pH
0.0 g carbon added

Test Progress :

Time hr	NaCN Conc g/l	NaCN Add g	Ca(OH)2 Conc g/l	Ca(OH)2 Add g	Start pH	End pH	O2 ppm
-1.0				2.72	7.8	10.5	0.3
-0.5				0.68	10.1	10.6	2.3
0.0	0.00	8.25		0.54	10.2	10.7	3.6
1.0	0.80	0.00		0.00	10.6		6.0
6.0	0.67	0.00		0.00	10.5		8.6
26.0	0.32	1.49		0.00	10.5		8.8
48.0	0.51		0.00		10.4		9.0

Reagent Consumption :   NaCN = 1.07 kg/t
Lime = 0.72 kg/t
Reducing Power :   RP = 100 ml of N/10 KMnO4 per l solution

Assays and Extractions :

Time hr	Product	Solids Au g/t	Solids Ag g/t	Liquid Au ppm	Liquid Ag ppm	Extract Au %	Extract Ag %
0.0	JigConc	52595.03	19625.88			63.2%	30.0%
6.0	Soln			29.34	32.05	31.9%	44.4%
26.0	Soln			31.26	39.78	33.4%	54.0%
48.0	Soln			33.68	46.52	35.1%	61.6%
	Total Extracted					98.3%	91.6%
48.0	Solids	2.33	8.92			1.7%	8.4%
						100.0%	100.0%

	Au (g/t)	Ag (g/t)	Au (oz/ton)	Ag (oz/ton)
Calc Head	134.73	105.84	3.930	3.088
Assy Head	130.52	99.21	3.806	2.893

SIZE DISTRIBUTION

SAMPLE NO: MN2041-C1 (GRAV. TL.)

Size Fraction (Tyler mesh)	Screen Aperture (microns)	Individual Percentage Retained	Cumulative Percentage Passing
65	208	0.4	99.6
100	147	7.5	92.1
150	104	19.4	72.7
200	74	17.9	54.8
270	53	6.6	48.2
325	44	10.5	37.6
400	37	2.1	35.5
Undersize		35.5	

BACON DONALDSON & ASSOCIATES LTD.

12271 HORSESHOE WAY
RICHMOND, B.C.
CANADA V7A 4Z1
TELEPHONE: (604) 277-2322
FACSIMILE : (604) 274-7235

CORDILLERAN ENGINEERING LTD.
1980 Guiness Tower
1055 West Hastings Street
Vancouver, B.C. V6E 2E9

April 21, 1992

Attention: Mr R.M.Samuels

Dear Rod,

Further to our report of April 6, 1992 we have submitted several of the test product for environmental analysis. Samples of effluent from both the flotation test and cyanidation test as well as solids from the cyanidation test were submitted to ASL Analytical Service Laboratories Ltd. The results of those analyses were reported directly to Cordilleran Engineering. In addition, acid-base accounting was performed on tailings from both tests as follows:

SAMPLE	S,%	Paste pH	N.P.	M.P.A.	Net N.P.
			(tons $CaCO_3$/1000tons waste)		
Float tail	0.10	5.8	13.5	3.12	10.4
CN tail	2.97	9.0	18.8	92.8	-74.0

The results indicate that while the flotation tailings would not be expected to be acid generating, the cyanidation tailings potentially are an acid producer. The high paste pH shown by the cyanidation tails are explained by the presence of lime from the cyanidation process.

Enclosed with this report is a polished section of the rougher flotation concentrate produced in the present testwork.

Yours Sincerely,
Bacon Donaldson & Associates Ltd.

MBeattie

Dr. M.J.V. Beattie, P.Eng.

ASL

CHEMICAL ANALYSIS REPORT

Date: Apr. 06, 1992

ASL File No. 2217C

Report On: Water Analysis (MN2-041)

Report To: Cordilleran Engineering Ltd.
1980 Guinness Tower
1055 West Hastings Street
Vancouver, BC
V6E 2E9

Attention: Mr. J.D. Rowe
cc -Bacon, Donaldson & Associates
Att'n: Mr. Ron Williams

Date Received: Mar. 18, 1992

METHODOLOGY

Metals

These analyses are carried out in accordance with procedures described in "Standard Methods for the Examination of Water and Wastewater" 17th Edition published by the American Public Health Association, 1989. The procedures involve a variety of instrumental analyses including atomic emission spectrophotometry (ICP) and atomic absorption spectrophotometry (AA) to obtain the required detection limit for each element. Specific details are available on request.

ASL ANALYTICAL SERVICE LABORATORIES LTD.
per:

Brent A. Makelki B.Sc.
Project Chemist

Barbara Szczachor B.Sc.
Supervisor, Water Quality Lab

ASL

RESULTS OF ANALYSIS - Water

File No. 2217C
Page 2

Parameter		MN2-041 RO TLS Soln
Total Metals		
Aluminum	T-Al	0.085
Arsenic	T-As	0.0033
Beryllium	T-Be	<0.005
Cadmium	T-Cd	<0.0002
Chromium	T-Cr	0.011
Copper	T-Cu	0.010
Iron	T-Fe	0.112
Lead	T-Pb	<0.001
Manganese	T-Mn	0.116
Mercury	T-Hg	<0.00005
Phosphorus	T-P	0.58
Selenium	T-Se	<0.0005
Silver	T-Ag	<0.0001
Uranium	T-U	0.00033
Zinc	T-Zn	0.201

< = Less than the detection limit indicated.
Results are expressed as milligrams per litre.

End of Report

RESULTS OF ANALYSIS -- Water

File No. 2448C
Page 3

Parameter		MN2-049 CM Tail Solution
Total Metals		
Aluminum	T-Al	0.500
Arsenic	T-As	1.47
Beryllium	T-Be	<0.005
Cadmium	T-Cd	0.0523
Chromium	T-Cr	0.001
Copper	T-Cu	35.9
Iron	T-Fe	12.1
Lead	T-Pb	0.016
Manganese	T-Mn	0.009
Mercury	T-Hg	0.00240
Phosphorus	T-P	1.61
Selenium	T-Se	0.0031
Silver	T-Ag	51.0
Uranium	T-U	0.00100
Zinc	T-Zn	1.10

< = Less than the detection limit indicated.
Results are expressed as milligrams per litre.

End of Report

RESULTS OF ANALYSIS - Sediment/Soil

File No. 2291C
Page 3

Parameter		CM Tails	Grav Tails	Grav Tails Dup.
<u>Total Metals</u>				
Aluminum	T-Al	11000	13100	10900
Antimony	T-Sb	<25	<25	<25
Arsenic	T-As	808	1020	970
Barium	T-Ba	46.7	50.1	42.6
Beryllium	T-Be	<0.5	<0.5	<0.5
Bismuth	T-Bi	70	86	69
Cadmium	T-Cd	4.6	5.3	5.1
Calcium	T-Ca	5190	5100	4870
Chromium	T-Cr	20.7	22.3	20.0
Cobalt	T-Co	7.7	9.0	9.0
Copper	T-Cu	667	783	777
Iron	T-Fe	52000	61200	58700
Lead	T-Pb	329	378	373
Lithium	T-Li	4.4	4.6	4.1
Magnesium	T-Mg	2670	2950	2740
Manganese	T-Mn	895	978	940
Molybdenum	T-Mo	<5.0	<5.0	<5.0
Nickel	T-Ni	<2.0	<2.0	<2.0
Phosphorus	T-P	648	679	670
Potassium	T-K	3750	4200	3400
Selenium	T-Se	<1.0	<1.0	<1.0
Silver	T-Ag	9.3	8.9	25.8
Sodium	T-Na	465	<250	<250
Tin	T-Sn	<30	<30	<30
Vanadium	T-V	21.9	24.6	22.5
Zinc	T-Zn	241	278	261

< = Less than the detection limit indicated.
Sediment results expressed as milligrams per dry kilogram.

End of Report

5.7 Tailings Environmental Testwork (Appendix 5-2)

Humidity cell testing was performed on tailings material by Brenda Process Technology. The report is shown in Appendix 5-2. Results show the water became slightly acidic after 21 weeks. The water analyses after 5 cycles (16 weeks) are tabulated below. Readings are ppm unless noted otherwise.

pH	5.93
Conductivity	10.0 mhos
S04	3.4
Alkalinity	1.9
Acidity	4.8
Ag	0.002
As, Bi, Hg, Sb	< 0.05
Mg	0.05
Cd	0.005
Cu	0.08
Zn	0.03
Ba, Ga, La, W	< 0.1
Mo, Sc, Sr, V	< 0.01
Pb	0.06
Fe, Al, Na, P, Ti	< 1.0
Mn	0.46

In practice a small amount of minus 6 mesh quicklime (Ca0) could be added continuously to the mill tailings box before it leaves the mill to maintain the tails pond pH between 8.0 and 9.0 and ensure tailing solids will not turn acidic after abandonment. Testwork will be done during the operation of the mill to "fine tune" this lime addition.

brenda PROCESS TECHNOLOGY

2281 HUNTER ROAD, KELOWNA, B.C., CANADA V1X 7C5 TELEPHONE: (604) 861-5501 FAX: (604) 861-5210

January 2,1994

RECEIVED
JAN 05

Mr. John W. Stollery, P. Eng.
President Fairfield Minerals Ltd.
1980 - 1055 West Hastings Street
Vancouver, B.C.
V6E 2E9

Dear John

Test work on the characterization of the Elk Claims tailings material as to whether it would be acid generating has been completed.

The test was conducted using a 500 gram Humidity cell and the test period was over a twenty week period. The sample was treated with deonized water for one week and then let stand with the air moving through it for two weeks. This constituted a cycle and for each cycle fresh or new deonized water was used.

As can be seen from the graphs (fig. 1-4) & tables 1 & 2 the material became acid generating after 15 weeks of treatment.

Since this was a very preliminary testing program, it is suggested that a more extensive campaign be carried out so that the material can be classified as to whether it is acid generating or not. This should be done on the ore itself, waste material to be stock piled and any products which will be discarded from any type of up grading facilities.

If there are any questions please feel free to call.

Yours truly

Jim.

James W. Austin
Senior Process Metallurgist

file: 435

Table 1
Brenda Process Technology
Humidity Test Cell Data

Client:Fairfield Minerals
Project: 435
Test No: 100
Test Sample: 1058.38 Grms

Cycle	Date	Solution(mls) Added	Solution(mls) Recovered	Solution(mls) Total	pH	Conductivity (mhos)	SO4(ppm)	Alkalinity (mg/l)	Acidity (mg/l)
	Mar.8/93	150	93.58						
Cycle1	Mar.15/93	150	122.70	332.03	5.98	25	10	N.A.	46
	Mar.22/93	150	115.75						
	Apr.12/93	150	116.74						
Cycle 2	Apr.19/93	150	123.39	351.89	6.3	27	8	2.4	13.6
	Apr.26/93	150	111.76						
	May 3/93	150	120.67						
Cycle 3	May10/93	150	129.10	379.37	6.6	30	11	3.2	N.A.
	May17/93	150	129.60						
	May24/93	150	135.90						
Cycle4	May31/93	150	123.10	396.13	6.98	16	2.7	4	14
	June7/93	150	137.13						
	June14/93	150	123.15						
Cycle 5	June21/93	150	126.85	389.84	5.93	10	3.4	1.9	4.8
	June28/93	150	139.84						
	July5/93	150	134.62						
Cycle 6	July12/93	150	134.51	409.74	N.A.	N.A.	N.A.	N.A.	N.A.
	July19/93	150	140.61						
	July26/93	150	132.28						
Cycle 7	Aug.3/93	150	127.52	259.8	4.76	720	355	1.2	5.6

Table 2

Brenda Process Technology

Humidity Test Cell Data

Client:Fairfield Minerals

Project: 435

Test No: 100

Test Sample: 1058.38 Grms

Cycle	Date	Ag mg/L	Al mg/L	As mg/L	Ba mg/L	Be mg/L	Bi mg/L	Ca mg/L	Cd mg/L	Co mg/L	Cr mg/L	Cu mg/L	Fe mg/L	Ga mg/L	Hg mg/L	K mg/L	La mg/L	Mg mg/L
Cycle1	Mar.22/93																	
Cycle 2	Apr. 26/93	<0.001	<1	<0.05	<0.1	<0.001	<0.05	1.5	0.012	<0.02	<0.02	<0.01	<1	<0.1	<0.05	<5	<0.1	<0.05
Cycle 3	May 17/93																	
Cycle4	June 7/93	0.006	<1	<0.05	<0.1	<0.001	<0.05	1.5	0.005	0.02	0.06	<0.01	<1	<0.01	<0.05	<5	<0.1	<0.05
Cycle 5	June 28/93	0.002	<1	<0.05	<0.1	<0.001	<0.05	1	0.005	<0.02	<0.02	0.08	<1	<0.1	<0.05	<5	<0.1	0.05
Cycle 6	July 19/93	0.003	<1	<0.05	<0.1	<0.001	<0.05	18	0.008	0.02	<0.02	0.04	<1	<0.1	>0.05	<5	<0.1	1.9
Cycle 7	Aug.3/93	<0.001	<1	0.1	<0.1	<0.001	0.05	110	<0.001	0.04	<0.02	0.23	<1	<0.1	<0.05	20	0.1	11.5

Cycle	Date	Mn mg/L	Mo mg/L	Na mg/L	Ni mg/L	P mg/L	Pb mg/L	Sb mg/L	Sc mg/L	Sr mg/L	Ti mg/L	Tl mg/L	U mg/L	V mg/L	W mg/L	Zn mg/L
Cycle 1	Mar.22/93															
Cycle 2	Apr. 26/93	0.03	<0.01	1	<0.01	<1	<0.05	<0.05	<0.01	0.01	<1	<0.1	<0.1	<0.01	<0.1	0.02
Cycle3	May 17/93															
Cycle 4	June 7/93	0.07	<0.01	<1	0.04	<1	0.05	<0.05	<0.01	<0.01	<1	0.2	0.1	<0.01	<0.1	0.01
Cycle 5	June 28/93	0.46	<0.01	<1	0.01	<1	0.06	<0.05	<0.01	<0.01	<1	0.1	0.1	<0.01	<0.1	0.03
Cycle 6	July 19/93	1.15	0.01	1	0.09	<1	<0.05	<0.05	<0.01	0.06	<1	>0.1	<0.1	<0.01	<0.1	0.06
Cycle 7	Aug.3/93	6.2	<0.01	12	0.63	<1	0.2	<0.05	<0.01	0.3	<1	0.2	<0.1	<0.01	<0.1	0.23

Fig.1
Fairfield Humidity Cell
pH/Cycle

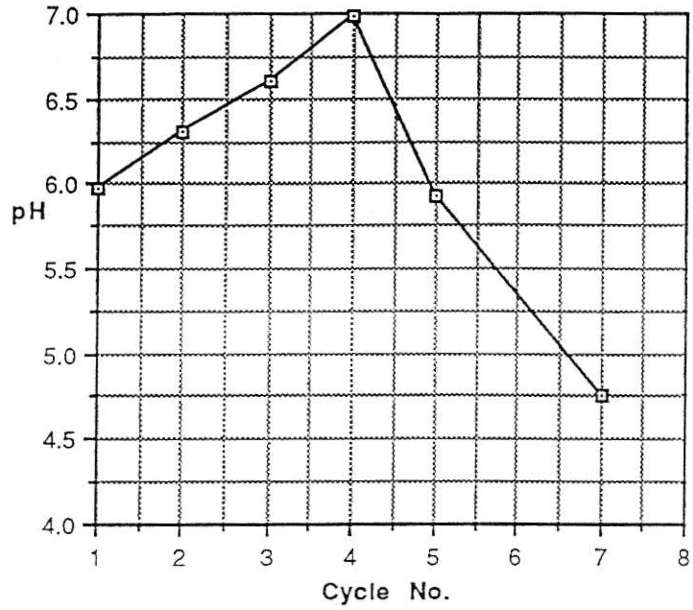


Fig. 2
Farfield Humidity Cell
SO4,Cond./Cycle

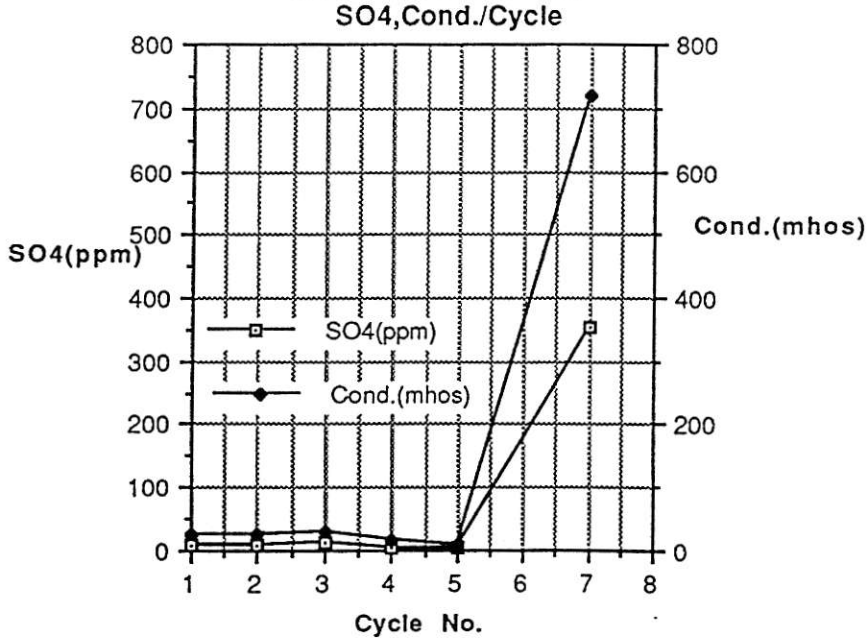


Fig. 3

Farfield Humidity Cell
Ca,Mg,Mn&K/Cycle

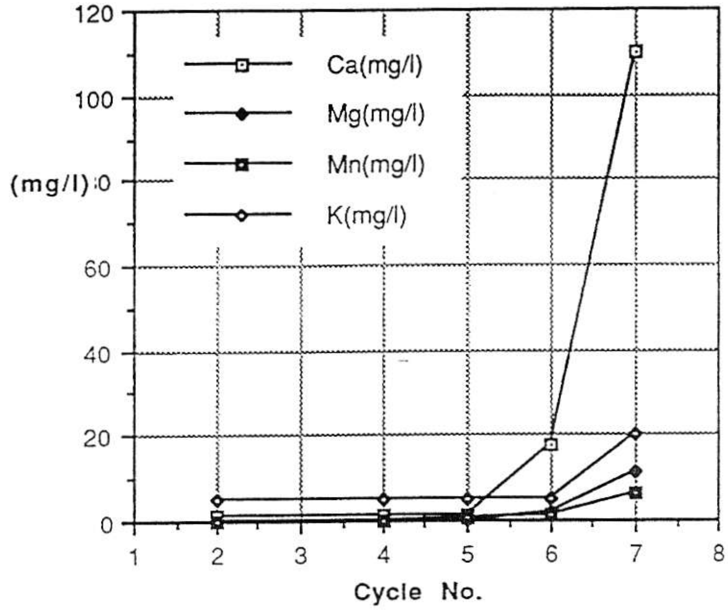
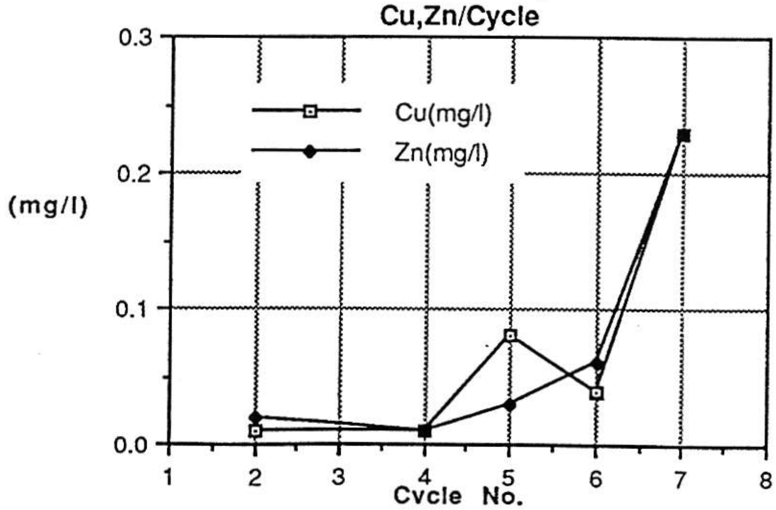


Fig.4

Farfield Humidity Cell
Cu,Zn/Cycle



6.0 MANPOWER AND INFRASTRUCTURE

6.1 Workforce Requirements

The underground mining operation will be of relatively short duration. A contract mining company will supply the majority of the required underground workers, some being local residents and some residing temporarily in the area for the duration of the job. Without detailed designations an estimate of the workers required is given below.

Mine	20 Miners	**Mill**	6 Mill Workers
	1 Supervisor		1 Mill Superintendent
	1 Surveyor		1 Electrician
	1 Electrician		2 Mechanics
	2 Mechanics		1 Assayer
	2 Geologists		1 Helper
	1 Helper		12 Total
	1 First Aid Attendant		
	1 Manager		
	3 Support Staff		
	33 Total		

6.2 Personnel Housing and Services

All personnel employed in mining of the Siwash North gold deposit will be housed off-site and commute daily to work. The communities of Merritt and Westbank are both equidistant, northwest and east, from the site, driving distances of 55 km which can be travelled in about 35 minutes. The village of Aspen Grove is 33 road-kilometres to the west.

The community of Merritt is most likely to receive the greatest influx of mining personnel. A number of experienced miners and equipment operators currently live in Merritt and have expressed interest in employment at the project.

The economy of the Merritt area is based primarily on the forest industry, with contributions from agriculture, tourism and service industries. Merritt had a population of 6180 in June, 1991 and continues to grow at a steady rate. Thirty-five percent of the population is under 20 years of age and nine percent are over 65.

Merritt is at 600m elevation and has a dry and generally mild climate. Total annual average precipitation is 32 cm, with 40% as snow. Monthly average temperatures range from -12 degrees C in January to 26 degrees C in July with a mean temperature of 6 degrees C.

Merritt has a full variety of commercial services and facilities. The city has paved streets and lighting, water and sewer systems, garbage pick-up, fire and police protection, hospital and ambulance service, court house, recreational facilities, churches, banks, medical and dental clinics and a full range of government agencies. There are 5 elementary schools with capacity for 920 students, a junior secondary with capacity for 440 and a senior secondary with capacity for 474. Post-secondary training is available at the Nicola Valley Institute of Technology. Charter flights are availabte from the paved airstrip and Greyhound bus service provides several departures daily to all major centres. The community has several rental apartments, trailer and mobile home parks and new subdivisions currently under development. Services that are not available in Merritt may be found in the larger city of Kamloops located 80 km to the north.

Westbank is located east of the mine site, adjacent to Okanagan Lake, and is 12 km west of the larger city of Kelowna. Westbank is smaller in population than Merritt but provides most of the same services.

Aspen Grove, to the west of the site, has only a General Store and gas pump. It consists of several widely-dispersed ranches and homes. Services for the residents are generally obtained in Merritt, 25 km to the north.

6.3 Personnel Transportation

Workers will commute to and from the site on a daily basis from nearby communities. Both Merritt and Westbank are easily accessible by highway 97C, 35 minutes driving time from the site. The mining contractor will be responsible for arranging transportation of workers. It is expected that they will use private passenger vehicles. Parking areas will be provided on site away from active mining equipment.

6.4 Access Road (Figure 6-1)

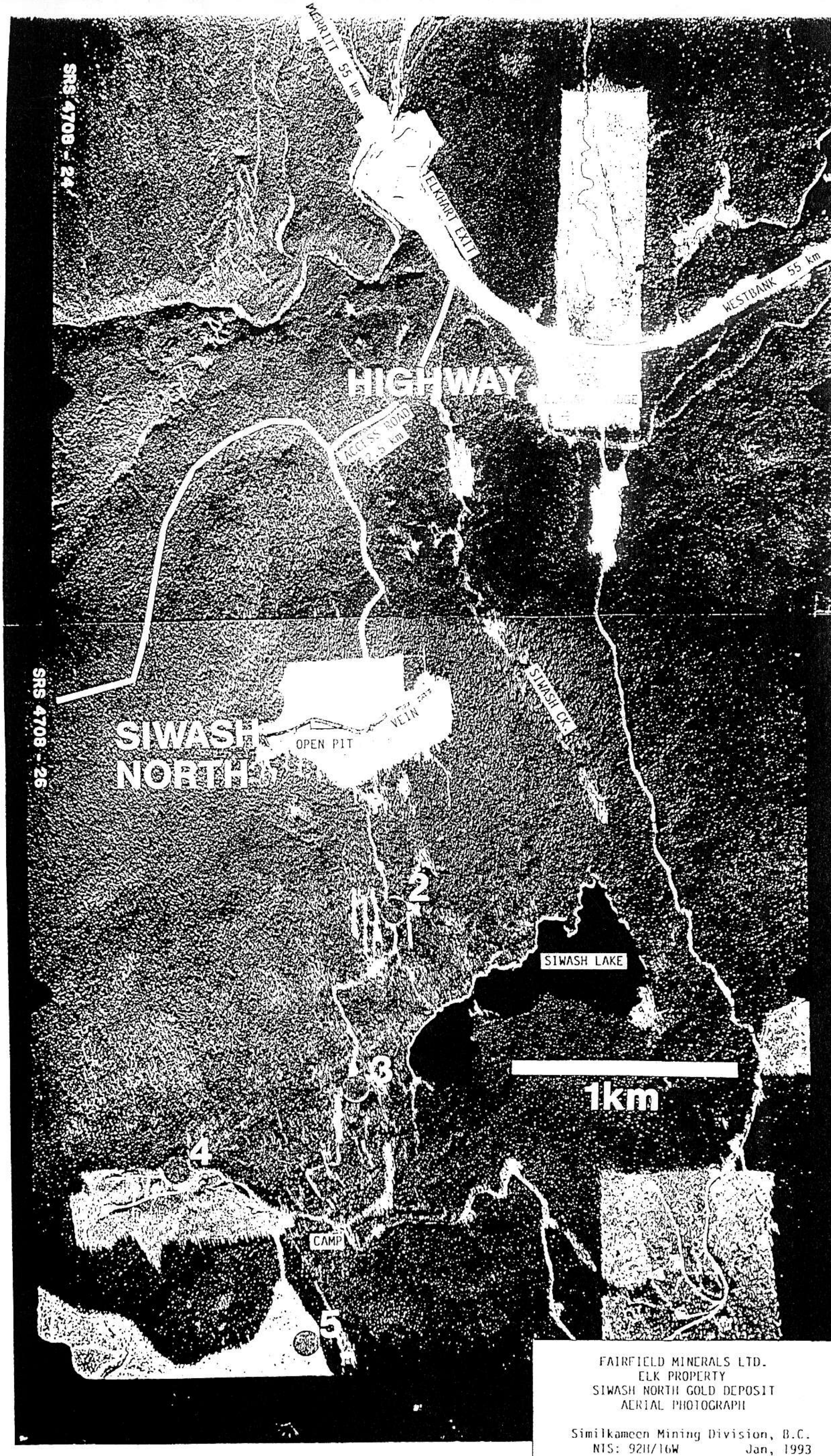
The main Siwash North site access road turns south from the paved Elkhart road, 550m southeast from the Elkhart exit ramp off Highway 97C. It was jointly-constructed in 1992 by Fairfield and Weyerhaeuser Canada Ltd. The first 1.5 km were built by Weyerhaeuser to access areas for proposed timber harvesting. A one-kilometre extension was added by Fairfield to connect to the mine site. Application has been approved by the Ministry of Transportation and Highways to include mining as a permitted land use for the 2.5 km of road, which was initially permitted for forest harvesting.

The road currently has a 10-metre wide running surface within a 25 metre right-of-way. All snags have been felled along the right-of-way. The road is ditched and culverted at stream crossings and is generally flat, with one stretch of hill up to a maximum 9% gradient.

The road was constructed from local glacially deposited soils containing varying contents of sand and clay. In wet conditions some sections become muddy and rutted. Gravel topping of these areas may be required. A short section approaching the junction with Elkhart Road will be gravelled to limit mud tracking onto the blacktop and shoulder support at the junction may be required to prevent cracking of the hard surface at the transition from gravel.

The original Siwash North access road was built in 1988, extending 2.5 km northerly from an old forest service road south of the site. The road surface is approximately 6 metres wide and it has local steep pitches up to 15% grade. This road is seldom used but provides an alternate access to the site and also to other nearby gold exploration targets.

Lockable steel gates are located on the main access road 1.5 km south from Elkhart Road and on the old access road 2.5 km south of the site. Warning and information signs are posted along the access roads and at the gates.



FAIRFIELD MINERALS LTD.
ELK PROPERTY
SIWASH NORTH GOLD DEPOSIT
AERIAL PHOTOGRAPH

Similkameen Mining Division, B.C.
NTS: 92H/16W Jan, 1993

Figure 6-1

6.5 Communications

Good quality cellular telephone communications are provided by a transmitter tower located on the Wart, a local height of land 8 km northwest of the work site. In addition, radiotelephone communications are dependable, with a number of "autotel" stations available from the site. Fax and computer modem systems can also be utilized on the cellular or "autotel" network.

6.6 Power Supply

Two 600 KW diesel generators will supply the mine, mill, pumphouse and ancillary surface equipment power with a third unit available on standby. A jacket water heat recovery system is proposed for the diesel engines. This would provide heat for the mill, mine dry and office.

7.0 ENVIRONMENTAL AND SOCIOECONOMIC INFORMATION

7.1 Physiography and Soils (Figure 2-2)

The Siwash North gold deposit is located in an area of gently to moderately sloping hills on an upland plateau. The vein system extends along the top and north side of an east-trending ridge about one kilometre long. Two streams have their headwaters near the east and west ends of the ridge. They flow northerly and merge into a single channel about one kilometre downstream. This drainage has been named Bullion Creek.

The open pit forms a notch in the north slope of the ridge. Two waste rock dumps have been built against the north-facing slope and extend northward onto flatter ground. The dumps occupy the area between the two channels of Bullion Creek.

The area of the deposit is blanketed by glacial till ranging from less than 1m to more than 4m in thickness. Glacial ice movement has been southerly, generally scraping the high points clean and depositing sediment in low areas, especially on the lee (south) side of hills and ridges. The overburden consists of mixed gravel, sand, silt and clay in various proportions with scattered cobbles and boulders. Enriched topsoil is very poorly developed and generally less than 10cm thick. Small swampy areas near the headwaters of Bullion Creek contain standing water and are generally vegetated by grasses and sparse trees. A layer of black organic detritus has accumulated in these areas ranging from 20 to 50cm thick. Glacio-fluvial deposits of graded gravel and sand are also found in the area. One such deposit, located 1.5 km northeast of Siwash North has been excavated for road building material. A larger gravel pit (Bob's Pit) located 7 km north of the site is the source of sand for use on the highway. Previous reclamation of trenches in the Siwash North area has shown that till material used for backfill and planted with grass seed has supported a good ground cover of grasses which continues to regenerate and thicken.

7.2 Climate (Figures 7-1,2,3,4 and Tables 7-1,2)

Climatic data is available from two nearby monitoring stations; Elkhart, located 2 km northeast of the site and Brenda, located 25 km east of the site. Both stations are at approximately the same elevation as Siwash North. Daily readings of temperature, precipitation and wind movement have been recorded at the Elkhart site during the months October through April and at the Brenda site during the months May through October.

Data from May, 1988 through March, 1994 have been summarized on the enclosed tables and graphs to show average monthly temperatures, with maximum and minimum average temperatures where available, average daily precipitation (mm water) for each month and wind speed and direction measurements.

The high temperatures occur consistently during July, August and September with monthly averages ranging from 13 to 18 degrees C. The low temperatures occur in December, January and February averaging between -5 and -12 degrees C.

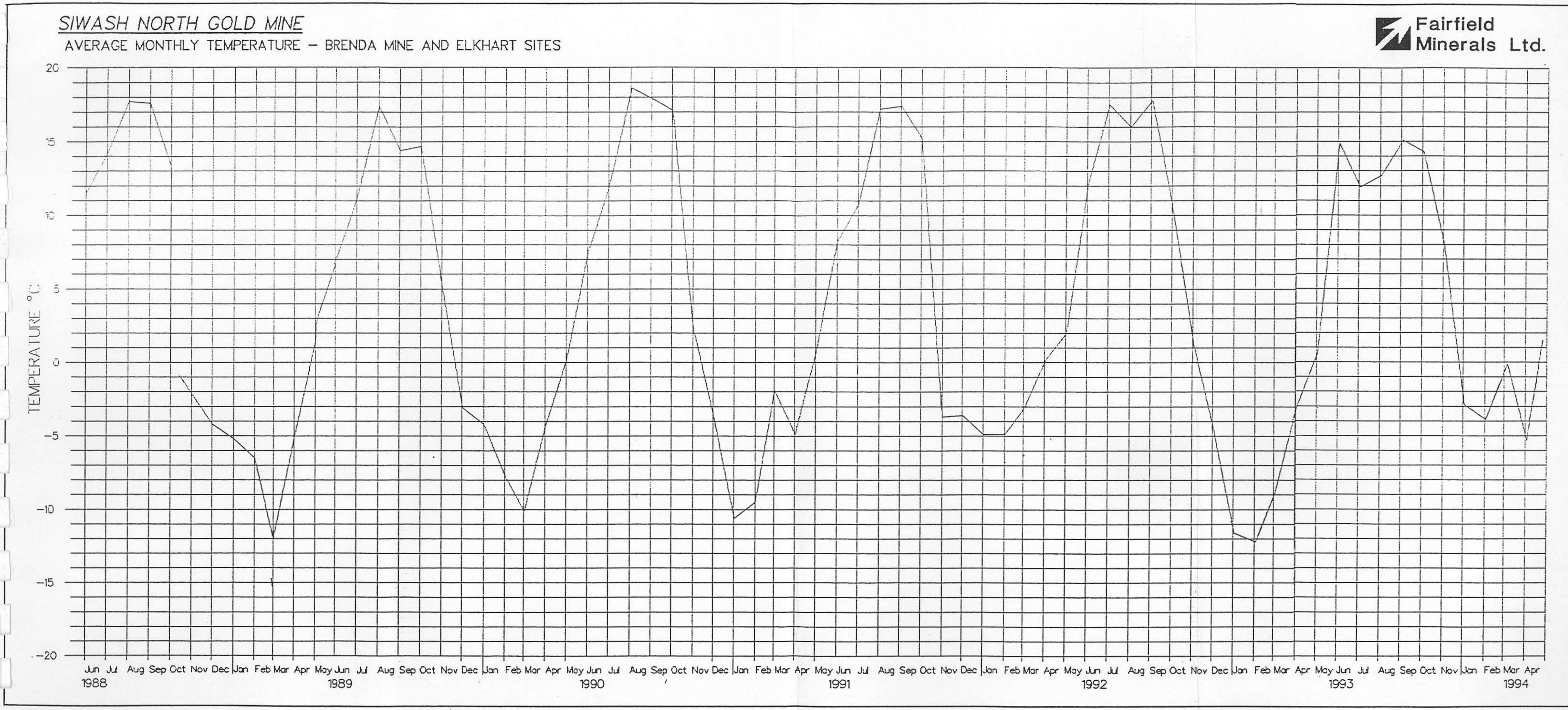
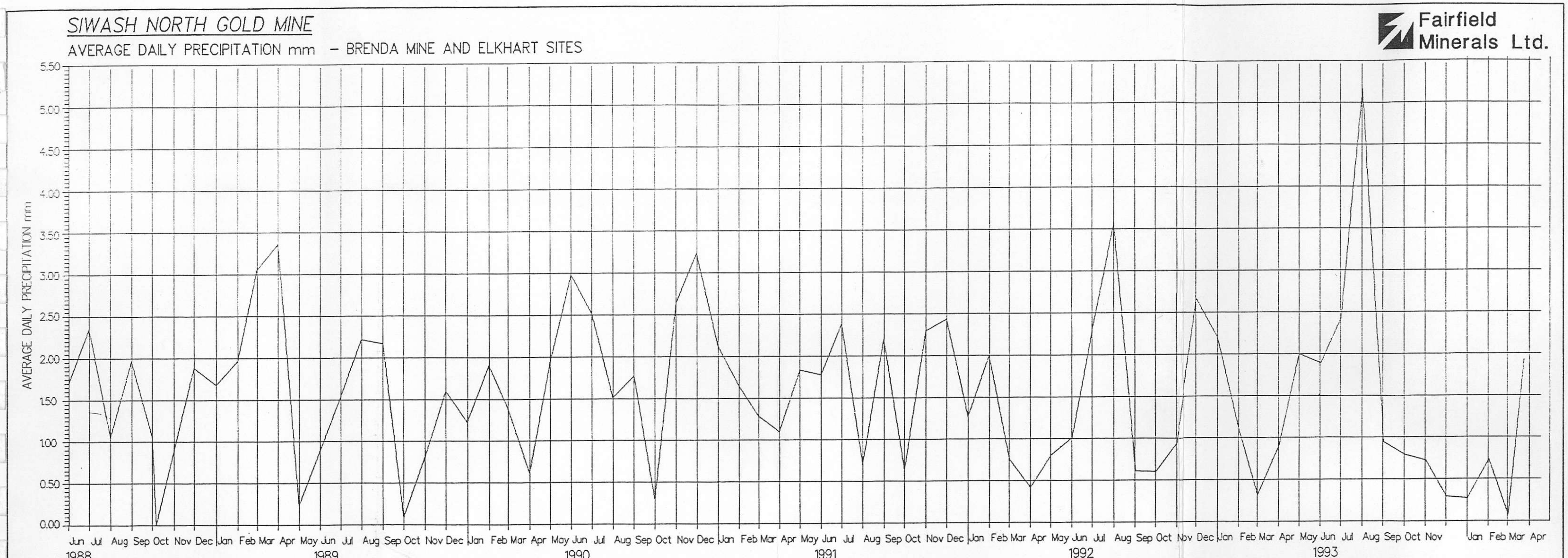

SIWASH NORTH GOLD MINE
AVERAGE MONTHLY TEMPERATURE – BRENDA MINE AND ELKHART SITES
Fairfield Minerals Ltd.
TEMPERATURE °C
20
15
10
5
0
-5
-10
-15
-20
Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Jan Feb Mar Apr
1988
1989
1990
1991
1992
1993
1994

Figure 7-1



SIWASH NORTH GOLD MINE
AVERAGE DAILY PRECIPITATION mm - BRENDA MINE AND ELKHART SITES
Fairfield Minerals Ltd.
AVERAGE DAILY PRECIPITATION mm
5.50
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Jan Feb Mar Apr
1988
1989
1990
1991
1992
1993

Figure 7-2

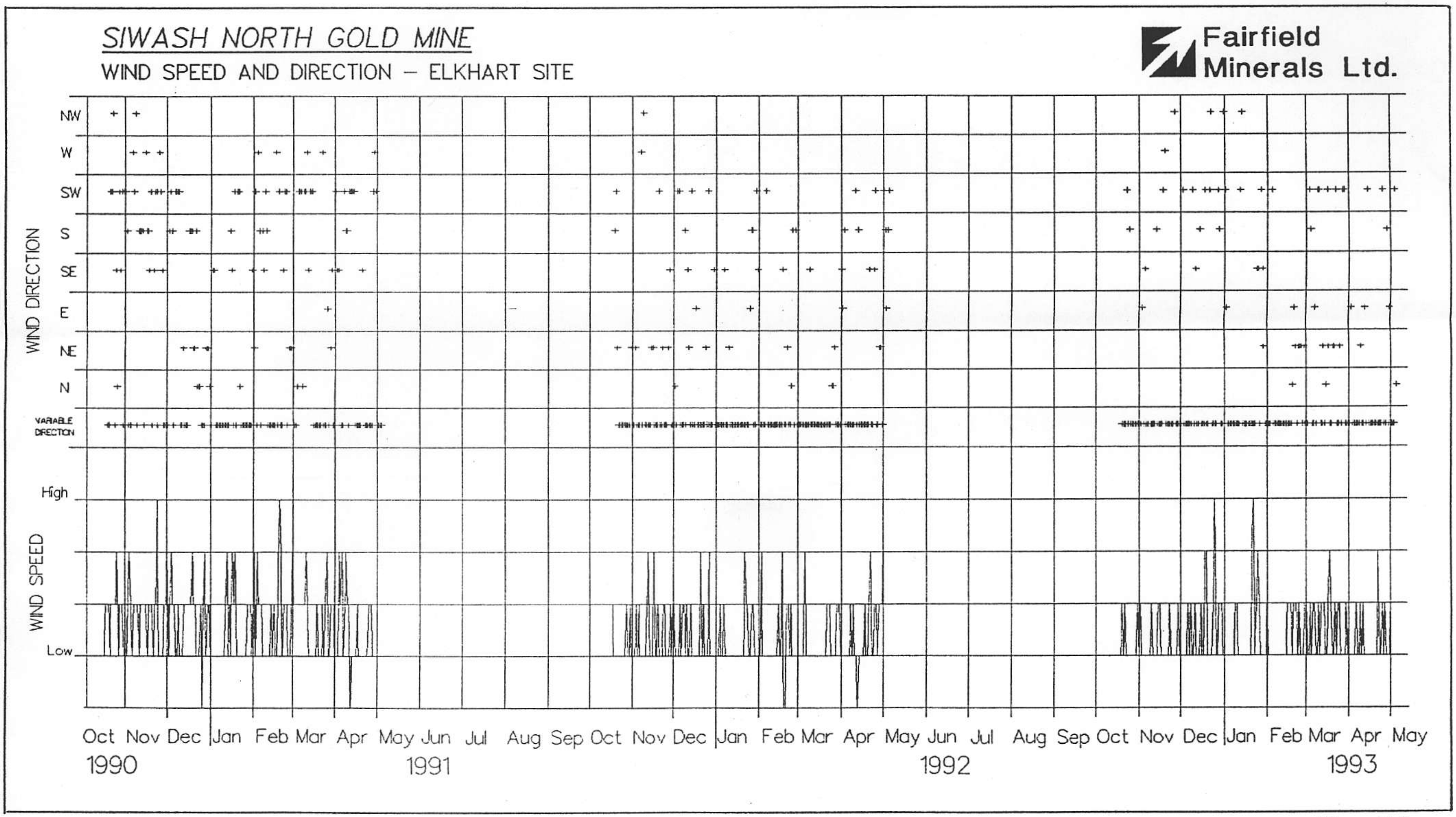

SIWASH NORTH GOLD MINE
WIND SPEED AND DIRECTION – ELKHART SITE
Fairfield Minerals Ltd.
WIND DIRECTION
NW
W
SW
S
SE
E
NE
N
VARIABLE DIRECTION
WIND SPEED
High
Low
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May
1990
1991
1992
1993

Figure 7-3

SIWASH NORTH GOLD MINE

WIND SPEED AND DIRECTION – BRENDA MINE SITE

Fairfield Minerals Ltd.

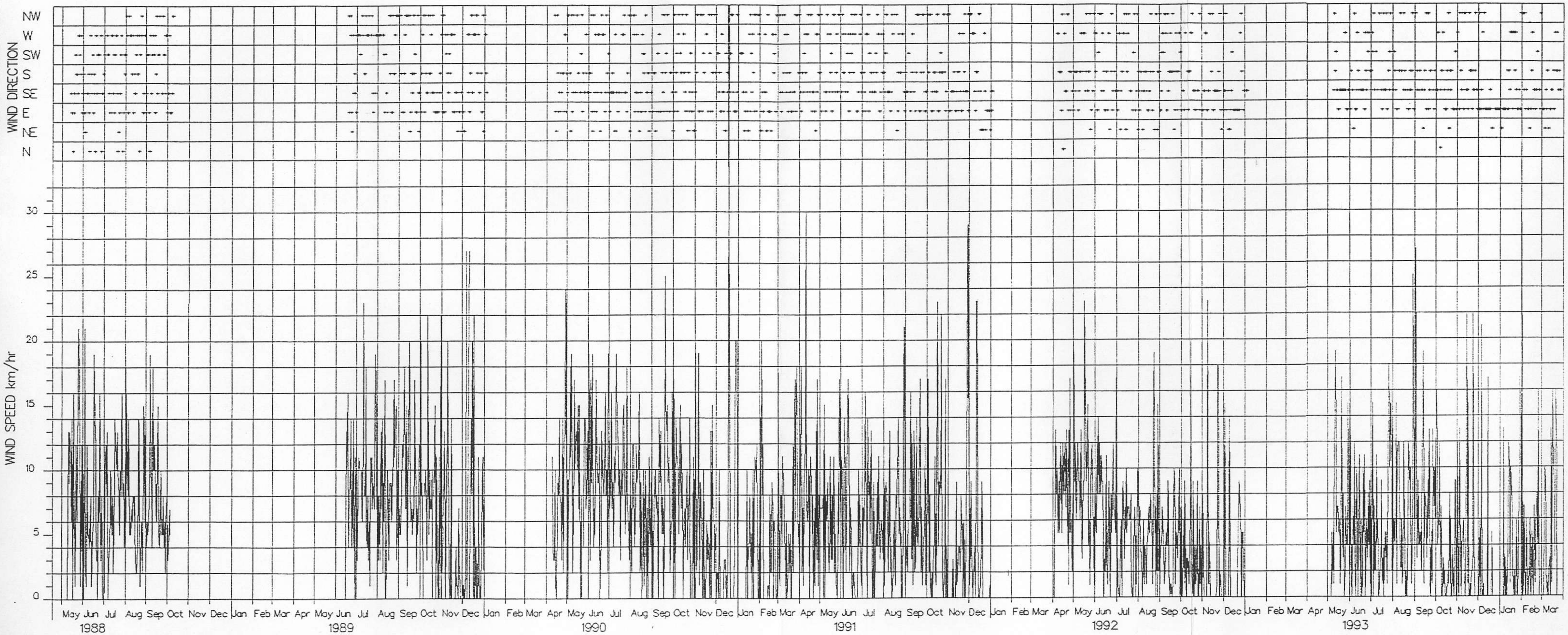


Figure 7-4

Table 7-1

MONTHLY AVERAGE TEMPERATURE DATA				
ELKHART AND BRENDA MINES LOCATIONS				
		AVERAGE	AVERAGE	AVERAGE
STATION	DATE	TEMP	MAX TEMP	MIN TEMP
Brenda	May-88	11.5		
Brenda	Jun-88	14.2		
Brenda	Jul-88	17.7		
Brenda	Aug-88	17.6		
Brenda	Sep-88	13.2		
Brenda	Oct-88	NA		
Elkhart	Nov-88	-4.2	0.0	-5.7
Elkhart	Dec-88	-5.2	-0.2	-6.8
Elkhart	Jan-89	-6.5	-0.2	-8.4
Elkhart	Feb-89	-12.0	-0.1	-15.5
Elkhart	Mar-89	-4.9	0.0	-7.6
Elkhart	Apr-89	1.5	0.3	-1.5
Elkhart	May-89	2.9	3.9	-2.0
Brenda	Jun-89	11.1		
Brenda	Jul-89	17.4		
Brenda	Aug-89	14.4		
Brenda	Sep-89	14.7		
Brenda	Oct-89	5.3		
Elkhart	Nov-89	-3.1	-0.0	-4.6
Elkhart	Dec-89	-4.2	-0.0	-5.6
Elkhart	Jan-90	-7.7	-0.2	-9.5
Elkhart	Feb-90	-10.1	0.2	-12.4
Elkhart	Mar-90	-4.3	0.1	-8.1
Elkhart	Apr-90	0.2	0.1	-3.3
Brenda	May-90	7.4		
Brenda	Jun-90	11.9		
Brenda	Jul-90	18.6		
Brenda	Aug-90	17.9		
Brenda	Sep-90	17.1		
Brenda	Oct-90	2.4		
Elkhart	Nov-90	-3.6	-0.1	-5.6
Elkhart	Dec-90	-10.6	-0.0	-13.1
Elkhart	Jan-91	-9.5	-0.0	-12.5
Elkhart	Feb-91	-1.9	-0.1	-5.1
Elkhart	Mar-91	-4.9	0.2	-10.1
Elkhart	Apr-91	0.6	0.2	-4.4
Brenda	May-91	8.3		
Brenda	Jun-91	10.8		
Brenda	Jul-91	17.2		
Brenda	Aug-91	17.4		
Brenda	Sep-91	15.2		

Table 7-1

MONTHLY AVERAGE TEMPERATURE DATA ELKHART AND BRENDA MINES LOCATIONS				
STATION	DATE	AVERAGE TEMP	AVERAGE MAX TEMP	AVERAGE MIN TEMP
Elkhart	Oct-91	-3.7	-0.1	-6.8
Elkhart	Nov-91	-3.6	-0.1	-5.5
Elkhart	Dec-91	-4.9	-0.1	-7.3
Elkhart	Jan-92	-4.9	0.0	-6.8
Elkhart	Feb-92	-3.1	0.1	-6.3
Elkhart	Mar-92	0.2	0.2	-4.8
Elkhart	Apr-92	2.0	0.1	-2.4
Brenda	May-92	12.2		
Brenda	Jun-92	17.5		
Brenda	Jul-92	16.0		
Brenda	Aug-92	17.8		
Brenda	Sep-92	10.5		
Elkhart	Oct-92	1.3	0.1	-1.3
Elkhart	Nov-92	-4.4	-0.0	-6.3
Elkhart	Dec-92	-11.6	-0.4	-14.2
Elkhart	Jan-93	-12.2	0.0	-15.8
Elkhart	Feb-93	-8.9	0.1	-14.0
Elkhart	Mar-93	-3.0	0.1	-7.3
Elkhart	Apr-93	0.6	0.2	-3.1
Brenda	May-93	14.9		
Brenda	Jun-93	11.9		
Brenda	Jul-93	12.7		
Brenda	Aug-93	15.1		
Brenda	Sep-93	14.3		
Brenda	Oct-93	8.0		
Brenda	Nov-93	-2.9		
Brenda	Dec-93	-3.9		
Brenda	Jan-94	-0.1		
Brenda	Feb-94	-5.3		
Brenda	Mar-94	1.5		

Table 7-2

PRECIPITATION DATA		
ELKHART AND BRENDA MINES LOCATION		
STATION	DATE	AVERAGE DAILY PRECIPITATION mm
Brenda	May-88	1.70
Brenda	Jun-88	2.35
Brenda	Jul-88	1.05
Brenda	Aug-88	1.97
Brenda	Sep-88	1.05
Brenda	Oct-88	0.00
ELKHART	Nov-88	1.88
ELKHART	Dec-88	1.68
ELKHART	Jan-89	1.97
ELKHART	Feb-89	3.05
ELKHART	Mar-89	3.37
ELKHART	Apr-89	0.23
Brenda	Jun-89	1.54
Brenda	Jul-89	2.22
Brenda	Aug-89	2.17
Brenda	Sep-89	0.09
Brenda	Oct-89	0.81
ELKHART	Nov-89	1.60
ELKHART	Dec-89	1.23
ELKHART	Jan-90	1.90
ELKHART	Feb-90	1.38
ELKHART	Mar-90	0.61
ELKHART	Apr-90	1.93
Brenda	May-90	2.98
Brenda	Jun-90	2.52
Brenda	Jul-90	1.51
Brenda	Aug-90	1.77
Brenda	Sep-90	0.29
ELKHART	Oct-90	2.65
ELKHART	Nov-90	3.23
ELKHART	Dec-90	2.13
ELKHART	Jan-91	1.65
ELKHART	Feb-91	1.29
ELKHART	Mar-91	1.10
ELKHART	Apr-91	1.83
Brenda	May-91	1.78
Brenda	Jun-91	2.38
Brenda	Jul-91	0.70
Brenda	Aug-91	2.20
Brenda	Sep-91	0.64
ELKHART	Oct-91	2.29
ELKHART	Nov-91	2.43
ELKHART	Dec-91	1.27
ELKHART	Jan-92	2.00
ELKHART	Feb-92	0.76
ELKHART	Mar-92	0.42
ELKHART	Apr-92	0.80
Brenda	May-92	1.01
Brenda	Jun-92	2.34
Brenda	Jul-92	3.57
Brenda	Aug-92	0.61
Brenda	Sep-92	0.60
ELKHART	Oct-92	0.94
ELKHART	Nov-92	2.67
ELKHART	Dec-92	2.19
ELKHART	Jan-93	1.10
ELKHART	Feb-93	0.32
ELKHART	Mar-93	0.90
ELKHART	Apr-93	2.00
Brenda	May-93	1.89
Brenda	Jun-93	2.42
Brenda	Jul-93	5.17
Brenda	Aug-93	0.95
Brenda	Sep-93	0.79
Brenda	Oct-93	0.72
Brenda	Nov-93	0.29
Brenda	Dec-93	0.27
Brenda	Jan-94	0.73
Brenda	Feb-94	0.07
Brenda	Mar-94	1.93

Average daily precipitation graphing shows a general trend toward slightly higher precipitation levels in May, June, July, August, November, December, January and slightly drier periods in February, March, April, September, October. June and December are consistently the wettest months and September is the driest.

Wind direction measurements at the Elkhart site during winter months show predominant southwest, south and southeast directions with a less predominant northeast trend and occasionally blowing in other directions.

Wind direction measurements from the Brenda site, mostly collected during summer and autumn months, show predominant east, southeast and south orientations as well as fairly common west and northwest trends. The prominent Trepanier Valley, located immediately north of the Brenda site, is oriented southeasterly and may have an influence on the local wind direction.

7.3 Hydrology (Figures 7-5,6,7)

Flow Rate and Water Levels

Water levels were measured at five stream locations (Fig. 7-5): Site 2 - Siwash Lake Outlet, Site 3 - Siwash Creek Highway, Site 10 - Bullion Creek, Site 12 - Camp Creek and Site 13 - Gold Creek, from May to October during 1992 and 1993. The level of Siwash Lake was also monitored during this period. Staff gauges were installed at these locations and read three times per week. To determine flow rate, weirs were installed at sites 10 and 13, and flowmeter measurements were taken at sites 2, 3 and 12.

Flow rates measured with the flow meter were plotted against the staff gauge measurements and regression formula were derived. Staff gauge measurements (SGM) were recorded in centimetres and flow rates are reported in cubic metres per second. The following formulas were determined relating staff gauge levels to flow rates:

Site 2: Flow rate = - 0.101323 + 0.730456 x SGM - 0.767456 x SGM2
Site 3: Flow rate = 0.010974 - 0.21783 x SGM - 2.0698 x SGM2
Site 12: Flow rate = 0.174091 - 1.87649 x SGM + 5.07871 x SGM2

Flow rates of sites with weirs were calculated using the following formula for square notched weirs with an opening L metres long:
Flow rate = 1.8 x L x (water height above base of weir noteh)$^{1.5}$ Flow rate graphs for each site are shown on Figure 7-6.

pH

pH measurements were taken three times per week while reading staff gauges at sites 2, 3, 10, 12, 13 and Siwash Lake during 1993, using a hand held pH metre with a range of 1 to 14 and accuracy of 0.2 units. pH was also measured by the laboratory on water samples collected monthly.

Temperature

Water temperature was also measured at the monitoring sites three times per week during 1992 and 1993. Graphs are shown on Figure 7-7.

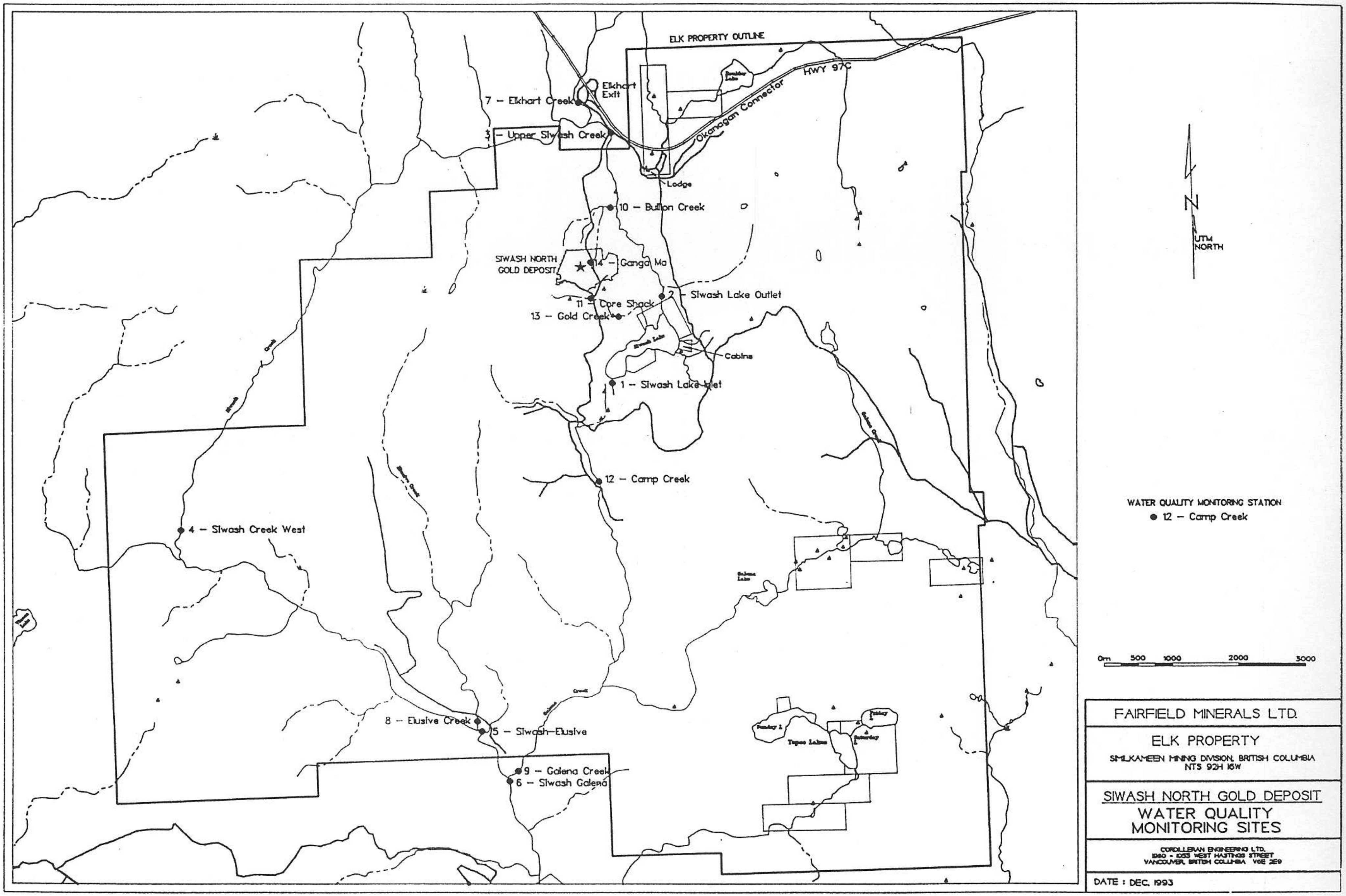

ELK PROPERTY OUTLINE
HWY 97C
Okanagan Connector
Elkhart Exit
7 – Elkhart Creek
3 – Upper Siwash Creek
Lodge
10 – Bullion Creek
SIWASH NORTH GOLD DEPOSIT
14 – Ganga Ma
2 – Siwash Lake Outlet
11 – Core Shack
13 – Gold Creek
Cabins
1 – Siwash Lake Inlet
12 – Camp Creek
4 – Siwash Creek West
8 – Elusive Creek
5 – Siwash–Elusive
9 – Galena Creek
6 – Siwash Galena
Tepee Lakes
UTM NORTH
N
WATER QUALITY MONITORING STATION
● 12 – Camp Creek
0m 500 1000 2000 3000
FAIRFIELD MINERALS LTD.
ELK PROPERTY
SIMILKAMEEN MINING DIVISION, BRITISH COLUMBIA
NTS 92H 16W
SIWASH NORTH GOLD DEPOSIT
WATER QUALITY
MONITORING SITES
CORDILLERAN ENGINEERING LTD.
1980 - 1055 WEST HASTINGS STREET
VANCOUVER, BRITISH COLUMBIA V6E 2E9
DATE : DEC. 1993

Figure 7-5

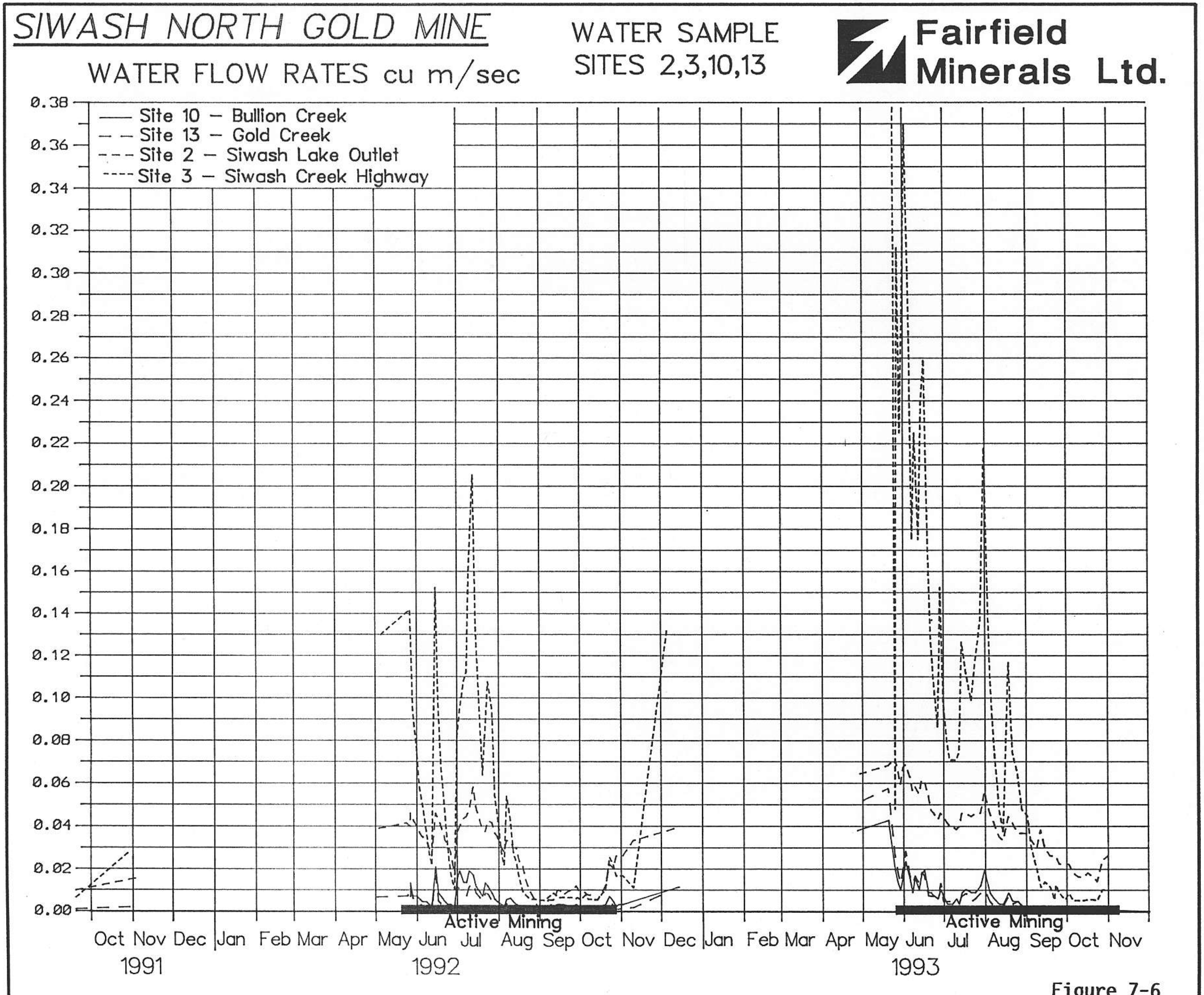

SIWASH NORTH GOLD MINE
WATER FLOW RATES cu m/sec
WATER SAMPLE SITES 2,3,10,13
Fairfield Minerals Ltd.
Site 10 – Bullion Creek
Site 13 – Gold Creek
Site 2 – Siwash Lake Outlet
Site 3 – Siwash Creek Highway
0.38
0.36
0.34
0.32
0.30
0.28
0.26
0.24
0.22
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Active Mining
Active Mining
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov
1991
1992
1993

Figure 7-6

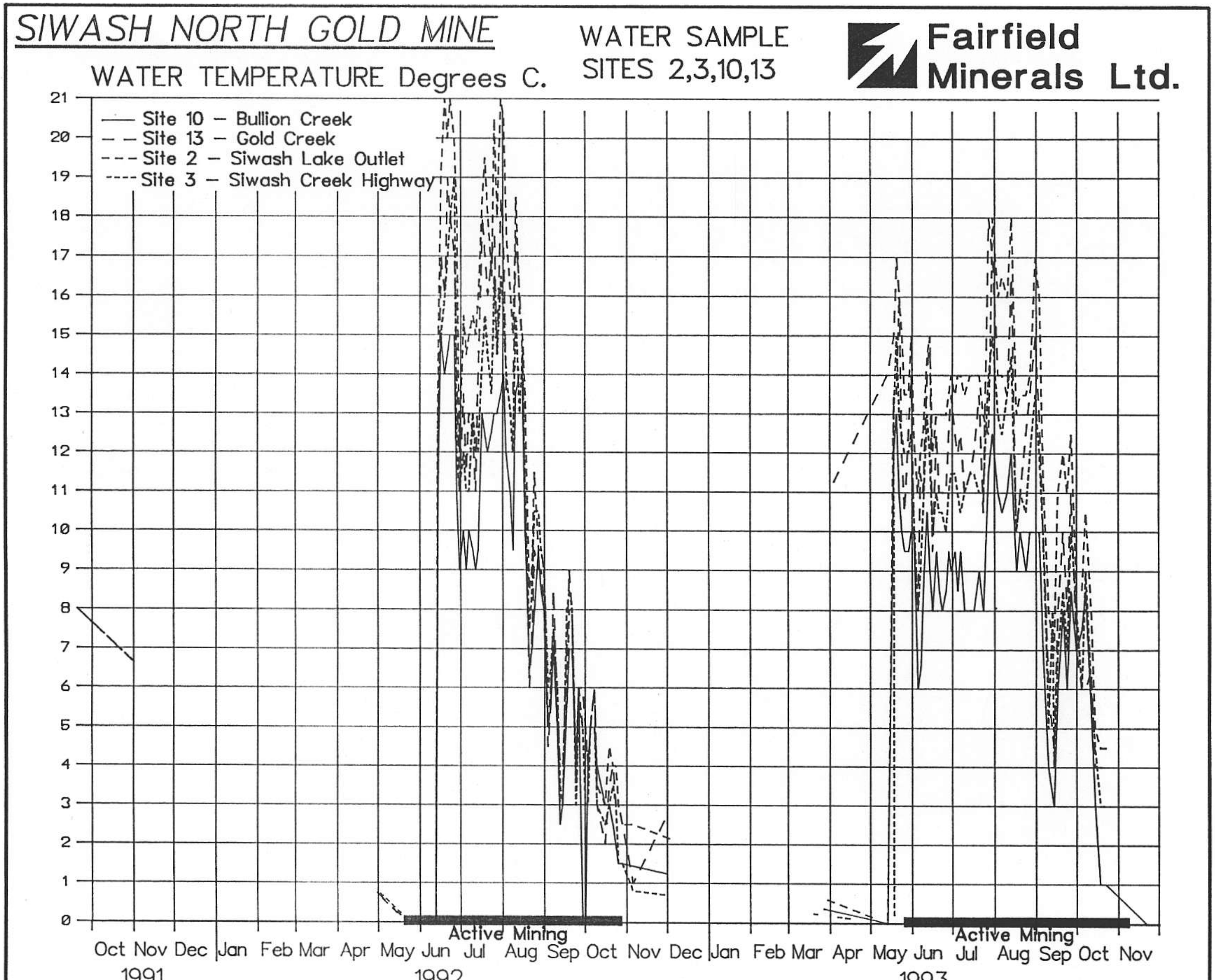

SIWASH NORTH GOLD MINE
WATER TEMPERATURE Degrees C.
WATER SAMPLE
SITES 2,3,10,13
Fairfield
Minerals Ltd.
Site 10 – Bullion Creek
Site 13 – Gold Creek
Site 2 – Siwash Lake Outlet
Site 3 – Siwash Creek Highway
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
Active Mining
Active Mining
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov
1991
1992
1993

Figure 7-7

7.4 Water Sampling (Figures 4-1, 7-5 and Table 7-3)

Initial water quality samples were collected from twelve sites (Fig. 7-5) on the Elk property in October 1991. Sampling was continued at four of these sites (sites 2, 3, 10, 13) on a monthly basis between May and October during 1992, 1993 and 1994. Regular sampling of the other sites was considered unnecessary due to their distance from the Siwash North work area and the probable lack of impact at these sites. Sample "1K Pit" and "Pit Water" on Table 7-3 (Water Sample Analysis Results), were collected from standing water at the bottom of the open pit in Aug. 1992 and June 1994 to determine pH of run-off from freshly exposed oxidized footwall. Water samples were collected using instructions from Mr. R. Hallam of Hallam Knight Piesold Ltd., an environmental consulting group, and ASL Labs. The samples were tested for various physical parameters and analyzed for compounds and elements as recommended by Mr. Hallam. The results are presented in Table 7-3.

Runoff from the open pit and waste dumps, and discharge from underground workings, drains to the north of the worksite into Bullion Creek which is monitored at Site 10. Bullion Creek flows into Siwash Creek between sample sites 2 and 3 with a dilution rate of about 1:6. Gold creek collects water that drains from the south part of the Siwash North clear-cut, across roads and reclaimed drill sites, but is not influenced by any major excavation activities. It is sampled at Site 13 and drains to the southeast into Siwash Lake. Site 14 was established in 1993 adjacent to the east waste dump to monitor immediate effects of runoff from the waste material and to determine dilution effects and the filtering ability of the swamps between sites 14 and 10.

Sumps B and C (Figure 4-1) were constructed in 1994 immediately downstream from the East and West waste dumps and will continue to be sampled regularly. Sump U is located at the portal and receives water pumped from underground workings. It will also be monitored regularly.

7.5 Fisheries Resources (Appendix 7-1)

An informal inventory of the fish population in Siwash Lake was undertaken by Fish and Wildlife in October, 1982. This information is shown on the attached sheets in Appendix 7-1. A unique genetic population of Rainbow Trout in Siwash Lake is indicated and the priority objective of Fisheries management is to conserve the wild stock.

Breeding areas for fish living in the lake are located down stream in Siwash Creek in several low-gradient, meandering sections over a length of about 2.5 km. A brief Fisheries study was undertaken in August, 1985 at the junction of Elkhart Creek with Siwash Creek which is 3 km downstream from Siwash Lake. The study was done to determine the impact on the fisheries from placement of a large diameter multi-plate culvert in Elkhart Creek for construction of highway 97C, which was undertaken in 1990. The results of the fish count are shown on the attached sheet. No additional information has been made available since completion of the highway, however, during water sampling in 1992, 1993 and 1994 company employees have noted abundant fingerling trout in several areas of Siwash Creek, from 300m to 3 km downstream from Siwash Lake.

ELK PROPERTY WATER SAMPLE ANALYSIS RESULTS
16-Jan-95

			PHYSICAL TESTS						DISSOLVED ANINONS		NUTRIENTS						CYANIDES	TOTAL METALS							
			Conductv	Tot Dislv	Hardness		Tot Susp	Turbidity	Alkalinity	Sulphate	Ammonia	NiNitrate	NiNitrite	Niortho-Phos	Tot Dis Ph	Tot Phos	Tot Cyanid	Aluminum	Antimony	Arsenic	Barium	Cadmium	Copper	Iron	Lead
SITE	REP#	DATE	umhos/cm	Solids	CaCO3	pH	Solids	NTU	CaCO3	SO4	N	N	N	P	P	P	CN	T-Al	T-Sb	T-As	T-Ba	T-Cd	T-Cu	T-Fe	T-Pb
Site 10	8842B	15-Oct-91	48.00	39	22.90	6.64	2	1.03	24.8	<1	<.005	<.005	<.001	0.003	0.028	0.063	0.010	0.096	0.0026	0.0012	0.017	<.0002	0.002	0.753	<.001
Site 10	3567C	24-May-92	32.10	26	12.40	6.68	<1	0.69	14.7	<1	<.005	<.005	<.001	0.005	0.010	0.013	0.009	0.110	<.0001	0.0002	<.01	<.0002	0.001	0.122	<.001
Site 10	4299C	28-Jun-92	52.10	42	23.60	6.57	2	0.85	14.1	<1	0.012	<.005	<.001	0.007	0.015	0.018	0.014	0.104	<.0001	0.0006	0.014	<.0002	0.002	0.449	<.001
Site 10	5107C	05-Aug-92	43.80	39	25.90	6.73	3	1.09	24.8	<1	0.020	0.013	<.001	0.006	0.020	0.020	0.028	0.095	<.0001	0.0005	0.018	<.0002	<.001	0.410	<.001
Site 10	5624C	30-Aug-92	55.10	44	24.20	6.58	3	1.73	26.4	1.0	0.009	<.005	<.001	0.007	0.020	0.021	0.004	0.108	<.0001	0.0016	0.017	<.0002	<.001	0.911	<.001
Site 10	6264C	30-Sep-92	47.00	38	21.80	6.92	4	0.50	22.0	<1	<.005	<.005	<.001	0.009	0.009	0.017	0.031	0.083	<.0001	0.0004	0.013	<.0002	0.001	0.276	<.001
Site 10	7173C	09-Nov-92	34.80	28	13.70	6.78	3	0.37	13.5	<1	<.005	<.005	<.001	0.004	0.009	0.010	0.003	0.157	<.0001	0.0004	0.010	<.0002	0.001	0.197	<.001
Site 10	D1717	28-May-93	35.10	28	13.90	6.75	<1	2.42	13.1	3.4	<.005	<.005	<.001	0.003	0.013	0.013	0.010	0.131	<.0001	0.0004	0.014	0.0002	0.004	0.137	0.001
Site 10	D2506	02-Jul-93	38.30	31	15.00	6.98	2	0.79	17.2	3.4	<.005	<.005	<.001	0.005	0.009	0.010		0.103	<.05	0.0002	0.011	<.0002	0.001	0.147	<.001
Site 10	D3210	30-Jul-93	38.10	28	16.00	6.62	<1	1.25	15.0	2.5	<.005	<.005	<.001	0.004	0.013	0.015		0.153	<.05	0.0002	0.014	<.0002	<.001	0.226	<.001
Site 10	D3971	31-Aug-93	46.00	30	18.70	7.18	3	0.48	21.7	1.6	<.005	<.005	0.003	0.003	0.008	0.009		0.044	<.05	0.0002	0.013	<.0002	0.001	0.139	<.001
Site 10	D4678	04-Oct-93	33.90	21	22.60	6.97	4	1.38	15.3	<1.0	0.019	<.005	<.001	0.009	0.015	0.020		0.105	<.05	0.0003	<.010	<.0002	<.001	0.211	<.001
Site 10	D5306	30-Oct-93	42.00	21	15.80	6.68	<1	0.38	15.8	2.5	<.005	<.005	0.004	0.003	0.003	0.007		0.061	<.05	0.0001	<.010	<.0002	<.001	0.084	<.001
Site 10	D8890	25-Apr-94	61.00	39	20.50	6.43	5	2.53	11.4	10.2	<0.005	1.310	0.007	0.005	0.019	0.028		0.346	<0.20	0.0003	0.021	<0.0002	0.002	0.304	<0.001
Site 10	D9750	01-Jun-94	51.40	31	20.30	6.92	1	0.46	19.0	4.6	<0.005	<0.005	0.002	0.003	0.005	0.006		0.059	<0.20	0.0001	0.014	<0.0002	0.001	0.117	<0.001
Site 10	E1624	30-Jun-94	62.00	39	24.40	6.68	3	1.09	24.3	6.1	<0.005	<0.005	0.002	<0.001	0.007	0.011		0.067	<0.20	0.0003	0.017	<0.0002	0.001	0.195	<0.001
Site 10	E2515	29-Jul-94	82.00	52	38.90	6.95	<1	2.26	39.4	2.0	0.021	0.061	0.003	0.012	0.022	0.031		0.075	<0.20	0.0007	0.023	<0.0002	<0.001	0.663	<0.001
Site 10	E3445	31-Aug-94	75.60	45	31.60	7.07	2	1.00	34.0	3.0	<0.005	0.009	0.003	0.007	0.017	0.021		0.114	<0.20	0.0006	0.018	<0.0002	<0.001	0.453	<0.001
Site 10	E5179	30-Oct-94	68.90	38	25.30	6.63	2	0.75	20.9	6.6	<0.005	<0.005	0.003	<0.001	<0.001	0.130		0.078	<0.20	0.0002	0.017	<0.0002	0.001	0.201	<0.001
Site 11	8842B	15-Oct-91	37.00	28	15.20	6.51	2	3.90	18.2	<1	0.011	<.005	<.001	0.013	0.015	0.338	0.010	0.120	<.0001	0.0020	0.012	<.0002	0.001	1.360	<.001
Site 11	3567C	24-May-92	20.50	16	7.43	6.43	2	0.53	8.4	<1	<.005	<.005	<.001	0.002	0.002	0.013	0.009	0.120	<.0001	0.0004	<.01	<.0002	0.001	0.387	<.001
Site 12	8842B	15-Oct-91	47.00	37	20.90	6.71	3	0.70	23.0	<1	<.005	<.005	0.002	0.004	0.011	0.064	0.002	0.062	<.0001	0.0002	0.014	<.0002	0.001	0.337	<.001
Site 13	3567C	24-May-92	19.90	16	7.02	6.36	2	0.71	7.4	<1	0.005	<.005	<.001	0.002	0.002	0.004	0.010	0.140	<.0001	0.0003	<.01	<.0002	<.001	0.399	<.001
Site 13	4299C	28-Jun-92	30.80	25	10.70	6.62	5	1.84	9.8	2.3	0.056	<.005	<.001	0.010	0.010	0.019	0.016	0.135	<.0001	0.0005	<.01	<.0002	0.007	1.200	<.001
Site 13	5107C	05-Aug-92	33.60	27	17.30	6.54	4	1.77	14.5	<1	0.049	<.005	<.001	0.008	0.042	0.090	0.035	0.098	<.0001	0.0005	0.014	<.0002	<.001	1.090	<.001
Site 13	5624C	30-Aug-92	36.30	29	15.00	6.33	4	3.86	15.2	<1	0.060	<.005	<.001	0.006	0.028	0.028	0.006	0.133	<.0001	0.0012	0.014	<.0002	<.001	1.440	<.001
Site 13	6264C	30-Sep-92	34.00	27	13.50	6.70	8	1.70	15.1	<1	0.035	<.005	<.001	0.016	0.031	0.033	0.012	0.126	<.0001	0.0004	0.013	<.0002	<.001	0.687	<.001
Site 13	7173C	09-Nov-92	27.00	22	9.91	6.42	5	1.47	10.2	<1	0.015	<.005	<.001	0.010	0.018	0.021	<.001	0.177	<.0001	0.0006	0.010	<.0002	0.010	0.761	<.001
Site 13	D1717	28-May-93	20.30	16	7.30	6.35	1	1.05	7.9	<1.0	0.005	<.005	<.001	0.006	0.016	0.016	0.009	0.146	0.0001	0.0005	<.010	<.0002	0.007	0.486	0.001
Site 13	D2506	02-Jul-93	22.80	13	8.33	6.70	5	0.93	9.3	<1.0	0.008	<.005	<.001	0.006	0.013	0.015		0.142	<.05	0.0004	0.011	<.0002	<.001	0.576	<.001
Site 13	D3210	30-Jul-93	22.40	16	9.74	6.30	<1	1.90	8.1	<1.0	0.010	<.005	<.001	0.009	0.013	0.013		0.161	<.05	0.0004	0.011	<.0002	<.001	0.660	<.001
Site 13	D3971	31-Aug-93	29.00	19	11.50	7.00	2	1.53	15.0	<1.0	0.012	<.005	<.001	0.004	0.004	0.019		0.135	<.05	0.0004	<.010	<.0002	0.001	0.769	<.001
Site 13	D4678	04-Oct-93	48.70	30	13.60	6.90	1	0.42	21.4	1.8	<.005	<.005	<.001	0.004	0.007	0.010		0.103	<.05	0.0003	0.021	<.0002	<.001	0.637	<.001
Site 13	D5306	30-Oct-93	30.10	15	12.20	6.45	6	1.11	12.1	<1.0	0.011	<.005	0.003	0.007	0.007	0.013		0.101	<.05	0.0002	0.013	<.0002	<.001	0.606	<.001
Site 13	D8890	25-Apr-94	22.60	13	6.96	5.80	7	4.62	5.5	4.6	<0.005	<0.005	0.005	0.006	0.022	0.036		0.441	<0.20	0.0003	0.014	<0.0002	0.002	0.719	0.112
Site 13	D9750	01-Jun-94	21.00	10	7.92	6.64	2	0.55	7.5	<1.0	<0.005	<0.005	0.003	0.002	0.011	0.013		0.105	<0.20	0.0002	<0.010	<0.0002	<0.001	0.423	<0.001
Site 13	E1624	30-Jun-94	28.80	12	9.75	6.26	5	0.87	9.3	<1.0	0.011	<0.005	0.002	0.003	0.009	0.015		0.112	<0.20	0.0004	0.011	<0.0002	<0.001	0.612	<0.001
Site 13	E2515	29-Jul-94	40.00	25	16.50	6.30	5	4.48	16.0	<1.0	0.113	0.009	0.004	0.009	0.009	0.017		0.126	<0.20	0.0009	0.020	<0.0002	0.001	3.080	<0.001
Site 13	E3445	31-Aug-94	31.60	16	12.80	6.47	5	1.90	13.6	<1.0	0.025	<0.005	0.004	0.009	0.026	0.026		0.108	<0.20	0.0004	0.011	<0.0002	<0.001	1.030	<0.001
Site 14	D3210	30-Jul-93	165.00	124	72.80	6.79	13	20.00	71.4	1.6	0.093	0.029	0.011	0.060	0.104	0.163		0.560	<.05	0.0056	0.153	<.0002	0.004	2.340	0.002
Site 14	D5306	30-Oct-93	532.00	329	271.00	7.18	11	6.16	247.0	14.3	3.300	1.810	0.483	0.083	0.083	0.105		0.166	<.05	0.0025	0.387	<.0002	0.003	1.420	<.001
Site 14	D8890	25-Apr-94	191.00	126	72.90	6.81	7	18.50	39.9	23.9	0.406	5.180	0.189	0.017	0.018	0.069		0.529	<0.20	0.0018	0.108	<0.0002	0.004	0.991	0.002
Site 14	D9750	01-Jun-94	340.00	220	155.00	7.28	<1	1.80	120.0	34.3	0.628	2.940	0.047	0.017	0.023	0.651		0.046	<0.20	0.0009	0.197	<0.0002	0.002	0.445	<0.001
Site 14	E1624	30-Jun-94	345.00	213	155.00	6.70	22	9.40	155.0	14.3	0.965	1.020	0.407	0.028	0.109	0.228		0.112	<0.20	0.0162	0.272	<0.0002	0.004	5.400	0.002
Site 14	E2515	29-Jul-94	461.00	300	205.00	7.37	18	9.81	222.0	20.2	2.090	0.151	0.044	0.048	0.072	0.139		0.096	<0.20	0.0047	0.263	<0.0002	0.001	2.260	0.001
Site 14	E3445	31-Aug-94	439.00	277	187.00	7.28	28	17.00	197.0	20.4	1.800	0.197	0.043	0.059	0.130	0.255		0.248	<0.20	0.0070	0.247	<0.0002	0.003	4.080	0.003
Site 2	8842B	14-Oct-91	28.00	18	8.57	7.02	1	0.74	11.8	<1	<.005	0.067	<.001	0.004	0.027	0.082	0.005	0.066	<.0001	0.0002	<.01	<.0002	0.002	0.213	<.001
Site 2	3567C	24-May-92	24.30	19	8.12	6.54	1	0.47	9.4	<1	0.007	<.005	<.001	0.003	0.008	0.019	0.003	0.100	<.0001	<.0001	<.01	<.0002	<.001	0.169	0.001
Site 2	4299C	28-Jun-92	29.00	23	8.56	5.60	1	0.60	13.6	<1	0.011	0.028	0.002	0.002	0.002	0.005	0.006	0.042	<.0001	0.0001	0.012	<.0002	0.002	0.206	<.001

Table 7-3

ELK PROPERTY WATER SAMPLE ANALYSIS RESULTS
16-Jan-95

			PHYSICAL TESTS						DISSOLVED ANINONS		NUTRIENTS						CYANIDES	TOTAL METALS							
SITE	REP#	DATE	Conductv umhos/cm	Tot Dislv Solids	Hardness CaCO3	pH	Tot Susp Solids	Turbidity NTU	Alkalinity CaCO3	Sulphate SO4	Ammonia N	NiNitrate N	NiNitrite N	Niortho-Phos P	Tot Dis Ph P	Tot Phos P	Tot Cyanid CN	Aluminum T-Al	Antimony T-Sb	Arsenic T-As	Barium T-Ba	Cadmium T-Cd	Copper T-Cu	Iron T-Fe	Lead T-Pb
Site 2	5107C	05-Aug-92	24.90	20	10.60	6.72	<1	0.39	9.9	<1	0.015	<.005	0.002	<.001	0.009	0.039	0.009	0.067	<.0001	<.0001	<.01	<.0002	<.001	0.163	<.001
Site 2	5624C	30-Aug-92	32.20	26	12.40	6.43	4	0.68	13.0	<1	0.015	0.050	0.001	0.004	0.014	0.015	0.003	0.085	<.0001	<.0001	<.01	<.0002	<.001	0.238	<.001
Site 2	6264C	30-Sep-92	28.00	22	10.90	6.98	7	0.50	12.7	<1	<.005	0.013	<.001	0.006	0.006	0.009	0.014	0.054	<.0001	0.0002	<.01	<.0002	<.001	0.167	<.001
Site 2	7173C	09-Nov-92	27.80	22	9.86	7.10	3	0.61	10.6	1.2	0.005	<.005	0.002	0.002	0.007	0.007	<.001	0.066	<.0001	0.0004	<.01	<.0002	0.001	0.161	<.001
Site 2	D1717	28-May-93	23.40	19	8.49	6.79	<1	1.31	11.1	3.1	<.005	<.005	<.001	0.006	0.009	0.011	<.001	0.128	<.0001	0.0001	<.010	<.0002	0.003	0.214	0.001
Site 2	D2506	02-Jul-93	24.80	20	8.68	7.40	<1	0.56	10.3	1.7	<.005	<.005	<.001	0.003	0.007	0.009		0.105	<.05	<.0001	<.010	<.0002	<.001	0.178	<.001
Site 2	D3210	30-Jul-93	24.90	18	9.65	6.80	1	0.47	9.6	<1.0	0.010	0.005	0.005	0.005	0.005	0.009		0.096	<.05	<.0001	0.011	<.0002	<.001	0.159	<.001
Site 2	D3971	31-Aug-93	26.00	20	10.60	7.38	3	0.70	13.2	1.7	<.005	<.005	0.001	0.003	0.007	0.009		0.049	<.05	<.0001	<.010	<.0002	0.001	0.155	<.001
Site 2	D4678	04-Oct-93	28.60	18	13.20	7.25	4	0.65	12.7	2.3	0.010	0.017	0.010	0.003	0.007	0.009		0.077	<.05	<.0001	<.010	<.0002	0.001	0.207	<.001
Site 2	D5306	30-Oct-93	27.00	16	10.50	6.95	3	0.98	11.8	2.3	<.005	0.011	0.007	0.002	0.007	0.009		0.053	<.05	<.0001	0.015	<.0002	<.001	0.188	<.001
Site 2	D8890	25-Apr-94	28.40	16	9.92	6.90	2	1.14	11.3	2.0	<0.005	<0.005	0.002	0.002	0.010	0.014		0.175	<0.20	<0.0001	<0.010	<0.0002	0.001	0.315	0.003
Site 2	D9750	01-Jun-94	25.00	13	9.91	7.04	<1	0.88	9.9	1.6	<0.005	<0.005	0.002	0.003	0.006	0.010		0.091	<0.20	<0.0001	<0.010	<0.0002	<0.001	0.167	<0.001
Site 2	E1624	30-Jun-94	29.40	14	10.60	6.78	3	0.72	10.6	1.5	<0.005	<0.005	0.002	<0.001	0.001	0.006		0.060	<0.20	<0.0001	<0.010	<0.0002	<0.001	0.175	<0.001
Site 2	E2515	29-Jul-94	38.90	22	14.50	6.64	<1	1.39	16.7	<1.0	0.045	0.062	0.002	0.005	0.013	0.020		0.065	<0.20	<0.0001	0.012	0.0003	<0.001	0.612	<0.001
Site 2	E3445	31-Aug-94	37.60	20	13.50	6.58	4	1.60	16.3	<1.0	0.017	0.006	0.002	0.007	0.019	0.019		0.057	<0.20	0.0002	<0.010	<0.0002	<0.001	0.293	<0.001
Site 2	E5179	30-Oct-94	30.20	16	11.40	6.71	<1	0.70	12.3	1.9	<0.005	<0.005	0.002	<0.001	0.003	0.011		0.038	<0.20	<0.0001	<0.010	<0.0002	<0.001	0.130	<0.001
Site 3	8842B	15-Oct-91	37.00	28	15.10	7.03	2	0.60	18.1	<1	<.005	0.005	0.002	0.004	0.020	0.048	0.004	0.078	<.0001	<.0001	0.012	<.0002	0.001	0.213	<.001
Site 3	3567C	24-May-92	23.10	18	8.45	6.76	<1	0.74	9.7	<1	<.005	<.005	<.001	0.009	0.009	0.010	0.007	0.120	<.0001	0.0001	0.013	<.0002	<.001	0.180	<.001
Site 3	4299C	28-Jun-92	30.50	24	11.00	5.80	2	0.64	26.2	<1	0.010	<.005	<.001	0.003	0.003	0.007	0.005	0.059	<.0001	0.0001	0.011	<.0002	<.001	0.412	<.001
Site 3	5107C	05-Aug-92	29.60	24	17.90	6.63	3	1.35	13.0	<1	0.014	<.005	<.001	0.003	0.025	0.041	0.019	0.064	<.0001	<.0001	0.012	<.0002	<.001	0.453	<.001
Site 3	5624C	30-Aug-92	35.00	28	14.10	6.83	11	0.72	15.3	1.6	0.007	0.008	<.001	0.003	0.012	0.012	0.004	0.070	<.0001	<.0001	0.011	<.0002	<.001	0.343	<.001
Site 3	6264C	30-Sep-92	36.00	29	14.40	6.95	5	0.70	17.0	<1	<.005	<.005	<.001	0.003	0.010	0.036	0.031	0.088	<.0001	0.0002	0.013	<.0002	<.001	0.281	<.001
Site 3	7173C	09-Nov-92	29.80	24	10.70	6.90	3	0.81	10.9	1.3	0.005	<.005	<.001	0.004	0.010	0.010	<.001	0.143	<.0001	0.0003	<.01	<.0002	0.001	0.214	<.001
Site 3	D1717	28-May-93	24.60	20	8.81	6.85	5	2.15	10.2	2.7	<.005	<.005	<.001	0.004	0.007	0.014	<.001	0.150	<.0001	0.0002	<.010	<.0002	0.002	0.191	0.001
Site 3	D2506	02-Jul-93	25.60	20	9.50	7.25	1	1.02	11.1	3.8	<.005	<.005	<.001	0.003	0.008	0.009		0.120	<.05	<.0001	0.011	<.0002	<.001	0.212	<.001
Site 3	D3210	30-Jul-93	26.00	19	10.80	6.75	1	0.72	10.1	1.9	<.005	<.005	0.003	0.002	0.002	0.008		0.127	<.05	<.0001	0.011	<.0002	<.001	0.244	<.001
Site 3	D3971	31-Aug-93	30.00	20	11.80	7.28	3	0.76	14.9	1.0	<.005	<.005	0.001	0.002	0.002	0.010		0.072	<.05	<.0001	<.010	<.0002	0.001	0.250	<.001
Site 3	D4678	04-Oct-93	34.40	21	16.20	7.16	2	1.37	14.7	2.5	<.005	<.005	<.001	0.005	0.006	0.011		0.096	<.05	<.0001	<.010	<.0002	<.001	0.288	<.001
Site 3	D5306	30-Oct-93	33.80	17	12.20	6.91	3	0.87	12.9	1.9	0.011	0.006	0.003	0.004	0.004	0.004		0.111	<.05	<.0001	<.010	<.0002	0.001	0.229	<.001
Site 3	D8890	25-Apr-94	28.90	17	10.50	6.61	5	2.28	8.9	3.9	<0.005	0.175	0.004	0.005	0.005	0.009		0.272	<0.20	0.0001	0.014	<0.0002	0.002	0.310	0.001
Site 3	D9750	01-Jun-94	26.50	15	10.60	6.98	1	1.18	10.5	2.4	<0.005	<0.005	0.002	0.003	0.005	0.014		0.110	<0.20	<0.0001	0.010	<0.0002	<0.001	0.195	<0.001
Site 3	E1624	30-Jun-94	31.00	17	11.90	6.76	5	0.63	12.4	2.0	<0.005	<0.005	0.002	<0.001	0.004	0.008		0.101	<0.20	<0.0001	0.011	<0.0002	<0.001	0.283	<0.001
Site 3	E2515	29-Jul-94	44.10	28	17.80	6.75	3	1.32	20.1	1.6	0.015	0.053	0.003	0.006	0.013	0.021		0.069	<0.20	<0.0001	0.012	<0.0002	<0.001	0.554	<0.001
Site 3	E3445	31-Aug-94	47.80	29	18.30	7.12	4	0.90	20.6	2.4	<0.005	<0.005	0.002	0.005	0.017	0.017		0.255	<0.20	0.0002	0.013	<0.0002	0.001	0.608	0.001
Site 3	E5179	30-Oct-94	48.60	29	18.50	6.88	2	1.30	17.8	3.6	<0.005	<0.005	0.004	<0.001	0.012	0.019		0.126	<0.20	0.0001	0.013	<0.0002	<0.001	0.599	<0.001
Sump B	E5179	30-Oct-94	164.00	101	59.20	6.53	3	1.90	40.8	20.9	0.137	1.430	0.004	0.050	0.050	0.067		0.190	<0.20	0.0009	0.074	<0.0002	0.002	0.676	0.001
Sump C	E3445	31-Aug-94	113.00	76	50.20	7.07	9	7.60	55.8	4.7	0.010	<0.005	0.004	0.030	0.073	0.113		0.204	<0.20	0.0084	0.044	<0.0002	0.003	1.370	<0.001
Sump C	E5179	30-Oct-94	98.20	60	42.00	6.56	6	4.30	42.6	4.0	0.096	0.019	0.009	0.006	0.029	0.051		0.220	<0.20	0.0033	0.034	<0.0002	0.001	1.120	<0.001
Sump U	E3445	31-Aug-94	626.00	478	258.00	8.07	9	9.60	155.0	78.1	2.000	21.900	2.670	0.033	0.049	0.080		0.156	<0.20	0.0059	0.119	0.0016	0.030	0.337	0.019
Sump U	E3445	31-Aug-94	626.00	478	263.00	8.12	12	11.30	152.0	77.5	1.940	21.100	2.460	0.034	0.046	0.078		0.168	<0.20	0.0059	0.125	0.0015	0.030	0.391	0.019
Sump U	E5179	30-Oct-94	705.00	635	255.00	11.00	10	9.80	143.0	108.0	14.900	35.800	2.760	0.007	0.072	0.105		0.213	<0.20	0.0045	0.075	<0.0002	0.024	0.229	0.002
1K Pit	5107C	05-Aug-92	242.00	194	-	7.65	13	25.30	64.4	58.8	0.043	0.297	0.007	0.027	0.041	0.082	-	-	-	-	-	-	-	-	-
Pit Water	D9750	01-Jun-94	593.00	450	272.00	8.24	6	4.54	135.0	71.8	3.530	25.600	0.497	0.004	0.006	0.023		0.234	<0.20	0.0024	0.087	<0.0002	0.016	0.048	0.013
Site 1	8842B	14-Oct-91	31.00	21	9.89	6.97	1	0.80	14.3	<1	<.005	<.005	0.001	0.002	0.024	0.053	0.009	0.084	<.0001	0.0003	<.01	<.0002	<.001	0.973	<.001
Site 4	8842B	15-Oct-91	182.00	161	94.80	7.47	<1	0.11	91.7	7.3	<.005	0.021	0.002	0.001	0.010	0.042	0.001	0.005	<.0001	0.0002	0.029	<.0002	<.001	<.03	<.001
Site 5	8842B	15-Oct-91	185.00	170	96.70	7.75	<1	0.14	97.0	9.0	<.005	0.011	<.001	0.003	0.050	0.050	0.001	0.017	0.0047	0.0009	0.024	<.0002	0.003	0.084	<.001
Site 6	8842B	15-Oct-91	162.00	145	85.00	7.85	<1	0.43	83.3	6.9	<.005	<.005	0.005	0.004	0.036	0.083	<.001	0.021	<.0001	0.0003	0.026	<.0002	0.001	0.067	<.001
Site 7	8842B	15-Oct-91	180.00	149	80.00	7.51	<1	1.03	59.1	10.2	<.005	0.010	0.002	0.004	0.035	0.035	<.001	0.026	<.0001	0.0006	0.018	<.0002	0.001	0.280	<.001
Site 8	8842B	15-Oct-91	158.00	142	82.70	7.84	1	0.18	83.3	5.2	<.005	0.006	0.004	<.001	0.051	0.059	<.001	0.011	0.0006	0.0007	0.017	<.0002	0.002	0.036	<.001
Site 9	8842B	15-Oct-91	98.00	82	45.10	7.76	1	[illegible]	[illegible]	[illegible]	<.005	<.005	0.003	0.003	0.025	0.051	0.003	0.052	0.0007	0.0004	0.024	<.0002	0.001	0.072	<.001

ELK PROPERTY WATER SAMPLE ANAL
16-Jan-95

			TOTAL METALS						DISSOLVED METALS												DISSOLVED METALS		
			Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc	Aluminum	Antimony	Arsenic	Barium	Cadmium	Calcium	Copper	Iron	Lead	Magnesium	Molybdenum	Nickel	Selenium	Silver	Zinc
SITE	REP#	DATE	T-Hg	T-Mo	T-Ni	T-Se	T-Ag	T-Zn	D-Al	D-Sb	D-As	D-Ba	D-Cd	D-Ca	D-Cu	D-Fe	D-Pb	D-Mg	D-Mo	D-Ni	D-Se	D-Ag	D-Zn
Site 10	8842B	15-Oct-91	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.092	<.0001	0.0009	0.015	<.0002	6.12	0.002	0.430	<.001	1.860	<.001	<.001	<.0005	<.0001	<.005
Site 10	3567C	24-May-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.110	<.0001	0.0002	<.01	<.0002	3.24	<.001	0.117	<.001	1.050	<.001	<.001	<.0005	<.0001	<.005
Site 10	4299C	28-Jun-92	<.00005	<.001	0.001	<.0005	<.0001	0.007	0.041	<.0001	0.0006	0.014	<.0002	6.50	<.001	0.323	<.001	1.790	<.001	0.001	<.0005	<.0001	<.005
Site 10	5107C	05-Aug-92	<.00005	<.001	0.001	<.0005	<.0001	<.005	0.062	<.0001	0.0004	0.017	<.0002	7.01	<.001	0.358	<.001	2.030	<.001	0.001	<.0005	<.0001	<.005
Site 10	5624C	30-Aug-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.075	<.0001	0.0012	0.016	<.0002	6.41	<.001	0.614	<.001	1.990	<.001	<.001	<.0005	<.0001	<.005
Site 10	6264C	30-Sep-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.079	<.0001	0.0004	0.013	<.0002	5.97	0.001	0.219	<.001	1.680	<.001	<.001	<.0005	<.0001	<.005
Site 10	7173C	09-Nov-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.136	<.0001	0.0002	<.01	<.0002	3.73	0.001	0.163	<.001	1.070	<.001	<.001	<.0005	<.0001	<.005
Site 10	D1717	28-May-93	<.00005	<.001	<.001	<.0005	<.0001	0.031	0.084	<.0001	0.0001	0.012	<.0002	3.70	0.002	0.137	<.001	1.120	<.001	<.001	<.0005	<.0001	<.005
Site 10	D2506	02-Jul-93	<.00005	<.030	<.020	<.0005	<.0001	<.005	0.081	<.05	0.0002	0.011	<.0002	3.87	<.001	0.147	<.001	1.300	<.030	<.020	<.0005	<.0001	<.005
Site 10	D3210	30-Jul-93	<.00005	<.030	<.020	<.0005	<.0001	<.005	0.150	<.05	0.0002	0.014	<.0002	4.33	<.001	0.191	<.001	1.270	<.030	<.020	<.0005	<.0001	<.005
Site 10	D3971	31-Aug-93	<.00005	<.030	<.020	<.0005	<.0001	<.005	0.020	<.05	0.0002	0.013	<.0002	4.96	<.001	0.124	<.001	1.530	<.030	<.020	<.0005	<.0001	<.005
Site 10	D4678	04-Oct-93	<.00005	<.030	<.020	<.0005	<.0001	<.005	0.077	<.05	<.0001	<.010	<.0002	6.26	<.001	0.151	<.001	1.700	<.030	<.020	<.0005	<.0001	<.005
Site 10	D5306	30-Oct-93	<.00005	<.030	<.020	<.0005	<.0001	<.005	0.057	<.05	0.0001	<.010	<.0002	4.47	<.001	0.068	<.001	1.120	<.030	<.020	<.0005	<.0001	<.005
Site 10	D8890	25-Apr-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	0.025	0.199	<0.20	0.0003	0.017	<0.0002	5.13	0.002	0.179	<0.001	1.870	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 10	D9750	01-Jun-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.057	<0.20	<0.0001	0.014	<0.0002	5.28	<0.001	0.102	<0.001	1.720	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 10	E1624	30-Jun-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.065	<0.20	0.0003	0.017	<0.0002	6.48	<0.001	0.165	<0.001	2.000	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 10	E2515	29-Jul-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.075	<0.20	0.0005	0.023	<0.0002	10.40	<0.001	0.527	<0.001	3.130	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 10	E3445	31-Aug-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.065	<0.20	0.0005	0.017	<0.0002	8.48	<0.001	0.329	<0.001	2.550	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 10	E5179	30-Oct-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.064	<0.20	0.0002	0.017	<0.0002	6.43	<0.001	0.169	<0.001	2.240	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 11	8842B	15-Oct-91	<.00005	0.002	<.001	<.0005	<.0001	<.005	0.075	<.0001	0.0013	0.012	<.0002	4.28	0.001	0.566	<.001	1.110	0.001	<.001	<.0005	<.0001	<.005
Site 11	3567C	24-May-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.120	<.0001	0.0004	<.01	<.0002	2.05	<.001	0.304	<.001	0.561	<.001	<.001	<.0005	<.0001	<.005
Site 12	8842B	15-Oct-91	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.032	<.0001	0.0002	0.014	<.0002	6.13	<.001	0.189	<.001	1.360	<.001	<.001	<.0005	<.0001	<.005
Site 13	3567C	24-May-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.140	<.0001	0.0003	<.01	<.0002	1.91	<.001	0.346	<.001	0.546	<.001	<.001	<.0005	<.0001	<.005
Site 13	4299C	28-Jun-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.057	<.0001	0.0005	<.01	<.0002	3.05	<.001	0.755	<.001	0.742	<.001	<.001	<.0005	<.0001	<.005
Site 13	5107C	05-Aug-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.088	<.0001	0.0004	0.014	<.0002	4.85	<.001	0.849	<.001	1.250	<.001	<.001	<.0005	<.0001	<.005
Site 13	5624C	30-Aug-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.102	<.0001	0.0011	0.014	<.0002	4.21	<.001	1.000	<.001	1.100	<.001	<.001	<.0005	<.0001	<.005
Site 13	6264C	30-Sep-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.102	<.0001	0.0003	0.013	<.0002	3.77	<.001	0.520	<.001	0.989	<.001	<.001	<.0005	<.0001	<.005
Site 13	7173C	09-Nov-92	<.00005	<.001	0.002	<.0005	<.0001	0.028	0.152	<.0001	0.0003	0.010	<.0002	2.83	0.002	0.591	<.001	0.689	<.001	<.001	<.0005	<.0001	<.005
Site 13	D1717	28-May-93	<.00005	<.001	<.001	<.0005	<.0001	0.027	0.128	<.0001	0.0003	<.010	<.0002	2.00	0.001	0.410	<.001	0.560	<.001	<.001	<.0005	<.0001	<.005
Site 13	D2506	02-Jul-93	<.00005	<.030	<.020	<.0005	<.0001	<.005	0.140	<.05	0.0003	0.011	<.0002	2.26	<.001	0.433	<.001	0.656	<.030	<.020	<.0005	<.0001	<.005
Site 13	D3210	30-Jul-93	<.00005	<.030	<.020	<.0005	<.0001	0.016	0.160	<.05	0.0004	<.010	<.0002	2.76	<.001	0.550	<.001	0.691	<.030	<.020	<.0005	<.0001	<.005
Site 13	D3971	31-Aug-93	<.00005	<.030	<.020	<.0005	<.0001	<.005	0.066	<.05	0.0004	<.010	<.0002	3.20	<.001	0.407	<.001	0.843	<.030	<.020	<.0005	<.0001	<.005
Site 13	D4678	04-Oct-93	<.00005	<.030	<.020	<.0005	<.0001	<.005	0.099	<.05	0.0002	0.016	<.0002	3.75	<.001	0.478	<.001	1.040	<.030	<.020	<.0005	<.0001	<.005
Site 13	D5306	30-Oct-93	<.00005	<.030	<.020	<.0005	<.0001	<.005	0.082	<.05	0.0002	<.010	<.0002	3.51	<.001	0.483	<.001	0.843	<.030	<.020	<.0005	<.0001	<.005
Site 13	D8890	25-Apr-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	0.009	0.281	<0.20	0.0003	0.010	<0.0002	1.81	0.001	0.449	<0.001	0.591	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 13	D9750	01-Jun-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.092	<0.20	0.0001	<0.010	<0.0002	2.19	<0.001	0.343	<0.001	0.594	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 13	E1624	30-Jun-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.100	<0.20	0.0004	0.011	<0.0002	2.76	<0.001	0.443	<0.001	0.697	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 13	E2515	29-Jul-94	0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.081	<0.20	0.0006	0.017	<0.0002	4.73	<0.001	1.550	<0.001	1.140	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 13	E3445	31-Aug-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.061	<0.20	0.0003	0.011	<0.0002	3.54	<0.001	0.611	<0.001	0.957	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 14	D3210	30-Jul-93	<.00005	<.030	<.020	<.0005	<.0001	0.010	0.110	<.05	0.0045	0.134	<.0002	21.90	<.001	0.949	0.001	4.390	<.030	<.020	<.0005	<.0001	<.005
Site 14	D5306	30-Oct-93	<.00005	<.030	<.020	<.0005	<.0001	<.005	0.019	<.05	0.0018	0.336	<.0002	78.00	0.001	0.434	<.001	18.500	<.030	<.020	<.0005	<.0001	<.005
Site 14	D8890	25-Apr-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	0.025	0.097	<0.20	0.0011	0.102	<0.0002	21.90	0.002	0.311	<0.001	4.440	<0.030	<0.020	<0.0005	<0.0001	0.005
Site 14	D9750	01-Jun-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.041	<0.20	0.0007	0.196	<0.0002	47.30	<0.001	0.243	<0.001	8.910	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 14	E1624	30-Jun-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	0.005	0.029	<0.20	0.0126	0.253	<0.0002	48.00	0.001	2.110	<0.001	8.600	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 14	E2515	29-Jul-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	0.018	0.036	<0.20	0.0006	0.248	<0.0002	62.80	<0.001	0.697	<0.001	11.700	<0.030	<0.020	<0.0005	<0.0001	0.008
Site 14	E3445	31-Aug-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	0.015	0.021	<0.20	0.0047	0.222	<0.0002	55.00	0.001	1.230	<0.001	11.500	<0.030	<0.020	<0.0005	<0.0001	0.009
Site 2	8842B	14-Oct-91	<.00005	0.001	<.001	<.0005	<.0001	0.007	0.050	<.0001	<.0001	<.01	<.0002	2.28	<.001	0.103	<.001	0.701	<.001	<.001	<.0005	<.0001	<.005
Site 2	3567C	24-May-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.100	<.0001	<.0001	<.01	<.0002	2.32	<.001	0.162	<.001	0.566	<.001	<.001	<.0005	<.0001	<.005
Site 2	4299C	28-Jun-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.037	<.0001	0.0001	<.01	<.0002	2.47	<.001	0.146	<.001	0.582	<.001	<.001	<.0005	<.0001	<.005

ELK PROPERTY WATER SAMPLE ANAL
16-Jan-95

			TOTAL METALS					!!	DISSOLVED METALS										DISSOLVED METALS				
			Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc	Aluminum	Antimony	Arsenic	Barium	Cadmium	Calcium	Copper	Iron	Lead	Magnesium	Molybdenum	Nickel	Selenium	Silver	Zinc
SITE	REP#	DATE	T-Hg	T-Mo	T-Ni	T-Se	T-Ag	T-Zn	D-Al	D-Sb	D-As	D-Ba	D-Cd	D-Ca	D-Cu	D-Fe	D-Pb	D-Mg	D-Mo	D-Ni	D-Se	D-Ag	D-Zn
Site 2	5107C	05-Aug-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.030	<.0001	<.0001	<.01	<.0002	3.04	<.001	0.141	<.001	0.728	<.001	<.001	<.0005	<.0001	<.005
Site 2	5624C	30-Aug-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.069	<.0001	<.0001	<.01	<.0002	3.58	<.001	0.170	<.001	0.846	<.001	<.001	<.0005	<.0001	<.005
Site 2	6264C	30-Sep-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.053	<.0001	<.0001	<.01	<.0002	3.14	<.001	0.131	<.001	0.747	<.001	<.001	<.0005	<.0001	<.005
Site 2	7173C	09-Nov-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.042	<.0001	0.0002	<.01	<.0002	2.88	<.001	0.116	<.001	0.646	<.001	<.001	<.0005	<.0001	<.005
Site 2	D1717	28-May-93	<.00005	<.001	<.001	<.0005	<.0001	0.012	0.106	<.0001	<.0001	<.010	<.0002	2.43	0.001	0.131	<.001	0.589	<.001	<.001	<.0005	<.0001	<.005
Site 2	D2506	02-Jul-93	<.00005	<.030	<.020	<.0005	<.0001	0.005	0.100	<.05	<.0001	<.010	<.0002	2.42	<.001	0.133	<.001	0.638	<.030	<.020	<.0005	<.0001	<.005
Site 2	D3210	30-Jul-93	<.00005	<.030	<.020	<.0005	<.0001	<.005	0.092	<.05	<.0001	0.011	<.0002	2.75	<.001	0.135	<.001	0.676	<.030	<.020	<.0005	<.0001	<.005
Site 2	D3971	31-Aug-93	<.00005	<.030	<.020	<.0005	<.0001	<.005	0.023	<.05	<.0001	<.010	<.0002	3.00	<.001	0.124	<.001	0.752	<.030	<.020	<.0005	<.0001	<.005
Site 2	D4678	04-Oct-93	<.00005	<.030	<.020	<.0005	<.0001	<.005	0.054	<.05	<.0001	<.010	<.0002	3.99	0.001	0.155	<.001	0.779	<.030	<.020	<.0005	<.0001	<.005
Site 2	D5306	30-Oct-93	<.00005	<.030	<.020	<.0005	<.0001	<.005	0.040	<.05	<.0001	0.012	<.0002	3.25	<.001	0.107	<.001	0.584	<.030	<.020	<.0005	<.0001	<.005
Site 2	D8890	25-Apr-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	0.038	0.151	<0.20	<0.0001	<0.010	<0.0002	2.73	0.001	0.244	<0.001	0.753	<0.030	<0.020	<0.0005	<0.0001	0.007
Site 2	D9750	01-Jun-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.077	<0.20	<0.0001	<0.010	<0.0002	2.82	<0.001	0.126	<0.001	0.698	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 2	E1624	30-Jun-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.057	<0.20	<0.0001	<0.010	<0.0002	3.05	<0.001	0.136	<0.001	0.727	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 2	E2515	29-Jul-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.065	<0.20	<0.0001	0.012	<0.0002	4.22	<0.001	0.351	<0.001	0.954	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 2	E3445	31-Aug-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.039	<0.20	0.0001	<0.010	<0.0002	3.85	<0.001	0.163	<0.001	0.935	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 2	E5179	30-Oct-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.028	<0.20	<0.0001	<0.010	<0.0002	3.22	<0.001	0.095	<0.001	0.828	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 3	8842B	15-Oct-91	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.044	<.0001	<.0001	0.011	<.0002	4.18	0.001	0.151	<.001	1.130	<.001	<.001	<.0005	<.0001	<.005
Site 3	3567C	24-May-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.120	<.0001	0.0001	<.01	<.0002	2.39	<.001	0.162	<.001	0.603	<.001	<.001	<.0005	<.0001	<.005
Site 3	4299C	28-Jun-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.039	<.0001	0.0001	<.01	<.0002	3.25	<.001	0.318	<.001	0.706	<.001	<.001	<.0005	<.0001	<.005
Site 3	5107C	05-Aug-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.048	<.0001	<.0001	0.012	<.0002	4.01	<.001	0.339	<.001	0.955	<.001	<.001	<.0005	<.0001	<.005
Site 3	5624C	30-Aug-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.062	<.0001	<.0001	0.011	<.0002	4.04	<.001	0.296	<.001	0.976	<.001	<.001	<.0005	<.0001	<.005
Site 3	6264C	30-Sep-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.088	<.0001	0.0001	0.011	<.0002	4.03	<.001	0.231	<.001	1.050	<.001	<.001	<.0005	<.0001	<.005
Site 3	7173C	09-Nov-92	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.100	<.0001	0.0002	<.01	<.0002	3.08	0.001	0.173	<.001	0.724	<.001	<.001	<.0005	<.0001	<.005
Site 3	D1717	28-May-93	<.00005	<.001	<.001	<.0005	<.0001	0.045	0.150	<.0001	<.0001	<.010	<.0002	2.61	0.001	0.167	<.001	0.558	<.001	<.001	<.0005	<.0001	<.005
Site 3	D2506	02-Jul-93	<.00005	<.030	<.020	<.0005	<.0001	<.005	0.092	<.05	<.0001	0.011	<.0002	2.64	<.001	0.180	<.001	0.705	<.030	<.020	<.0005	<.0001	<.005
Site 3	D3210	30-Jul-93	<.00005	<.030	<.020	<.0005	<.0001	<.005	0.127	<.05	<.0001	0.011	<.0002	3.08	<.001	0.206	<.001	0.750	<.030	<.020	<.0005	<.0001	<.005
Site 3	D3971	31-Aug-93	<.00005	<.030	<.020	<.0005	<.0001	<.005	0.021	<.05	<.0001	<.010	<.0002	3.37	<.001	0.186	<.001	0.832	<.030	<.020	<.0005	<.0001	<.005
Site 3	D4678	04-Oct-93	<.00005	<.030	<.020	<.0005	<.0001	<.005	0.087	<.05	<.0001	<.010	<.0002	4.79	<.001	0.223	<.001	1.030	<.030	<.020	<.0005	<.0001	<.005
Site 3	D5306	30-Oct-93	<.00005	<.030	<.020	<.0005	<.0001	<.005	0.078	<.05	<.0001	<.010	<.0002	3.68	<.001	0.166	<.001	0.722	<.030	<.020	<.0005	<.0001	<.005
Site 3	D8890	25-Apr-94	<0.00005	<0.030	<0.020	<0.0005	0.0002	0.010	0.195	<0.20	<0.0001	0.014	<0.0002	2.82	0.001	0.215	<0.001	0.845	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 3	D9750	01-Jun-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.084	<0.20	<0.0001	<0.010	<0.0002	3.01	<0.001	0.162	<0.001	0.759	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 3	E1624	30-Jun-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.072	<0.20	<0.0001	0.011	<0.0002	3.40	<0.001	0.220	<0.001	0.830	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 3	E2515	29-Jul-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.069	<0.20	<0.0001	0.012	<0.0002	5.01	<0.001	0.482	<0.001	1.280	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 3	E3445	31-Aug-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.078	<0.20	<0.0001	0.011	<0.0002	5.11	<0.001	0.411	<0.001	1.460	<0.030	<0.020	<0.0005	<0.0001	<0.005
Site 3	E5179	30-Oct-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.110	<0.20	0.0001	0.012	<0.0002	4.95	<0.001	0.504	<0.001	1.480	<0.030	<0.020	<0.0005	<0.0001	<0.005
Sump B	E5179	30-Oct-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.123	<0.20	0.0008	0.071	<0.0002	15.20	0.001	0.544	<0.001	5.160	<0.030	<0.020	<0.0005	<0.0001	<0.005
Sump C	E3445	31-Aug-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.131	<0.20	0.0073	0.044	<0.0002	14.20	0.002	1.180	<0.001	3.560	<0.030	<0.020	<0.0005	<0.0001	<0.005
Sump C	E5179	30-Oct-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	<0.005	0.099	<0.20	0.0025	0.030	<0.0002	11.30	<0.001	0.650	<0.001	3.360	<0.030	<0.020	<0.0005	<0.0001	<0.005
Sump U	E3445	31-Aug-94	<0.00005	<0.030	<0.020	<0.0005	0.0001	0.038	0.016	<0.20	0.0051	0.113	0.0002	74.90	0.026	<0.030	0.002	17.100	<0.030	<0.020	<0.0005	0.0001	0.024
Sump U	E3445	31-Aug-94	<0.00005	<0.030	<0.020	<0.0005	0.0001	0.045	0.016	<0.20	0.0050	0.123	<0.0002	76.60	0.026	0.039	0.002	17.600	<0.030	<0.020	<0.0005	0.0001	0.027
Sump U	E5179	30-Oct-94	<0.00005	0.082	<0.020	<0.0005	0.0001	<0.005	0.033	<0.20	0.0042	0.073	<0.0002	97.30	0.022	0.057	<0.001	2.880	0.082	<0.020	<0.0005	0.0001	<0.005
1K Pit	5107C	05-Aug-92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pit Water	D9750	01-Jun-94	<0.00005	<0.030	<0.020	<0.0005	<0.0001	0.022	0.007	<0.20	0.0023	0.086	<0.0002	77.30	0.011	<0.030	0.002	19.300	<0.030	<0.020	<0.0005	<0.0001	0.019
Site 1	8842B	14-Oct-91	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.076	<.0001	0.0002	<.01	<.0002	2.64	<.001	0.371	<.001	0.802	<.001	<.001	<.0005	<.0001	<.005
Site 4	8842B	15-Oct-91	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.005	<.0001	0.0002	0.027	<.0002	31.30	<.001	<.03	<.001	4.060	<.001	<.001	<.0005	<.0001	<.005
Site 5	8842B	15-Oct-91	<.00005	0.002	<.001	<.0005	<.0001	<.005	<.005	<.0001	0.0002	0.027	<.0002	31.20	0.001	0.046	<.001	4.550	<.001	<.001	<.0005	<.0001	<.005
Site 6	8842B	15-Oct-91	<.00005	0.002	<.001	<.0005	<.0001	<.005	0.005	<.0001	0.0002	0.027	<.0002	26.80	<.001	<.03	<.001	4.400	0.001	<.001	<.0005	<.0001	<.005
Site 7	8842B	15-Oct-91	<.00005	<.001	<.001	<.0005	<.0001	<.005	0.009	<.0001	0.0006	0.018	<.0002	26.10	0.013	0.143	<.001	3.600	<.001	<.001	<.0005	<.0001	<.005
Site 8	8842B	15-Oct-91	<.00005	0.002	<.001	<.0005	<.0001	0.005	<.005	<.0001	0.0005	0.017	<.0002	26.00	0.001	<.03	<.001	4.300	0.001	<.001	<.0005	<.0001	<.005
Site 9	8842B	15-Oct-91	<.00005	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Province of British Columbia
MINISTRY OF ENVIRONMENT, LANDS AND PARKS

BC Environment

MEMORANDUM

Suite 201, 3547 Skaha Lake Road, Penticton, British Columbia V2A 7K2 / Telephone: (604) 493-8261

Fisheries and Wildlife
Management Programs
Okanagan Sub-Region

August 21, 1992

File: 34020-20-04
Siwash Lake

Attention: Brian Harris, RPBio
Habitat Technician

Re: Siwash Lake

In response to your memo regarding Siwash Lake, I have the following comments:

1) All lakes which are totally supported by natural reproduction, including Siwash Lake, receive a high management priority rating in this sub-region. Literature indicates genetically unique populations of trout can develop in as little as two generations following fish introduction. Historical stocking records report the only rainbow trout stocking at Siwash Lake occurred in 1953. It is safe to assume there has been considerable genetic adaptation to the Siwash Lake environment since that time, resulting in a potentially unique rainbow trout population.

   It is interesting to note eastern brook trout were stocked (this is likely a mistake in the historical records) in Siwash Lake from 1965 to 1967, but do not appear to have developed a self-sustaining population. This is an excellent example of how little thought went into protecting monoculture wild stocks of trout in previous times. It has been this kind of action which has destroyed the genetic integrity of some unique trout populations

2) The #1 strategic objective of the Fisheries Program is "Conserve wild fish stocks". Our program is currently developing a provincial wild stock management plan which will provide further direction in managing wild stocks.

3) We currently have very limited fishery information available for Siwash Lake. A 1982 lake and stream survey indicated trout growth rate is slow (as expected for a high elevation and low T.D.S. lake), but condition factor appeared excellent. Gillnetting timing and duration was poor for providing any indication of population size. The stream survey indicated all fish production likely occurs in the outlet creek. The two inlets contain no suitable spawning habitat.

Some creel census data was collected by the lodge owner in 1989. A total of 66 hours (July-Aug) of fishing time produced 152 rainbow trout (no sizes available). This translates into a CPUE of 2.3 fish/hr. which is very high and indicative of a large population. Unfortunately, the sample size is small, so we should not place too much weight on the results. Rory Smith, Conservation Officer Service, Kelowna (lodge owners son) reports catch success has remained high since his father purchased the resort in 1981.

Flight count data for Siwash Lake shows an average annual effort of approximately 500 angler days.

4) There are several future management options for Siwash Lake, but more fish population and fishery data is required before any changes are made. More restrictive regulations may be required in the future in order to protect this important wild stock, but considering angler effort and recent C.P.U.E. data, this does not appear to be necessary at this time.

In summary, Siwash Lake rates very high on the Okanagan Sub-Region lakes priority list. The major reason for the high rating is the presence of a potentially unique genetic stock of rainbow trout. As a result, a no stocking policy is in effect and every effort is made to protect this fish population and associated habitat. No changes in current management strategy are planned at this time. Further data will be collected in the near future after which the current management strategy will re-evaluated.

S. Matthews, RPBio
Fisheries Biologist
Fisheries Management Program

SM/pa

cc: Rory Smith, Conservation Officer Service, Kelowna

Appendix 7-1

LAKE: SIWASH INSP.DATE: DISTRICT: Princeton M.U.: 6 ELEV.(m): 1555
LAT.: 49:51 LONG.: 120:18 1:50,000 Paradise Lk 1:125,000 Tulameen
AREA (ha): PERIM.(m): VOLUME(m^3) TDS(ppm):
MEAN DEPTH (m): MAXIMUM DEPTH (m): INLETS?: 1 OUTLETS?: 1

DRAINAGE REACHES: Siwash C - Hayes C - Similkameen - Okanagan R - Columbia R
ACCESS: 0/ 32km/ 0 from Princeton. Private jeep road from Teepee Lakes. Fishing camp.

FACILITIES: All facilities except provisions and beaches. 1 cabin. Recreational Reserve - Lodge.

WATER USE: Nil

SPECIES: RBT ANGLER EFFORT: 1983-88 ave 1018 ang/days/summer AV.WT.(g)
CATCH SUCCESS: 2 (flight counts) AV.LT.(cm)

STOCKING RECORD:

YEAR	NUMBER	SPECIES	SEASON	NO./KG.	SOURCE	COMMENTS
1980						
1981						
1982						
1983						
1984						
1985						
1986						
1987						
1988						
1989						
1990						

NATURAL SPAWNING: Swampy inlet and outlet.

STOCKING PLAN: Not required. Natural stocking.

MANAGEMENT OBJECTIVE: B Protect present fishery.

REGULATIONS:
COMMENTS: Teeming with small fish up to 1 lb. Good ice fishing. 1979 Peachland main now comes within .5 miles of Siwash lkae. Fish 6-10" - fishing pressure increasing - logging up to shoreline. Lodge owner reported fair to good catch succes in 1982, fish averaging 9-10". Appear to be adequate numbers of fish (many rising). Available spawning investigated and set gill nets Oct '82 (daytime). See report in Siwash Lake file. Assess in 1986 or 1987. Creel census forms given to Rory Smith for recording CPUE data - obtain forms in Winter 89. See file for review of census forms which were returned - [redacted].

FURTHER INFORMATION ON FILE (40.35) REHABS?: PHOTOS?:
CREEL DATA?:
MOST RECENT INVENTORY: Oct '82 REPORT FILED?: Yes
PHYSICAL DATA?: Yes PERTINENT FISHERY REPORT NUMBERS?: 1077

Additional Information: Lakes file contains: topographic plan of Lake.

ASPEN GROVE TO PEACHLAND FUNCTIONAL HIGHWAY STUDY

FISHERIES IMPACT ASSESSMENT

NAME: Elkhart Creek FINAL MAP SHEET NUMBER(1:5,000)

FINAL CHAINAGE STATION:

LOCATION: Crossing below the junction with Boulder Lake Creek and above the junction of Siwash lake Creek.

REVISED CHAINAGE STATIONS	1:5,000 map no.	Station Number	Date
	19	640+65	Dec. 13,1985

FISH HABITAT PRESENT

Important spawning and rearing areas dowstream of the crossing site(See attached data sheet) for rainbow trout from Boulder and Elkhart Lake. As well the channel in the vicinity of the crossing is low gradient wetland and swamp however it is an rearing area as well.

PROPOSED DESIGN AND CONCERNS

The design calls for a 20 meter fill which suggests there could be a culvert 87 meters long. The average channel slope is 1.5% but the actual slope at the proposed crossing site should be below 1%. There are major concerns over fish passage at this site due to the height of the fill and the length of the culvert.

Appendix 7-1

FISH POPULATION ESTIMATE

Stream Name: Siwash (Elkhart) Creek **Date:** Aug. 21, 1985.

Location: Below the junction of Siwash Lake Creek..

Site: Pool/Riffle **Method:** Electroshocking **Temperature:** 12°c

L. 35.5m. x W. 1.52m. = A. $53.96 m^2$.

Species	age class	length (mm) Min.	Max.	mean	weight (g) mean	Population Estimate C_1	C_2	N	S.E. N	Total Weight (g)	Density/Biomass by area (m^2) N/m^2	g/m^2	Density/Biomass by length (m) N/m	g/m
Rb.	0+	36	59	45.5	1.03	90	17	110.9	2.96	114.23	2.06	2.12		
Rb.	1+	62	73	67.9	3.45	14	2	16.3	.78	56.24	.30	1.04		
Rb	2+	82	160	115.4	16.9	11	0	11.0	0	185.68	.20	3.44		

TOTALS: 138.2 356.15 2.56 6.60

Site: **Method:** **Temperature:**

L.____m. x W.____m. = A.____m^2.

Species	age class	length (mm) Min.	Max.	mean	weight (g) mean	Population Estimate C	C	N	S.E. N	Total Weight (g)	Density/Biomass by area (m^2) N/m^2	g/m^2	Density/Biomass by length (m) N/m	g/m

TOTALS:

Comments:
- -Slope 1%.
- -Weight = $1.1 \times 10^{-5} \times \text{fishlength}^3$
- -D90= 25 cm., D50 = 15 cm. , cobble bed , with some debris and cutbanks.

7.6 Vegetation and Forest Resources (Figure 7-8)

Vegetation in the area of the deposit consists predominantly of pine forest with small percentages of intermixed balsam, spruce and fir. Understory in the forest is sparse, consisting mainly of moss, grasses and small shrubs. Deadfall in some areas is thick, due largely to broken tree tops, attributed to a storm of heavy snow and freezing rain which apparently hit the area over 15 years ago.

Small, flooded, grassy meadows are common along many of the creeks in the area. Patches of alder bushes occur along creek banks.

Clear-cut logged plots are common throughout the region. Logging companies have been active in the area for over 15 years and many of the plots have regrowth of young trees 2 to 3 metres in height. Weyerhaeuser logged 36 hectares immediately north of the Siwash North area during early 1994. This plot extends along a portion of the mine access road and encompasses most of the area of the proposed tailings pond. Weyerhaeuser also has approximately 28 hectares to the west of the site planned for logging in the near future. Fairfield has clear-cut 50 hectares in the Siwash North area between 1988 and 1994, in stages, as exploration of the deposit advanced. A large portion of the Siwash North clear-cut was grass seeded in 1990 and a substantial ground cover of grasses is now established.

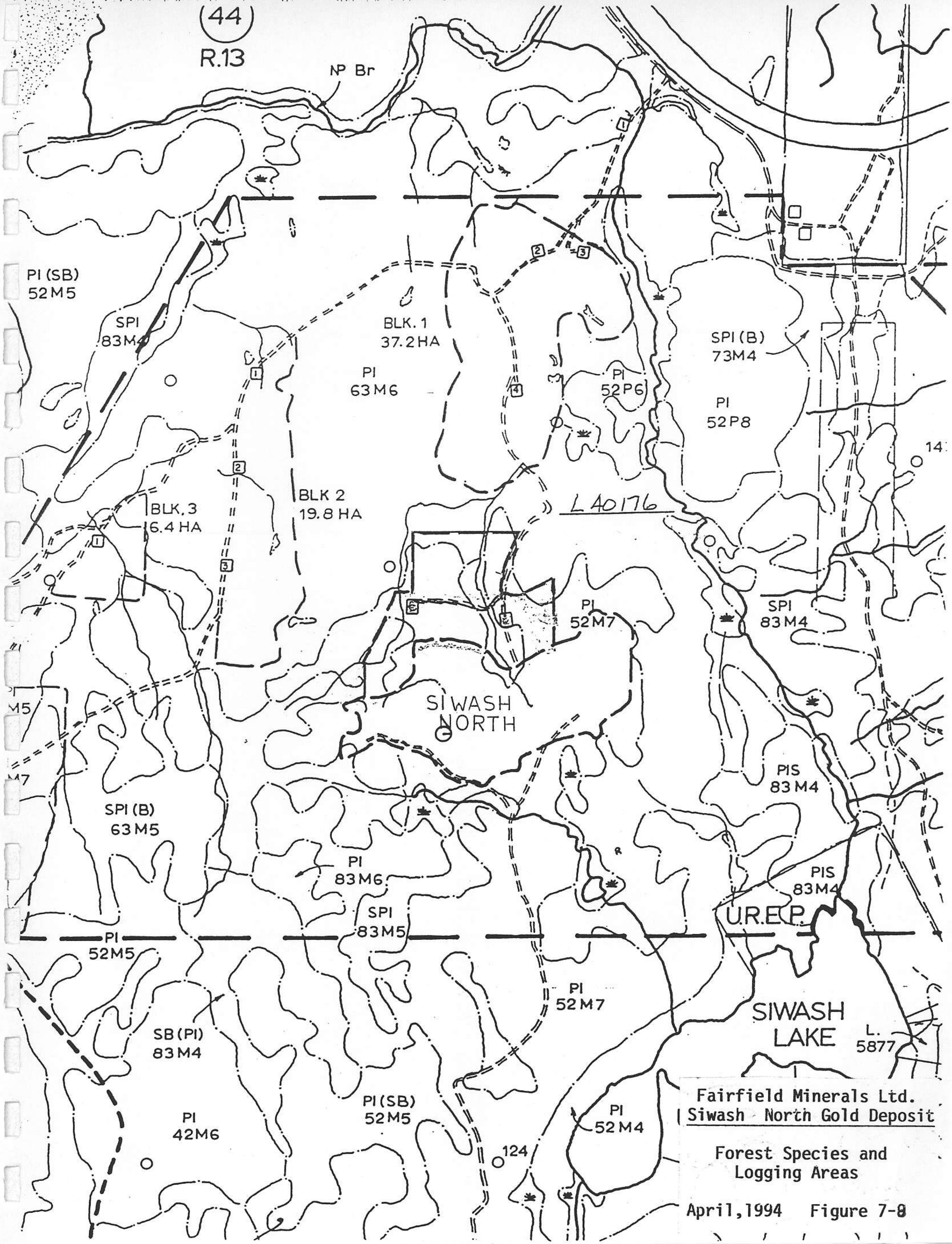
7.7 Agriculture and Recreation

Crown land in the area has been leased by ranchers for cattle grazing use. Cattle are allowed to roam free during the summer and autumn months and are rounded up prior to winter. They generally habitate areas several kilometres south of the work site and seldom enter the mine area. A gate on the south access road effectively deters cattle from venturing into the site.

The only known cultivation of crops in the area is a small hayfield of approximately 25 hectares on the north side of the highway near Elkhart exit. Mr. J. Creighton harvests the hay to feed his horses which are kept at a small farm situated in the field.

Recreation in the area includes hunting for deer, moose and game birds and fishing in several of the local small lakes. Anglers are seen occasionally on Siwash Lake which is 1.5km southeast of the mine site. The only road access to Siwash Lake is via private road to cabins at the east end of the lake located on a recreational lease lot held by Mr. J. Creighton.

Other recreation activities consist of touring or sightseeing on the numerous logging access roads, by motorcycle or 4-wheel-drive vehicle in summer months or by snowmobile or skis in the winter.



Fairfield Minerals Ltd.
Siwash North Gold Deposit

Forest Species and Logging Areas

April, 1994 Figure 7-8

8.0 POTENTIAL IMPACTS, ENVIRONMENTAL ISSUES AND PROPOSED MITIGATIVE MEASURES

8.1 Air Quality

Air quality in the area of the Siwash North deposit is very good and no significant impacts are expected. The majority of the clear-cut area surrounding the mine site has an established growth of grasses and ground cover vegetation which protects the soil from wind dispersion. Access roads are well compacted so vehicle traffic produces little dust.

Soil placement and grass seeding was done on most of the dump slopes upon completion of the open pit program in October 1994. Establishment of vegetation cover on the dumps will largely eliminate the wind dispersion of dust.

8.2 Water Quality

8.2.1 Acid Generation Potential

Studies undertaken to date indicate low potential for generation of acidic runoff from the proposed waste rock dumps or from tailings (see Section 4-3). Acid-base testing of a variety of rock types representing the material which will comprise waste rock dumps has indicated a strongly positive net neutralization potential. An estimated 5% of the waste rock will consist of strongly phyllic-altered granodiorite from immediately adjacent to the vein. Samples of this material have shown moderate levels of sulfur content and high potential acidity but they also have high neutralization potential, resulting in an overall weakly positive net neutralization potential.

This strongly altered, pyritic rock will be mixed or interlayered in the dumps with significantly larger proportions of unaltered granodiorite which has high neutralization potential. Surface waters percolating downward through waste rock piles may become weakly acidic while in contact with altered rock but this will be counteracted as the water passes over underlying fresh, unaltered rock. The resulting pH of water running from the waste piles is expected to be between 6.0 and 7.5. In addition, soil capping to be placed on the surface and slopes of waste dumps is comprised of clay-bearing glacial till which is moderately impermeable and will therefore cause a portion of surface waters to flow off the dump slopes rather than filtering down through the piles.

Runoff from waste rock dumps is collected in ditches surrounding the site and channeled into two sumps at the north side of the clearing (Sumps B and C, Figure 4-1). Water from the sumps will be sampled regularly and analyzed to test for any increase in acidity or sulphate content. If an increase is detected then the runoff water could be neutralized by placement of crushed carbonate rock in the drainage ditches and the sumps through which the water flows.

It appears that nitrogen levels are diluted or neutralized to normal values within a short distance downstream from the waste dumps. The proposed reclamation of dumps by soil capping and grass seeding will considerably reduce the amount of surface water which filters through the waste rock and leaches explosives residues into the water system. Water samples will continue to be analyzed for nitrogen and other elements indicative of explosives residues.

8.3 Hydrology

The operation is not anticipated to have any impact on hydrology in the deposit area. An estimated 20,000 litres per day will be drawn from a well near the mill and all other required water will be recirculated from mine water and the tailings pond. The bulk of the water will be used for mill operations and the remainder for drilling in the mine.

8.4 Fisheries

Runoff water from the mine site all enters Bullion Creek which flows 1.0 km to the north where it enters Siwash Creek 1.7 km downstream from Siwash Lake. A water quality monitoring site is located on Bullion Creek at this junction. Sites are also located on Siwash Creek 1.5 km upstream and 1.0 km downstream from the junction.

Water discharged from the mine site is not expected to contain any harmful levels of contaminants and should have no impact on fisheries in the area. Runoff from waste rock dumps and from the open pit is not expected to impact on the fisheries. This water will be collected in sumps at the mine site and monitored regularly. The tailings pond will be designed to have no water discharge to the environment. Should any changes in water quality occur then treatment will be undertaken to correct the problem.

The mine access road crosses Siwash Creek near Elkhart road, approximately 3 km downstream from Siwash Lake. A low-gradient, 2-metre diameter culvert is installed in the creek at the crossing allowing unimpeded fish passage.

8.5 Wildlife

The proposed mining operation is not expected to have any significant impact on wildlife in the area. The work site covers a small area in existing clear-cuts. Riparian habitats downstream from the site should not be affected by small volumes of water drawn from their headwaters and waters released into the system are expected to be maintained at high quality. The north-south Siwash Creek corridor is an important wildlife habitat located 1.0 km east of the open pit. It will remain undisturbed by the proposed work, with the exception of the existing access road crossing of Siwash Creek, located adjacent to highway 97C, 2.0 km north of the site. Daily traffic to and from the site will be relatively light and will travel only a short distance from the highway. Workers will be instructed not to alarm or harass wildlife encountered along the route. "No hunting or shooting" signs will be posted within a 2 km radius of the work site.

8.6 Vegetation and Forest Resources

Most, if not all, of the expected impact to local vegetation has occurred during exploration of the deposit. Logging has been undertaken in stages to currently total 50 hectares of clear-cut, which provided access for trenching, drilling, open pit, waste rock dumps, ore stockpiles and equipment yards. The proposed tailings pond is within an area which has been almost completely logged by Weyerhaeuser in 1994. Remaining small patches of trees will have to be logged to accommodate the pond design. Waste dumps, roads and disturbed areas will be grass seeded upon completion of work in the area. It is expected that upon closure of mining operations and reclamation at Siwash North, the majority of the site will support forest regrowth equal to that established prior to any disturbance.

8.7 Agriculture and Recreation

The proposed mining operation is not expected to impact on agriculture or recreational activities in the area. Free-range cattle are unlikely to enter the work site. Fences and cattle guards are located along the highway, restricting entrance from the north and a gate blocks entrance to the south access road. Additional fencing could be erected if required.

Mine access roads are closed to non-authorized traffie by steel gates and posted signs located 1.0 km north and 2.5 km south of the deposit. Previously established forestry roads south of the site and passing east of Siwash Lake are unaffected and remain open to recreational traffic. The work site and clear-cut area are not visible from the highway or from Siwash Lake, thereby having little effect on the aesthetic value of the area. "No shooting" signs are posted in the vicinity of the deposit, but this area of restricted hunting is relatively small. Danger signs are posted around the open pit perimeter, waste dumps and explosive magazines. A permanent berm of soil and rock has been installed around the top edge of the open pit to block inadvertent access.

8.8 Access Road

Adequate road access to the mine site is currently in place and no further road building is planned. A minimal amount of maintenance, consisting of grading, local gravelling and felling of occasional windfall will be undertaken on the access and site roads. Sprinkling of water will be undertaken to control dust in areas of heavy traffic during dry weather.

Upon completion of all mining and exploration in the Siwash North area, site roads will be reclaimed by scarifying, recontouring and grass seeding. The Ministry of Forests will be contacted with respect to assuming responsibility of the main access road for use as a forest resource service road. Otherwise this road will also be reclaimed.

8.9 Refuse and Sewage

Combustible domestic and industrial garbage generated by the open pit program will be incinerated in approved locations at the site. Application will be made to permit burial of non-toxic industrial waste such as wood or metal materials in the waste rock dumps. All other refuse will be removed to land disposal sites at nearby communities. It is anticipated that the mining program will produce very little refuse material.

A 13,000 litre holding tank is currently in use at the mine dry facility. It can be emptied into a sewage pump truck and removed periodically, as required. As additional plumbing facilities are constructed they will be connected to holding tanks or septic drain fields. They will be sanitary and comply with regulations of the Health Act.

8.10 Contaminants and Hazardous Materials

Workers will be subjected to some airborne contaminants produced from blasthole drilling, blasting and shotcreting in the mine and from crushing operations in the mill. Personnel working in the areas of dust contaminants will be instructed to wear approved filter masks and proper ventilation will be provided.

Hazardous materials used for the project will include explosive products, diesel and gasoline fuel, petroleum-based lubricants and reagents used in the mill and refinery. Only qualified personnel will handle hazardous materials and it will be ensured that they are properly trained in safe handling procedures.

Guidelines will be determined for specific handling details regarding hazardous materials, for clean up procedures in case of spills and for regular inspections of sites containing hazardous materials or contaminants.

Fuel will be stored in tanks or tank trucks located in specified areas which are bermed or ditched and lined with impermeable material to contain any leaks or spills. Fuel will be transported to the site in permitted commercial tank trucks and pumped into container tanks. Empty containers of sufficient size will be kept on hand to collect any fuel which may leak from equipment on site.

Packaged explosives will be stored in approved magazines and explosive products will be transported to the site in permitted vehicles.

A mine emergency response plan has been drafted to address the actions to be taken in the event of hazardous occurrences underground. This document will be updated as the project advances.

9.0 RECLAMATION AND MONITORING

9.1 Waste Rock Dumps

Reclamation of waste rock dumps was begun during the open pit expansion program in 1994. Several of the dump slopes were flattened to 2:1 (26 degrees) gradient during placement of the waste rock from the pit. Upon completion they were capped with a layer of soil 0.5 to 1.0m thick, transported from nearby overburden stockpiles. The slopes were planted with a seed mixture of grasses and ground cover species recommended for the climatic conditions of the site. Dump tops were ditched to direct surface runoff water to designated channels which surround the dumps and empty into two collection sumps located to the north and northwest of the site.

Slopes will be examined regularly for indications of slumping or erosion. Water samples will be collected at scheduled intervals from sumps and monitoring stations downstream and analyzed to test for any increases in acidity or suspended solids.

Upon completion of underground mining all unreclaimed dump slopes will also be flattened, topped with soil and grass seeded.

9.2 Tailings Pond and Dam

Upon mine closure, the liquid content of the tails pond will be pumped underground. A 30m long section of the highest portion of the dam, (by the reclaim decant and pump) will be bulldozed over the tailings in that area. The removed dam portion will be immediately replaced by a lower dam of non-acid generating crushed rock. The purpose of this dam is to remove fine tailings from any run off from the tailings but prevent any water build up within the dam. A small water retaining dam may be required 'downstream' of this permeable dam to age and check the quality of seepage. Seepage would be pumped underground or, if acceptable, discharged. The whole of the tailing area would then be covered with previously stockpiled overburden to a depth of 30 - 40 cm and seeded. The dam would also be graded downstream. The overall effect of this would be a gradually sloped structure which would divert run off from the enclosed tailings.

9.3 Structures and Equipment

All temporary trailer buildings and equipment utilized for the mining operation will be removed from the site following completion of the program. The truck scale and explosives magazines will be removed and their sites cleaned and reclaimed. All pipelines, power lines, poles, underground ductwork, pipes and wiring will be removed upon abandonment.

9.4 Water Courses

No significant changes to water courses or available water flow are anticipated during the mining program. Short drainage ditches channel runoff from the dump areas to existing stream channels on the east and west sides of the site. Collection sumps are located in these channels north and northwest of the site.

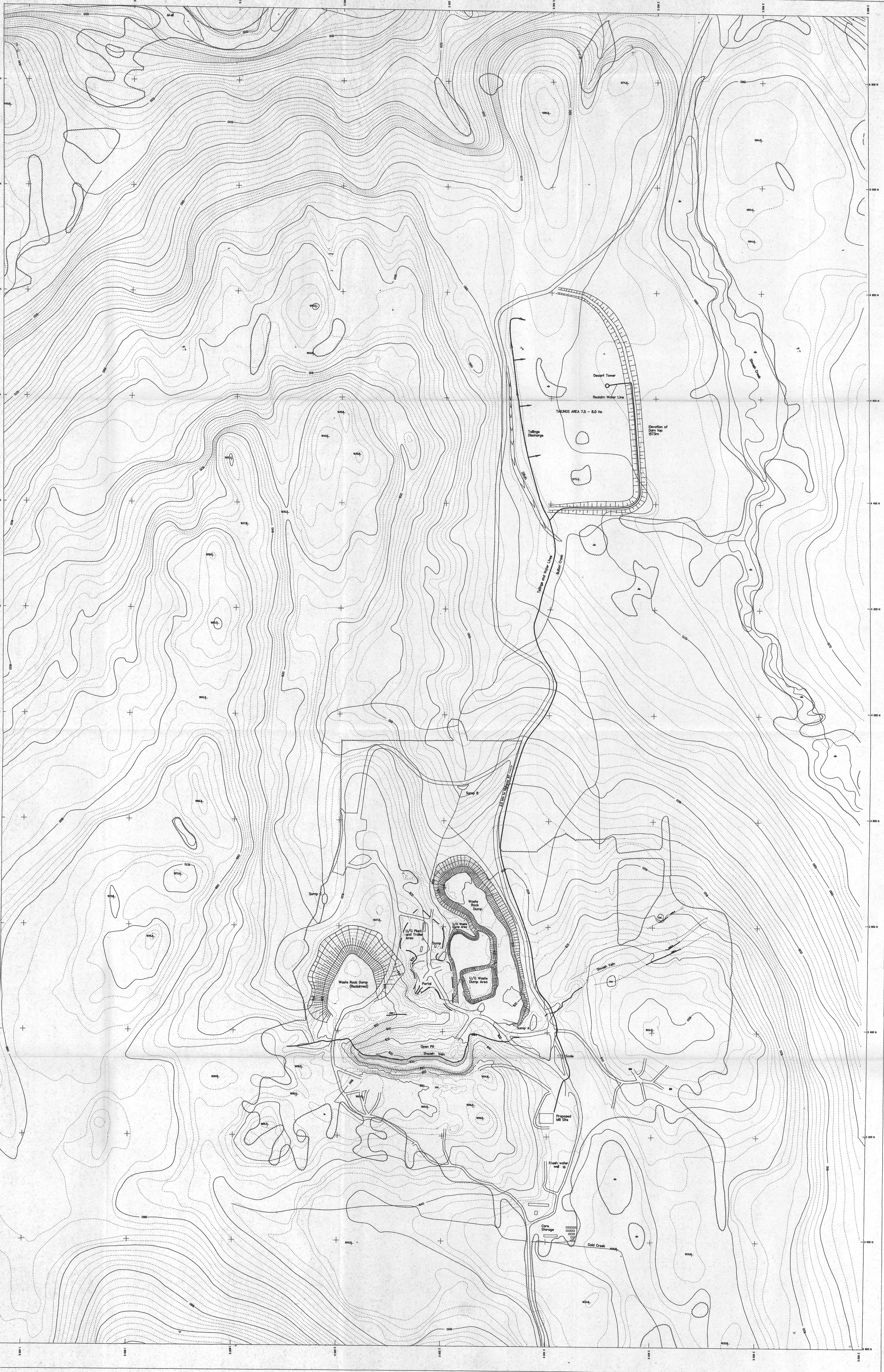
Ditches will divert surface runoff from the proposed tailings contaimnent area. Recirculation of water from the tailings pond for mill use should result in zero discharge from the pond.

Upon Completion of mining operations, all culverts will be removed from road crossings and stream banks will be re-shaped and contoured to approximately natural conditions. Sumps will be left intact in the channels to promote settling of suspended particles from runoff water. Banks around the sumps will be sloped, groomed and grass seeded to enhance soil stability.

9.5 Roadways and Landings

Upon completion of mining operations and exploration on the site, all roads and compacted landings will be scarified. Ditches will be filled and berms removed to return to approximately natural slope. Scarified areas will be grass seeded.

The 5 kilometres of main access road, extending from Elkhart road to the mine site and continuing south to connect with established forestry roads, is expected to be left intact for future use as a timber haulage route. If it is not required for future use it will also be reclaimed.



Fairfield Minerals Ltd.

LEGEND

- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- DEPRESSION CONTOUR
- STREAM
- INTERMITTANT STREAM
- INDEFINITE STREAM
- TREES
- SINGLE TREE
- BRUSH / SCRUB
- SWAMP
- PAVED ROAD
- DIRT ROAD
- ROUGH ROAD
- FOOTPATH
- AREA OUTLINE
- SAND
- SAND in Water

inches 0 1 2
centimetres 0 1 2 3 4 5

BRITISH COLUMBIA GEOLOGICAL SURVEY

This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.

0 20 40 80 120 160

SIWASH GOLD MINE

Similkameen Mining Division
NTS 92H/16W, B.C.

MINE SITE PLAN

SCALE 1 : 2500

Drawn by Eagle Mapping	Figure 4-1
Dec., 1994	

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