003165

ADVANCED EXPLORATION AND DEVELOPMENT OF THE DY UNDERGROUND MINE

PROJECT DESCRIPTION

Prepared for:

Curragh Resources Inc.
Whitehorse, Yukon

Prepared by:

Rescan Environmental Services Ltd.
Vancouver, British Columbia

March 1991

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PROJECT FACT SHEET

CORPORATE DATA

Project Name:	Dy (Lead-Zinc-Silver) Project
Company Name and Address:	Curragh Resources Inc. #1900 - 95 Wellington St., West Toronto, Ontario
Contact/Title:	Mr. Colin Benner, P.Eng. Executive Vice-President, Operations Toronto, Ontario Tel: (416) 363-7111
	Mr. Gerry Acott Manager, Environmental Affairs Whitehorse, Yukon Tel: (403) 668-8021

PROJECT DETAILS

Project Location:	200 km northeast of Whitehorse, YT 62° 13'N Latitude 133° 08'W Longitude
Exploration Cost to Date:	Approximately $12 million
Development Cost:	Approximately $35 million
Estimated Total Capital Cost:	Approximately $75 million
Minerals:	Pyrite, sphalerite, galena, chalcopyrite, barite, quartz.
Mining Method and Production Rate:	Combination of room and pillar, longhole stope, cut and fill, maximum 7,500 tpd Initially 1,500 tpd
Process Plant/Mill:	Use existing mill at Faro, assumed truck haulage to concentrator on surface.

Ore Beneficiation Process:	Conventional differential flotation
Proposed Mine Life:	15 years

MINERAL RESERVES

Reserves:	Geological:	21.0×10^6 tonnes 5.8% Pb, 6.8% Zn, 83 g/t Ag, 0.94 g/t Au
	Preliminary Mineable:	11.3×10^6 tonnes
Cut-off Grade:	9% lead plus zinc for preliminary mineable	
Potential for Additional Reserves:	Potential for significant (10 mt) extensions to Dy deposit; 5 million tonnes indicated at Swim Basin and good potential for additional discovery.	

ACCESS/TRANSPORTATION

Road:	All weather Highway access to area. Main Mine Access Road from Faro mill to Vangorda Plateau site and Blind Creek Road from town site
Air Access:	Scheduled service to Whitehorse; charter to Faro Airstrip

POWER SUPPLY:

On-site diesel generation during initial exploration, tie into power grid for production.

WORKFORCE INFORMATION:

Construction Workforce: (Annual Average)	40
Operation Workforce: (Annual Average)	120
Housing Options:	Existing facilities in town of Faro, YT

Workforce Rotation/Schedule:	Operational workforce based in Faro, YT. Construction and development workforces based in a camp in Faro with 6 weeks on and 2 weeks off.

PRELIMINARY DEVELOPMENT SCHEDULE:

Decline Collar and Surface Setup:	Startup to Startup + 2 months
Upper Decline Excavation:	Startup + 2 months to Startup + 9 months
Lower Decline Excavation:	Startup + 9 months to Startup + 16 months
Drifting and Underground Drilling on B Zone:	15 - 20 months after collaring
Initial Test Mining in B Zone:	13 months after collaring
Phase I Ramp Mining:	13 months after collaring
Phase II Shaft Mining:	20 months after collaring
Advanced Exploration Water License:	July 1991
Initial Environmental Evaluation:	April 1992
Full Production Water License:	1992

1 - Introduction

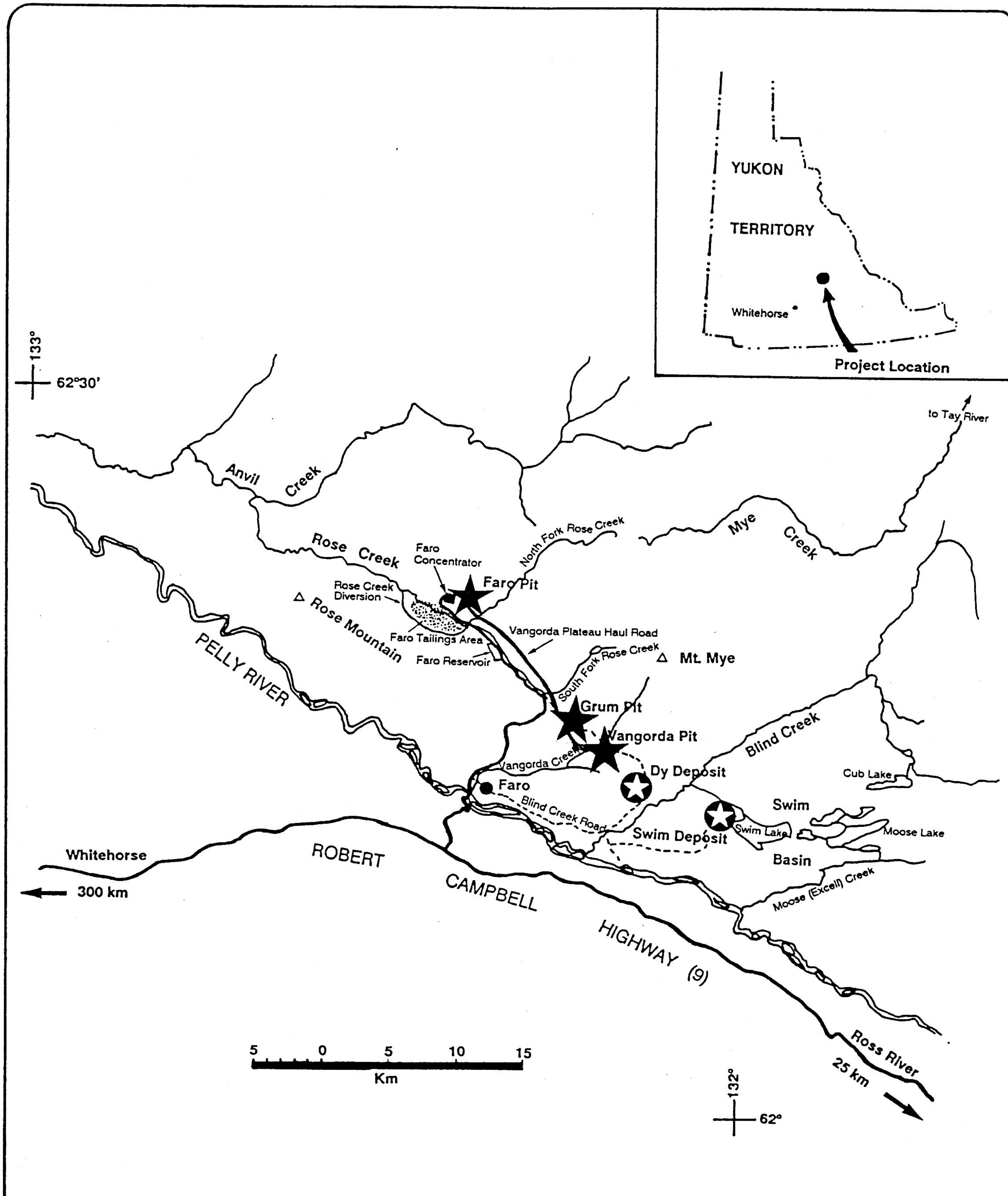
1.0 INTRODUCTION

1.1 Preamble

Curragh Resources Inc. (CRI) is a Canadian-controlled company that owns and operates the lead-zinc-silver mining and concentrating operations located in the Anvil District near Faro, Yukon Territory (Figure 1-1). There are five ore deposits with well defined reserves identified in the Anvil District: Faro, Vangorda, Grum, Dy and Swim. In 1983, geological reserves for all five deposits totalled 96 million tonnes. To-date, only three of the deposits are being mined: Faro and the newly developed Vangorda, and Grum deposits. CRI is undertaking advanced exploration of other ore bodies in the area to determine the feasibility of bringing them into production at a later date. This document will detail the planned exploration and development of one of the two remaining unmined ore bodies, namely the Dy deposit

The purpose of this document is to describe the proposed Dy Project with respect to the geology of the ore body and host formation, the plan for exploring the ore body and any related infrastructure development, the phased underground mining of the deposit and an overview of existing land use, environmental setting, and ongoing and proposed environmental and socioeconomic assessments related to the project. The document is intended to help place the project clearly into a regulatory framework with phased in approvals/permits which keep pace with the phased in nature of the project as go/no go feasibility decision points are reached.

The Dy project is the first exclusively underground mine project in the Anvil Range. As such, it poses a new situation for the proponent and the regulatory regime who are both generally accustomed to dealing with large open pits. This deposit can readily be developed so that it does not cause significant environmental impact during mine operations or after mine closure. Curragh is committed to develop the deposit in such a manner through devising progressive material handling and waste management procedures. The deposit is also unique in that the entire ore body is 300 feet below the regional base water level. Thus, any potential post operational environmental impact will be eliminated as the workings flood with stagnant water.



(D.S. Jennings & G.A. Jilson, 1984)

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Figure 1-1 Location of the Dy Ore Body

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1.2 Project Location and Setting

The Dy property is located in the Anvil Range lead-zinc-silver district near Faro (approximately 300 km northeast of Whitehorse) Yukon Territory, with coordinates 62° 13' N and 133° 08' W (Figure 1-1). Specifically, it is situated 6 km southeast of the Grum Deposit on the Vangorda Plateau on the south slopes of Mt. Mye at an approximate elevation of 1,168 m (3,800 ft).

Surface exploratory drilling to delineate the deposit was carried out at Dy from 1977 through 1981. Drill indicated ore reserves for this property are estimated to be 21 million tonnes grading 5.8% lead, 6.8% zinc and 0.12% copper. In addition, the ore contains 83.0 g/t of silver and 0.94 g/t of gold. The deposit remains open to extension in several directions.

The proposed exploration site is located on morainal landforms. The terrain is rugged with steep slopes that are covered by a thin veneer of overburden. The soil texture ranges from sandy loam at the surface to slightly heavier textures (loam - silt loam) in the subsurface.

The predominant vegetation in the area (Plates 1-1 and 1-2) is shrub to forest-shrub consisting of willow (*Salix* spp.), scrub birch (*Betula glandulosa*), aspen poplar (*Populus tremuloides*), white spruce (*Picea glauca*), and lodgepole pine (*Pinus contorta var. latifolia*). Willow, scrub birch and small poplar dominate on open slopes. The area was subject to a forest fire in recent history and relatively dense, immature stands of lodgepole pine are common to many sites. White spruce tends to predominate at lower elevations giving way to jack pine at higher altitudes. The tree line is at approximately 1,476 m (4,800 ft).

Access to the property is from the northwest via a secondary road which is an extension of the main mine access road servicing the Faro, Grum and Vangorda open pits. Access can also be gained to the site from the southwest from the town of Faro via the Blind Creek Road (Figure 1-1).

1.3 Historical Perspective

The initial mineral discovery in the Anvil Range was that of the Vangorda deposit which was first drilled in 1953 through 1955 by a company called Prospector Airways.

Plate 1-1: Typical Upland Forest in vicinity of proposed mine site.

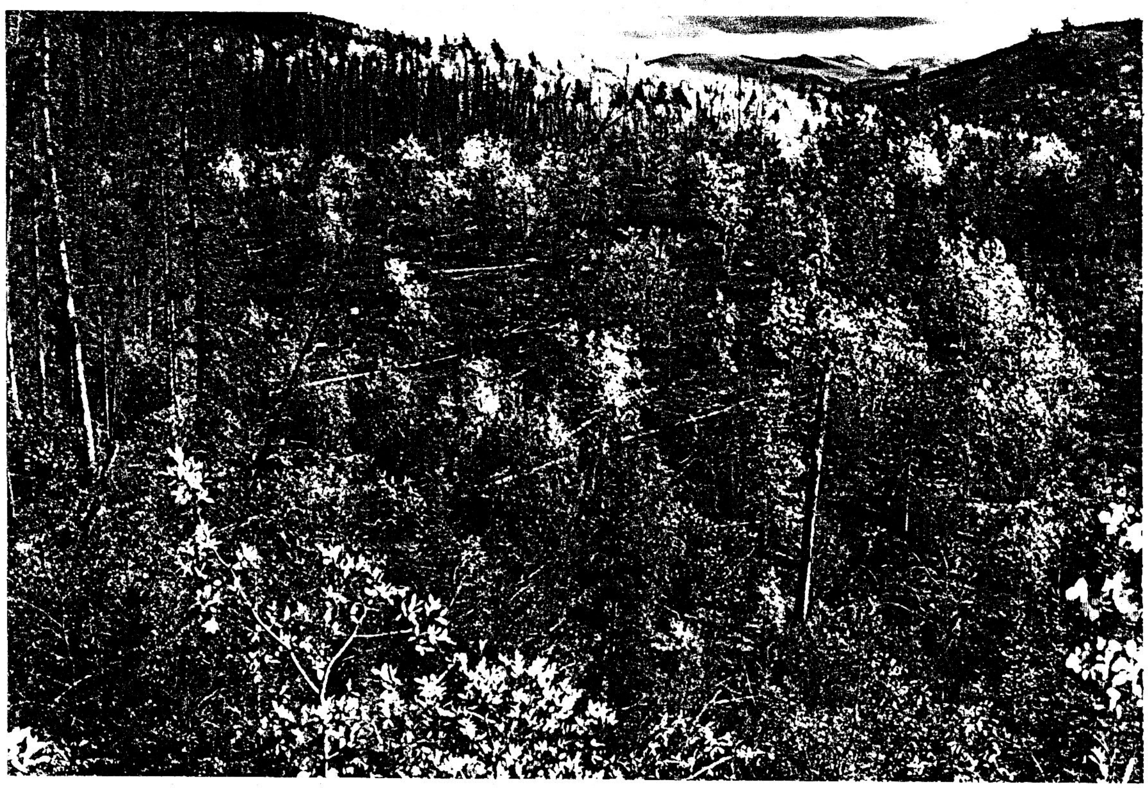

Plate 1-2: Location of proposed storage area for waste rock from exploration decline excavation.

Systematic geological mapping of the Anvil District was not carried out until 1961 (Roddick and Green 1961; cited in Jennings and Jilson 1984). The locating of the Vangorda deposit was followed by the subsequent discoveries of the Faro (1964), Swim (1964), Grum (1973) and Dy (1976) deposits. Exploration in the area continues.

The Faro deposit was the first of these ore bodies to be developed and brought into production. Mining of the Faro deposit commenced in 1969 under the auspices of the Anvil Mining Corporation, later Cyprus Anvil Mining Corporation (CAMC). Under CAMC's management, production of ore reached rates of up to 10,000 tonnes per day. In the mid 1970s, CAMC embarked on a program of expansion which included both an aggressive exploration program, resulting in the Dy discovery, and the acquisition of mineral deposits and claims on the Vangorda Plateau held by Kerr Addison Mines Ltd., including the Grum, Vangorda, and Swim deposits. The objective of the acquisition was to bring other Vangorda Plateau deposits into production to supplement the Faro mill feed.

Depressed base metal prices coupled with low productivity and high production costs at Faro, and the added burden of the debt load brought about by expansion, led to a major slowing of production at Faro and closure of the concentrator by CAMC in 1982. Some open pit waste stripping operations were carried out between June 1983 and October 1984 but production had ceased completely by the end of 1984.

In November 1985, Curragh Resources Inc. acquired the holdings of Cyprus Anvil Mining Corporation and reactivated the Faro operation in January 1986. Concentrator operations resumed in June 1986 and the first concentrates were shipped in July 1986. In 1989, development of the Vangorda Plateau was begun with stripping of the Vangorda and Grum deposits which are to eventually supplement the Faro mill feed. Ore removal is currently under way at the Vangorda pit. Ore removal from the Grum pit is not expected to commence significantly until 1992. It is anticipated that the ore reserves in the Faro Pit will be exhausted by March 1992.

In early 1990 a small underground operation was initiated just southwest of the Faro Pit from a portal in the pit. This operation will close in 1992. The mill at Faro is currently processing 13,000 tonnes of ore per day. The mine produces two concentrate products; a lead concentrate which includes payable quantities of gold and silver, and a zinc concentrate. The concentrate is hauled in custom-designed, sealed containers via road to Skagway, Alaska where they are loaded on ships for markets in Europe and Asia. The Faro operations are major producers supplying 3% of the western worlds zinc and 5% of its lead concentrates in 1989. Curragh is the sixth largest zinc producer in the world. Once the Faro Pit is exhausted, mill feed will be supplied by the Vangorda and Grum deposits. The anticipated maximum milling rate of the combined Vangorda/Grum ore is 11,000 tonnes per day. However, milling rates comparable to the full production rate capacity of the Faro mill (13,000 tpd) are possible. Proven open pit mineable ore reserves indicate a project life of 11 years. Development of the Dy deposit would increase this by five years.

2 - Geology

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2.0 GEOLOGY

2.1 District Geology

The Anvil Range lead-zinc-silver district, in central Yukon Territory, lies in the Selwyn Basin metallogenic province and the Yukon Plateau (Yukon Tannana Terrane) physiographic province (Figure 2-1).

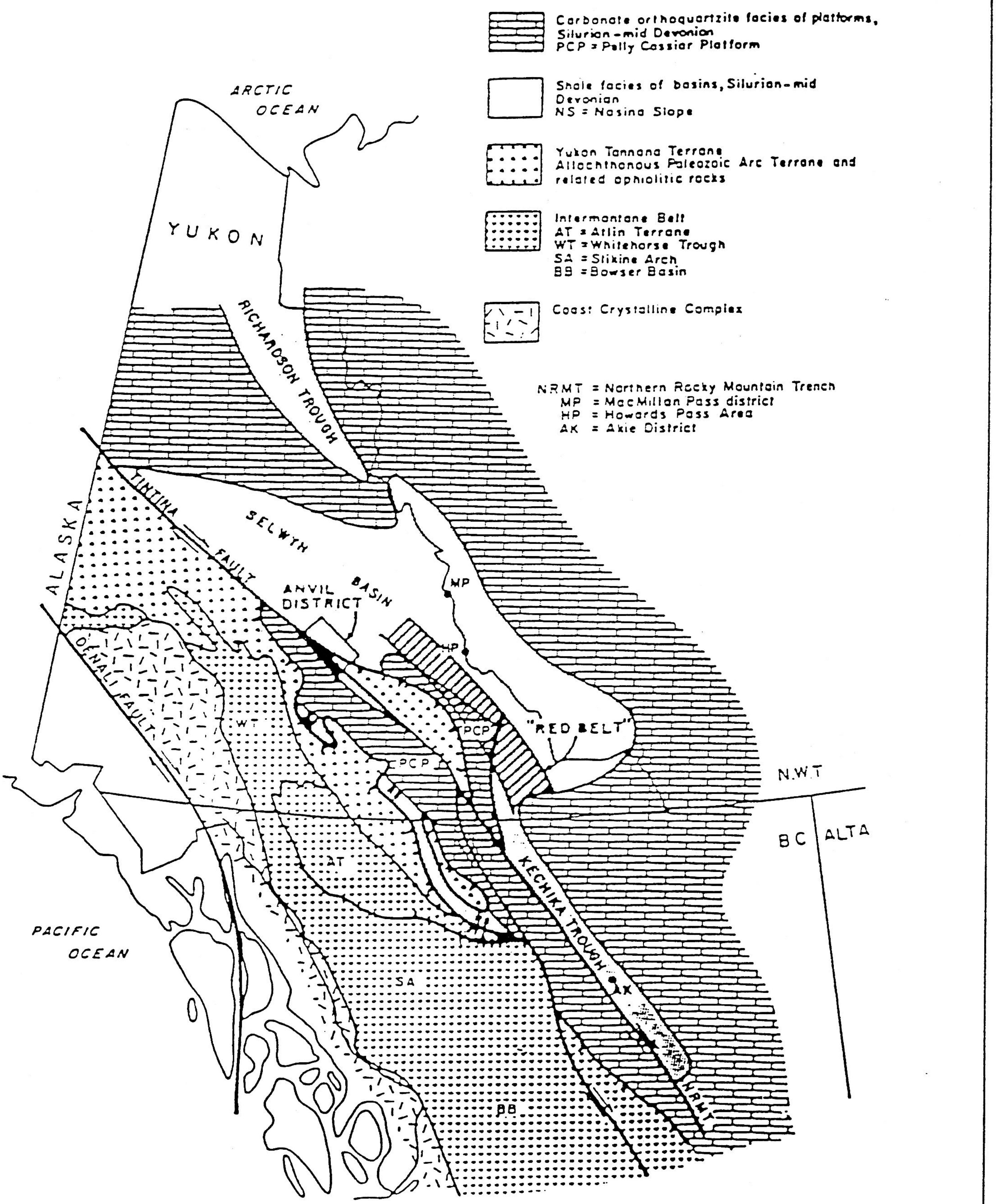
The ore deposits of the Anvil district formed in the shale-rich, outboard portion of the early Paleozoic-late Proterozoic North American miogeocline, and are located within the southwest portion of the Selwyn Basin sub-province of the Northern Canadian Cordillera (Jennings and Jilson 1984). This basin is bordered on the west and southwest by the Pelly Cassiar Platform and on the east, north, and northeast by the Mackenzie Platform (Figure 2-1).

Geologically, the district is a structurally complex, polydeformational terrane exposed in the Anvil Arch, a northwest trending structural uplift whose core is underlain by a Cretaceous granitic suite. Around the flanks of the Arch is a sequence of late Precambrian to upper Paleozoic metasedimentary and metavolcanic rocks which host the ore deposits.

The syn-sedimentary, exhalative massive sulphide orebodies in the Anvil camp show a distinct stratigraphic control. Specifically they are localized within an approximately 150 m thick transition zone between the Precambrian Mt. Mye and lower Paleozoic Vangorda Formations (Figure 2-2).

The Mt. Mye formation is essentially a monotonous sequence of metamorphosed shales. It is diagnostically non-calcareous. The formation ranges in thickness up to 2 kilometres and becomes more heterogeneous towards the top with the appearance of some calcareous and meta-volcanic members. The Mt Mye formation is only weakly pyritic and static ABA testing in Vangorda Plateau (CRI 1989) indicates the rock comprising the formation show no, or at most weak, potential for acid generation.

The Vangorda Formation, characterized by calcareous phyllites (metamorphosed shales) and metamorphosed volcanic rocks, is separated from the underlying Mt. Mye by



(D.S. Jennings & G.A. Jilson, 1984)

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Figure 2-1 Anvil District Location in Relation to the Regional Geology of the Yukon Territory

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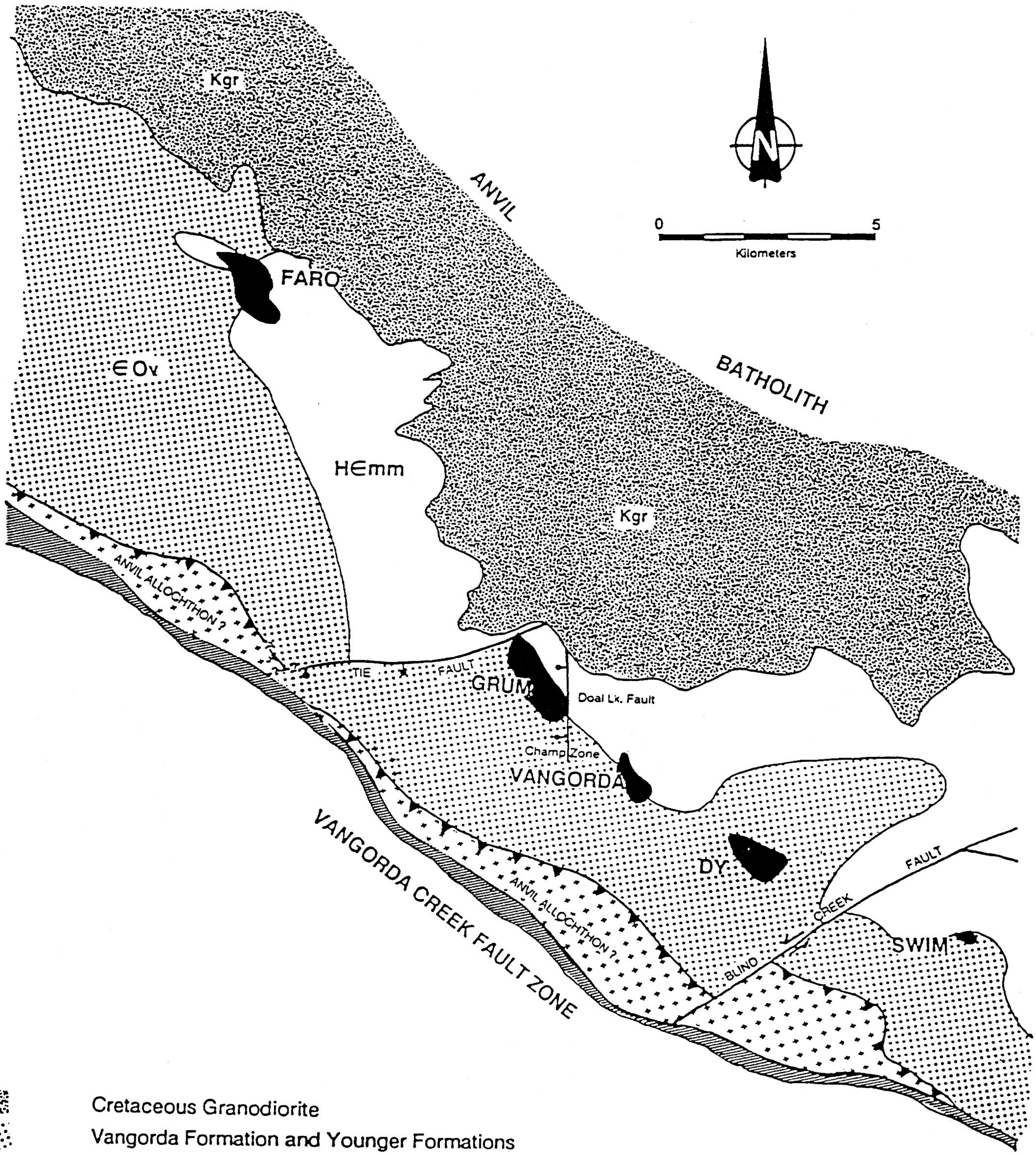

- Cretaceous Granodiorite
- Vangorda Formation and Younger Formations
- Mt. Mye Formation
- Thrust Fault
- Normal Fault
- Fault Zone
- Sulphide Deposit (projected to surface)

(D.S. Jennings & G.A. Jilson, 1984)

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Figure 2-2 Ore Body Locations Relative to the Mt. Mye and Vangorda Formations	
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a complex transition zone. This transition zone is typified by regionally extensive units of graphitic phyllite along with a mixture of non-calcareous and calcareous phyllites and some basaltic meta-volcanic and meta-intrusive units. Rocks of the formation are notable for their calcite content and consequent acid consuming nature. However, the basal unit of the formation may be slightly acid generating locally.

All of the known massive sulphide deposits to date in the Anvil camp are associated with the carbonaceous phyllites within the transition zone. There are five known deposits found along a prominent curvilinear trend in the district with a total pre-mining geological reserve of 120.1 million tonnes averaging 3.7% Pb and 5.6% Zn. They are from northwest to southeast, the Faro, Grum, Vangorda, Dy, and Swim. To date, the Faro, Grum, and Vangorda deposits which represent 95 million tonnes of the above geological reserves, have been developed by open pit.

The deposits are thought to have formed from hot metalliferous brines discharged from submarine fumaroles localized along a synsedimentary fault or hinge line which developed in response to late Hadrynian or lower Cambrian extensional tectonism. The sulphide ores in the Anvil Camp occur as massive, sheet-like to lenticular, predominantly pyritic bodies showing distinct lateral and vertical zonation. This zonation of sulphide ore types, the Anvil Cycle, is common to all Anvil sulphide deposits. A typified sequence would consist of a ribbon banded graphitic quartzite facies, overlain by a more massive pyritic sulphide facies in turn overlain by baritic facies. Laterally, the same zonation is commonly seen with the uppermost baritic facies occupying the more central area of the deposit. Each deposit has associated with it a white-mica dominant alteration (or bleaching) envelope in the surrounding phyllites which suggests a hot ore fluid/wallrock interaction at the time of sulphide deposition. All ore types and subeconomic sulphide rocks will potentially be acid generating. Some or all bleached or altered phyllite may be acid generating.

2.2 Deposit Geology

In the Dy deposit, there are three, possibly five horizons defined (Figures 2-3 and 2-4). The internal structure of the deposit is too poorly understood to allow for a reasonable evaluation of stratigraphy and thus the deposit ore type distribution. However, there does appear to be a predominance of more baritic ore type in the southwest (A Zone) compared to a predominance of pyritic massive and of disseminated, variably graphitic,

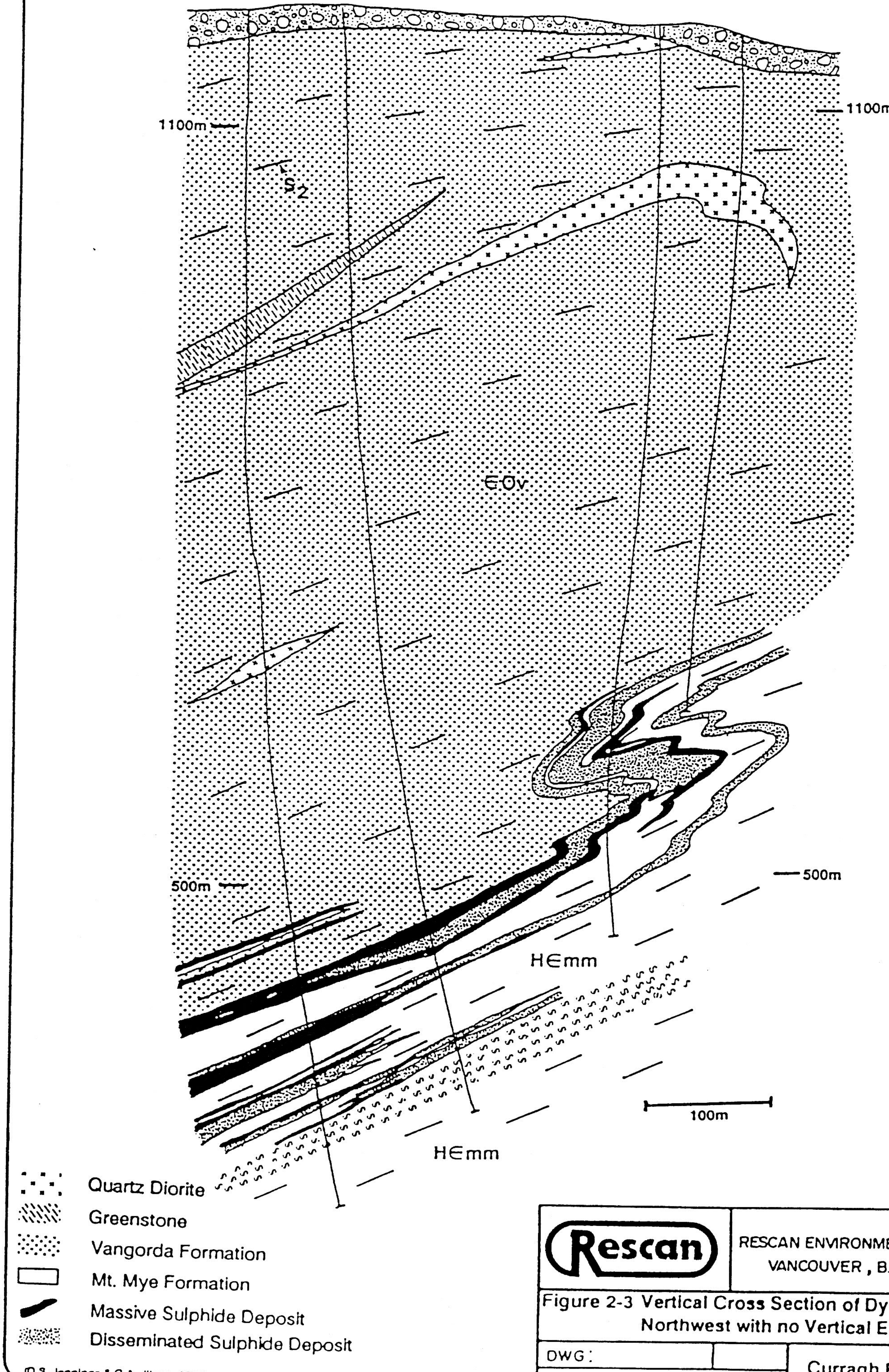

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Figure 2-3 Vertical Cross Section of Dy Deposit Looking Northwest with no Vertical Exaggeration

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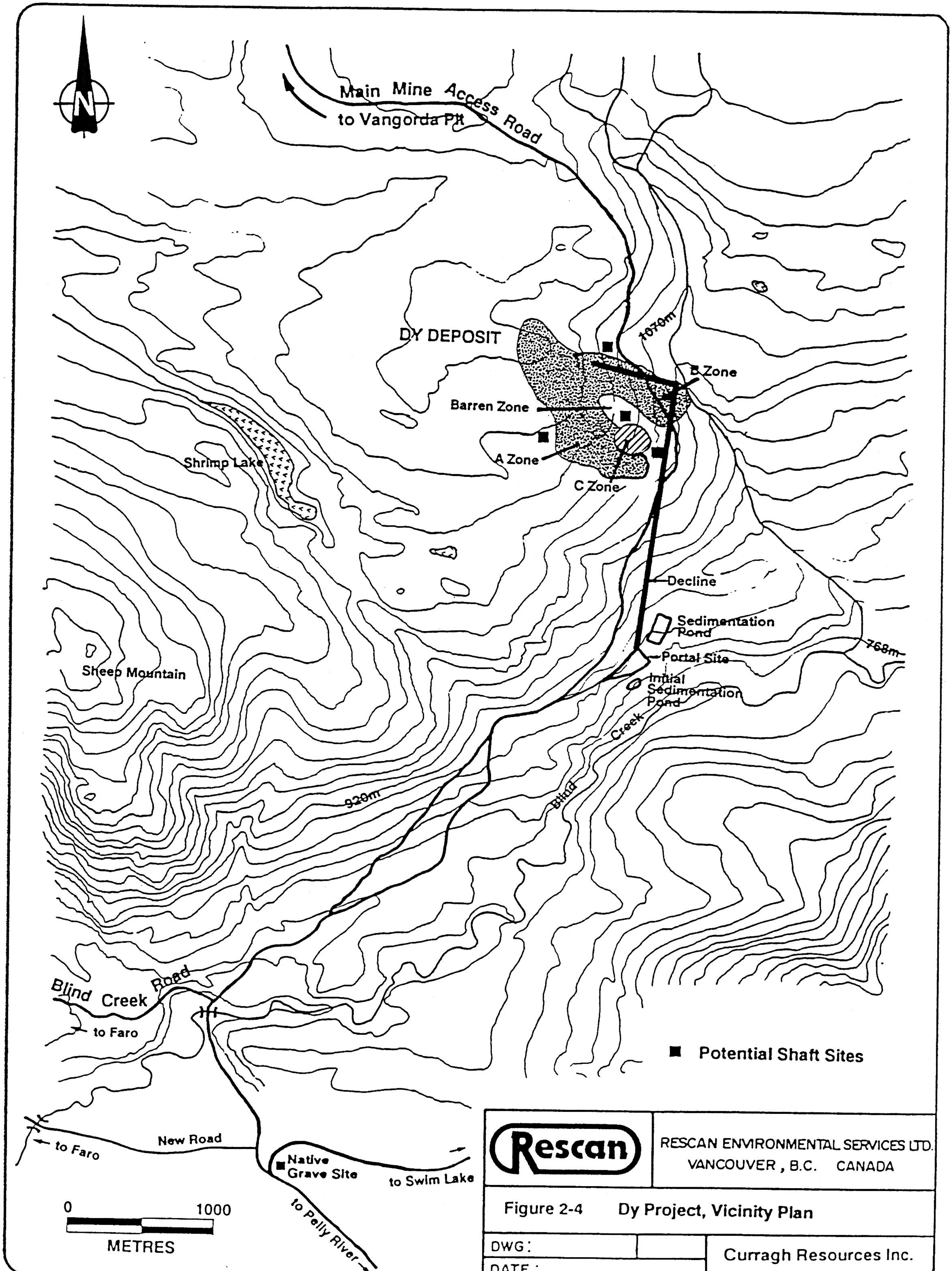

Figure 2-4 Dy Project, Vicinity Plan

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ores in the northeast (B Zone). The central part of the deposit consists of barren massive and semimassive sulphides. As the internal geometry of the deposit is presently understood, the deposit lies on upper Z symmetry (looking northwest) long limb of megascopic F1 antiform with local superimposition of moderate scale F2 folds. A major low angle extensional fault occurs beneath the deposit. There also appear to be numerous steep faults that cut the deposit but their orientation is not well known.

The proposed exploration program will provide for a more accurate definition of the structure and dimension of this ore body. Initial development will focus on the B Zone because of high overall grade and zinc predominance compared to lead predominance of the A Zone. Initial production may actually be from the C Zone, a stratigraphically high ore horizon which may prove to be a rich deposit just west of the access decline about 1,200 m from the portal. Fill in drilling is underway from surface to better define the B Zone and test the potential of the C Zone.

3 - Environmental Setting and Land Use

3.0 ENVIRONMENTAL SETTING AND LAND USE

3.1 Land Use Overview

Mining presently constitutes the single largest land use in the region. Less prominent land uses include trapping; commercial, subsistence and sport fishing; native food and sports hunting; and both native and non-native commercial woodcutting (firewood). There is very limited forestry and no agricultural activity in the region.

Trapping

Trapping is carried out by the Native peoples of the Kaska Dena Nation (Ross River Band), who hold the group trapping rights to the area. The species of prime interest to trappers are mink, marten, otter, lynx, fox (for furs) and the snowshoe hare (for food). Other less sought after species include wolf, beaver, muskrat, bear and wolverine. Few details on the number of animals taken during the winter harvest are available.

The Ross River Band suggests that the area in the vicinity of the proposed exploration portal is regularly trapped for marten and fox and that catches of marten (the most sought after species) have decreased noticeably since the inception of the original Faro mine in 1969 (Peter LeDue, pers. comm. 1990). A massive forest fire swept through the region in 1969. Forest fires are a serious menace to marten habitat since they are denizens of climax coniferous forest and avoid burned-over or logged areas. A significant portion of the area in the vicinity of the proposed mine was burned in 1969, whereas mining activity in the same area has been minimal.

Commercial, Subsistence and Sport Fishing

No commercial fishing licenses have been issued at Faro or Ross River in the last ten years (Mr. J. Burdek, pers. comm. 1990). However, there are several subsistence fisheries centered at both Pelly Crossing and Ross River which exploit chinook salmon populations in the Pelly River and Blind Creek systems. The subsistence fishery provides food for humans and dogs, and is important culturally in that it maintains a traditional lifestyle. This fishery predominantly harvests chinook salmon (*Oncorhynchus tshawytscna*), but other species such as whitefish (*Prosopium* spp.), northern pike (*Esox* *lucius*), inconnu (*Stenodus leucichthys*), and Arctic grayling (*Thymallus articus*) are also taken. No estimates of the numbers of these species taken are available.

Sports angling takes place in Vangorda and Blind Creeks, the Pelly River and in Blind and Swim Lakes. The predominant species angled for include Arctic grayling and chinook salmon. While it is anticipated that neither the advanced exploration program nor proposed mining activities will adversely impact Blind Creek, a detailed environmental assessment related to these activities is being undertaken to ensure the environmental integrity of Blind Creek is maintained coincident with project development.

Subsistence and Sport Hunting

There is little available information on the level of subsistence hunting being conducted by native and/or resident hunters in the vicinity of the proposed exploration portal. However, it is known that hunting activity by local and non-resident hunters in the Faro region is restricted. The area encompassing Faro falls under Big Game Zone Subunit #4-51 (Figure 3-1). This area has been closed to hunting of all big game (Mr. N Barichello, pers. comm. 1990) to protect the local Fannin Sheep population from exploitation through hunting and poaching. Faro residents wishing to hunt must go farther afield to the Swim Lakes Big Game Zone (#4-47) or Mt. Mye Big Game Zone (#4-46).

3.2 Biophysical Environment

The Dy property lies within the Blind Creek drainage basin. Blind Creek flows in a southwesterly direction into the Pelly River. The Pelly River drains west into the Yukon River which flows northwest into Alaska to Ft. Yukon where it alters course and flows west, through Alaska, and discharges into the Bering Sea.

3.2.1 Regional Climate

The region in which the proposed mine will be located has no pronounced wet or dry season. The average number of days with some precipitation is generally in the order of 100 to 120. Snow can occur at any time of the year, but will generally cover the ground

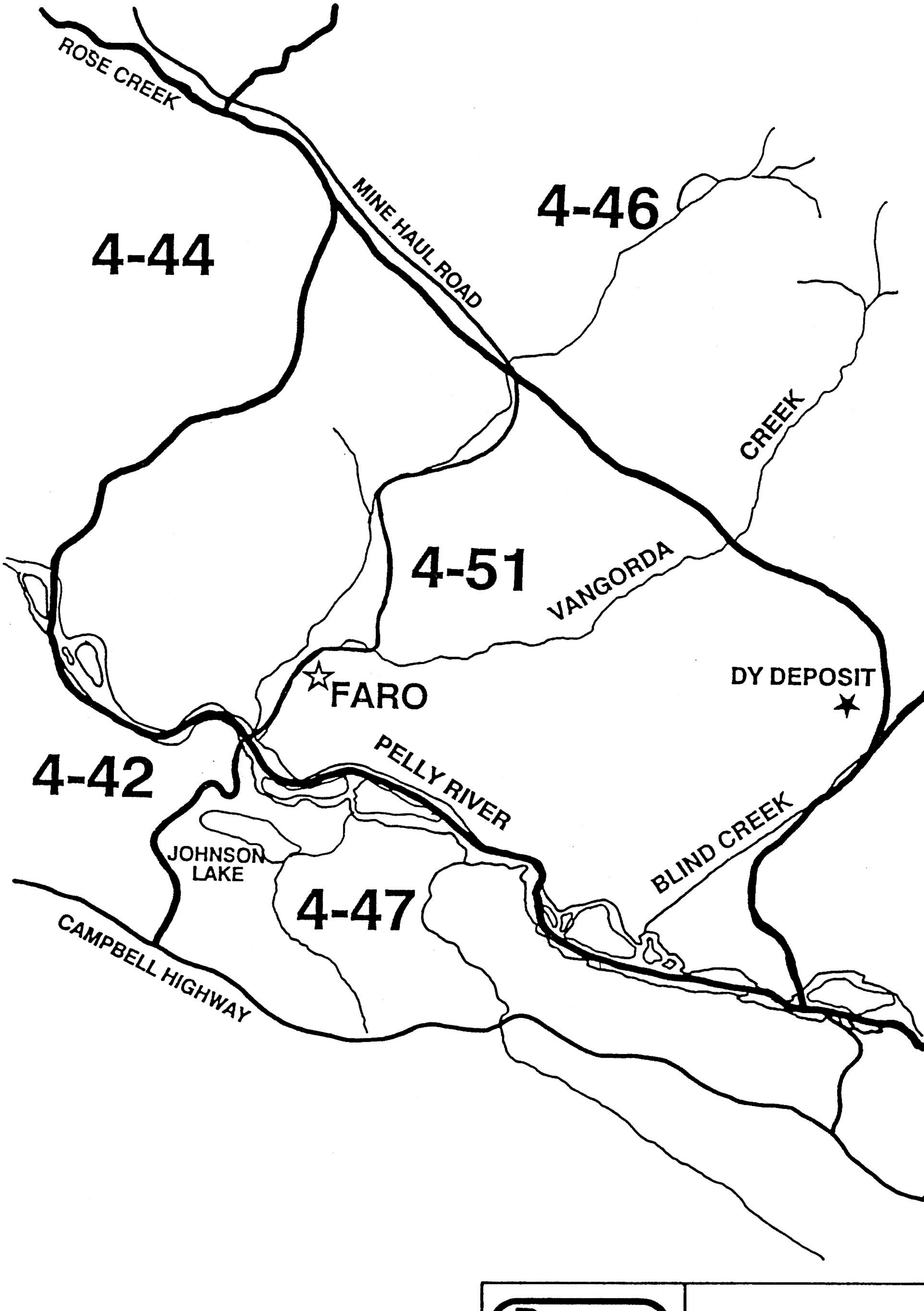

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Figure 3-1 YTG Big Game Zones Relative to the Dy Deposit

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in most years from October to May. Evaporation in the Yukon generally exceeds the total precipitation and ranges between 350 and 450 mm per annum.

The Atmospheric Environment Service (AES) established three meteorological stations near the proposed mine: in Faro in 1977, at the Anvil site in 1967, and at Grum Camp in 1983. Daily measurements of temperature and precipitation have been recorded.

Temperature

Based on the period of record for the Grum station, it is estimated that mean monthly temperatures in the area would range from a high of 11.7°C in July to a low of -13.4°C in December. Extreme cold temperatures have been recorded at Faro as low as -55°C, with extreme maximums in the order of 33°C. The extreme cold temperatures in the region make outside construction in the winter very difficult. The working season for surface construction will generally be from May to September.

The mean monthly temperature normals for Grum, Faro and Anvil are shown in Table 3-1 below.

Table 3-1

Regional Mean Monthly Temperatures in Degrees Celsius

Month	Faro	Anvil	Grum Camp
January	-24.5	-19.8	-10.8
February	-15.9	-13.9	-13.1
March	-10.1	-11.2	-9.3
April	-0.8	-3.2	-4.3
May	7.1	4.0	2.9
June	12.5	9.9	8.1
July	14.9	11.5	11.7
August	12.4	9.5	8.1
September	7.1	4.6	3.0
October	-0.4	-3.1	-2.9
November	-13.8	-11.6	-13.1
December	-21.7	-17.2	-13.4
Mean Monthly	-2.8	-3.4	-2.8
Elevation (m)	694	1158	1150
Years of Record	11	12	5

Source: Steffen, Robertson and Kirsten, 1989.

The relatively high temperature in January and December at Grum Camp compared to the temperature recorded in Faro and at the Anvil station for the same month, is attributed to the uncommonly warm temperatures recorded for 1985 and 1986. Given the elevation of the proposed project area (1,168 m), temperatures at the Dy project site will likely approach those recorded at the Anvil and Grum stations.

Precipitation

The mean annual precipitation recorded at the Grum Camp station, based on 6 years of data collection, is 539 mm (21.2 inches). The maximum total monthly precipitation occurs in July as rainfall. The least amount of precipitation falls in November and generally consists of snowfall. There is no measurement available concerning the 24-hour maximum precipitation recorded at Grum. However, at Faro, according to Canadian climate normals published by Environment Canada, the greatest 24-hour rainfall recorded was 46.7 mm. The greatest 24-hour rainfall at Anvil is 36.8 mm. The mean monthly precipitation distribution based on data recorded at Grum Camp, Anvil and Faro is presented in Table 3-2.

3.2.2 Surface Water Hydrology

The proposed minesite is located on the western slopes of the Blind Creek watershed, which drains to the Pelly River. The southeast facing slopes of the plateau runoff directly to Blind Creek. The portal will be located on a north westerly trending ridge which drains to Blind Creek.

Historic streamflow records for Blind Creek are limited (Table 3-3). Therefore, a permanent, continuous stream recorder will be installed prior to freshet 1991 and will be maintained over high and low flow seasons. This will allow estimation of monthly streamflows (high, low and mean) at the minesite which will be compared to stream gauging stations within the region that have collected data for a longer period of record (recognizing the differences in drainage areas between gauging stations). The nearest long-term station is located on the Ross River, about 65 kilometres southeast of Faro. In addition local stream gauging stations have been established on Vangorda and Rose Creeks as part of environmental studies associated with other ore deposits. Data from these stations is seasonal, covering the ice-free period only. Ross River is a major tributary of the Pelly River and has a drainage area of 7,250 square kilometres. The

Table 3-2

Regional Mean Monthly Precipitation Distribution at the Grum Camp, Faro and Anvil

	Grum Camp			Anvil	Faro
Months	Total Precip (mm)	Total Rainfall (mm)	Total Snowfall (cm)	Total Precip (mm)	Total Precip (mm)
January	25.4	0.0	25.4	26.0	21.0
February	25.9	0.0	25.9	22.4	16.4
March	31.2	0.0	31.2	30.4	24.6
April	32.8	0.8	32.0	15.5	7.6
May	51.9	7.9	44.0	16.3	17.4
June	56.6	49.7	6.9	41.6	50.4
July	98.5	98.5	0.0	49.7	28.7
August	80.4	67.6	12.8	41.5	25.2
September	42.3	25.1	17.2	32.9	31.1
October	47.8	7.6	40.2	36.9	21.7
November	22.3	0.0	22.3	29.9	27.0
December	23.7	0.0	23.7	24.6	18.6
Mean Annual	538.8	257.1	281.6	367.7	287.7
Years of Record	6	6	6	12	11

Source: Steffen Robertson and Kirsten, 1989.

Table 3-3

Mean Monthly Discharge (1985) in m³/s at Selected Gauging Stations

Months	Blind* Creek (1975)	Pelly** River (09BC004)	Ross** River (09BA001)	Vangorda** Creek (at Faro)	Rose** Creek (1968)
January	NR	27.00	9.42	NR	0.27
February	NR	23.60	7.52	NR	0.21
March	NR	22.70	6.42	NR	0.20
April	NR	24.60	7.51	NR	0.24
May	NR	321.00	132.00	NR	4.01
June	12.90	837.00	295.00	2.01	6.14
July	6.15	548.00	184.00	1.26	4.58
August	4.50	277.00	94.00	1.06	4.24
September	5.41	260.00	68.10	1.05	5.43
October	NR	165.00	52.00	NR	1.39
November	NR	49.90	11.60	NR	0.92
December	NR	36.40	8.50	NR	0.64
Mean Monthly		216.02	73.01		2.36
Drainage Area (km³)	605	22,100	7,250	90.8	208.00

NR = No record
* **Source: Montreal Engineering Company, 1976.**
** **Source: Steffen, Robertson and Kirsten, 1989.**

1985 mean monthly unit discharges (cubic metres/sec) for Ross River, Pelly River and Vangorda and Rose Creeks are presented in Table 3-3. The Rose and Vangorda Creek stations cited below are no longer operational. However, new continuous streamflow recorders were established on both of these creeks in the fall, 1990. Data from these devices is currently not yet available.

3.2.3 Water Quality

A baseline water quality survey of Blind Creek was initiated in September 1990. Four sites within the watershed were sampled and analyzed (Table 3-4; Figure 3-2). Generally this watercourse can be described as very slightly alkaline in pH (7.52 - 7.89), clear (< 25 colour units), relatively soft (< 65 mg/l total hardness), and low in total suspended solids (< 8.7 mg/l). Total and dissolved metals were present at very low levels (i.e. < 0.022 mg/l zinc, < 0.01 mg/l lead, < 0.16 mg/l iron). Results of previous sampling of Blind Creek (see 1988 data; Table 3-4) are generally consistent with the above findings. However it should be noted that higher hardness and high metals concentrations are evident at times.

A regular water quality monitoring program, designed to fully characterize the pre-development surface water quality in the Blind Creek drainage basin, is presently underway.

3.2.4 Fisheries Resources

Investigations were undertaken during August 1989 to characterize the fisheries resource potential and habitat features of stream reaches on Blind Creek (see Figure 3-2 for sampling sites). Populations of slimy sculpin (36.4%), Arctic grayling (29.3%), juvenile chinook salmon (25.4%), burbot (8.4%) and round whitefish (0.4%) were estimated (all percentages based on species biomass measured in g/m^2).

Juvenile chinook were found throughout the Blind Creek drainage. Grayling were captured near the lake-head source, and at the mouth of Blind Creek. None were found between the lake and the creek mouth. Burbot and whitefish were only identified below the lower bridge crossing (approximately 2 km upstream from the confluence with the Pelly River). Slimy sculpins were found throughout the system.

Table 3-4

Water Quality Test Results for Water from Blind and Swim Creeks 1988 - 1990

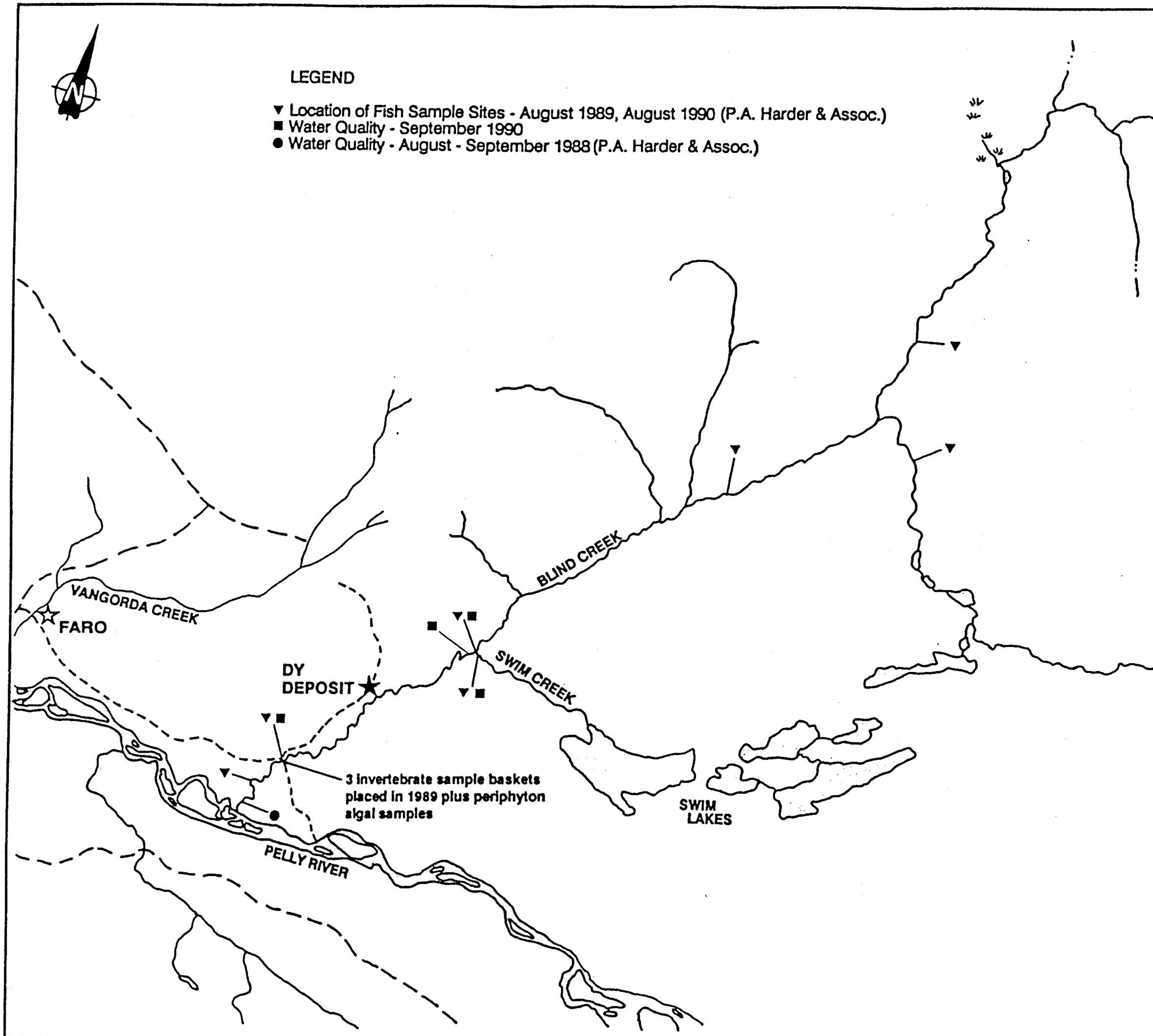
Parameter		Blind Creek Aug 5/88	Blind Creek Sep 23/88	Blind 1 Sep 20/90	Blind 2 Sep 20/90	Blind 3 Sep 20/90	Swim 1 Sep 20/90
Physical Tests							
Colour	CO	-	-	24.00	24.00	25.00	34.00
Conductivity	Mumhos/cm	-	-	113.00	119.00	130.00	368.00
Total Dissolved Solids		-	-	90.00	100.00	110.00	320.00
Hardness	$CaCO_3$	-	-	53.00	55.20	65.70	189.00
pH		8.06	7.31	7.52	7.59	7.78	7.89
Total Suspended Solids		4.10	1.00	6.70	7.30	4.00	8.70
Dissolved Anions							
Alkalinity	$CaCO_3$	59.90	66.20	48.30	50.40	53.70	129.00
Chloride	Cl	-	-	<0.50	<0.50	<0.50	<0.50
Fluoride	F	-	-	0.11	0.10	0.10	0.19
Sulphate	SO_4	10.00	7.00	8.30	9.00	10.00	68.10
Cyanides							
Total Cyanide	CN	-	-	<0.005	<0.005	<0.005	0.007
Other Tests							
Sulphide	S	-	-	<0.020	<0.020	<0.020	<0.020
Ammonia		0.29	0.05				
Total Metals							
Aluminum	Al	-	-	0.099	0.136	0.100	0.074
Antimony	Sb	-	-	0.0009	0.0013	0.0004	<0.0001
Arsenic	As	-	-	0.0006	0.0007	0.0006	0.0010
Barium	Ba	-	-	0.037	0.041	0.039	0.039
Beryllium	Be	-	-	<0.005	<0.005	<0.005	<0.005

Table 3-4 (cont'd)

Water Quality Test Results for Water from Blind and Swim Creeks 1988 - 1990

Parameter		Blind Creek Aug 5/88	Blind Creek Sep 23/88	Blind 1 Sep 20/90	Blind 2 Sep 20/90	Blind 3 Sep 20/90	Swim 1 Sep 20/90
Total Metals (cont'd)							
Boron	B	-	-	<0.100	<0.100	<0.100	<0.100
Cadmium	Cd	-	-	<0.0002	<0.0002	<0.0002	<0.0002
Chromium	Cr	-	-	<0.001	<0.001	<0.001	<0.001
Cobalt	Co	-	-	<0.001	<0.001	<0.001	<0.001
Copper	Cu	<0.002	<0.002	0.001	0.004	0.004	0.004
Iron	Fe	0.250	0.155	0.060	0.160	0.070	0.090
Lead	Pb	<0.005	<0.005	0.001	0.010	0.002	0.005
Manganese	Mn	-	-	0.900	<0.005	0.028	0.008
Mercury	Hg	-	-	<0.00005	<0.00005	<0.00005	<0.00005
Molybdenum	Mo	0.017	0.014	<0.001	<0.001	<0.001	<0.001
Nickel	Ni	-	-	0.001	0.001	0.001	0.001
Selenium	Se	-	-	<0.0005	<0.0005	<0.0005	<0.0005
Silver	Ag	-	-	<0.0001	<0.0001	<0.0001	<0.0001
Vanadium	V	-	-	<0.005	<0.005	<0.005	<0.005
Zinc	Zn	0.002	0.002	0.018	0.022	0.016	0.014
Dissolved Metals							
Calcium	Ca	-	-	15.40	16.20	18.90	46.30
Magnesium	Mg	-	-	3.46	3.49	4.39	17.40
Potassium	K	-	-	0.64	0.67	0.69	1.48
Sodium	Na	-	-	2.00	2.07	2.06	4.95

< - less than
Results are expressed as milligrams per litre except for pH, colour (CU)
*** Data from report entitled "Biological Monitoring at Blind, Vangorda and Anvil Creeks, 1988". Curragh Resources Inc. (February 1989).**



No	Revision	Date	By

CAD No.

Rescan Environmental Services Ltd.
VANCOUVER CANADA

Figure 3-2 Fisheries Resources and Water Quality Sampling Sites

Scale	Project
Designed	Dwg No.
Date	— — — —

Up to 700 returning chinook salmon spawn in Blind Creek (Harder 1989, 1990, unpublished data). The salmon return to the stream in early-August. Spawning takes place throughout the lower 35 km of Blind Creek.

3.2.5 Wildlife Resources

Wildlife having management, economic or recreational importance in the Dy Project area include ungulates such as moose (*Alces alces*), caribou (*Rangifer tarandus caribou*), and mountain sheep (*Ovis dalli stonei*); carnivores such as grizzly (*Ursus arctos*) and black bear (*Ursus americanus*), wolves (*Canis lupus*), foxes (*Vulpes vulpes*), wolverine (*Gulo gulo*) and lynx (*Lynx lynx*); furbearers such as marten (*Martes americanus*), mink (*Mustela vison*), otter (*Lontra canadensis*) and beaver (*Castor canadensis*); game birds such as ptarmigan (*Lagopus lagopus*) and blue (*Dendragapus obscurus*), ruffed (*Bonasa umbellus*) and spruce grouse (*Canachites canadensis*); and small mammals like the snowshoe hare (*Lepus americanus*).

Ungulates

Distribution and density of ungulates in the region is seasonal. A formal survey of wildlife in the Faro area, including the proposed exploration portal as well as various possible production shaft sites, was conducted in September 1990. During this survey, moose were only found at elevations between 1,756 m (4,500 ft) and 1,950 m (5,000 ft) which is at or slightly above the treeline. However, dense growths of willow, aspen and poplar located in the sub-alpine transition zone, which includes the location of the proposed portal (Plate 3-1), and in the flood plain of the Pelly River suggest that these areas provide summer and winter forage habitat for moose. During the September 1990 survey, a single-transect survey through willow-brush habitat in the vicinity of the proposed portal site resulted in a count of 8 pellet groups over 100 m. This suggests significant use of the area by moose.

Caribou were only observed in alpine meadows on Mt. Mye, above 1,950 m (5,000 ft). This is typical of their distribution during summer months (Banfield 1977). These animals are known to overwinter in the Tay River valley to the north of Mt. Mye, far removed from the location of the proposed mine. There have been no reported sightings of caribou on the south-facing slopes of Mt. Mye (B. Pelchart, pers. comm. 1991).

Plate 3-1: Typical Willow-aspen-scrub birch habitat in the vicinity of the proposed mine portal

The high alpine on Mt. Mye provides summer range for a population of Fannin sheep (Figure 3-3; McLeod 1981; Lortie 1988; Schweinsburg 1989). However, during September 1990 only one flock of 11 young rams were seen utilizing summer habitat on Mt. Mye during an extensive aerial survey of the region. The largest portion of the known herd, a flock containing approximately 8 rams and 32 ewes was observed at much lower elevations migrating towards their known wintering grounds on Sheep Mountain near the town of Faro (Figure 3-3). Sheep Mountain is a sparsely treed ridge between 980 m and 1,750 m elevation with a predominantly south-facing aspect where the animals find grasses and other forage under a comparatively thin blanket of snow.

The proponent, Curragh Resources Inc., has consulted with representatives of the Yukon Territorial Government Fish and Wildlife Branch (YTG) and with other various interested parties about the local sheep population and the impacts of mining development on the sheep. These consultations have led to the establishment of a joint undertaking between Curragh Resources and YTG to protect and manage the sheep (Hoefs 1988). Curragh is committed to extending their involvement in this undertaking to include the additional period of operational mining activity brought about by implementation of planned activities at the Dy Property.

Carnivores

Grizzly bear and the black bear frequent the Faro area. Both species are omnivorous scavengers and are attracted to any easy source of food such as at a camp or dump. Grizzly bears are particularly concentrated in the Faro area. While typical population densities for grizzlies in the Yukon would be approximately one bear for every 80 square kilometers, on a typical night at the Faro dump (approximately 1 km from town), one can see as many as 5 to 8 of these animals scavenging for food. However, no grizzlies were spotted during two extensive overflights of the proposed location for the exploration portal and surrounding terrain. Two black bears were observed in the alpine meadows of Mt. Mye.

There are no reported sightings of wolves, fox or lynx in the immediate vicinity of the town of Faro or the proposed exploration site, nor were any sighted during the September 1990 wildlife survey. However, scats of either fox or lynx (or both) were found in and around the area of the proposed project.

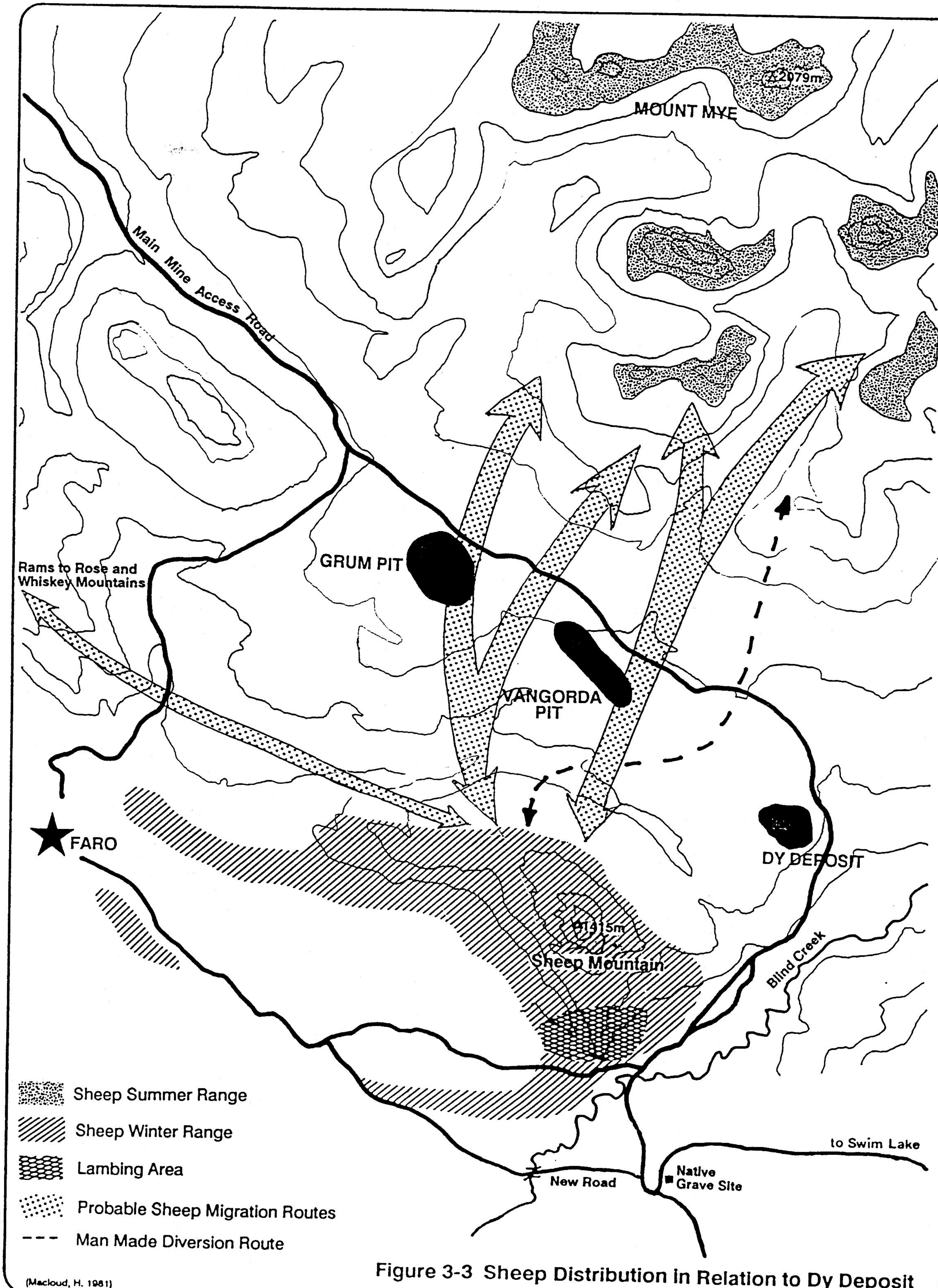


Figure 3-3 Sheep Distribution in Relation to Dy Deposit

DB-R0021

Much of the area surrounding the Dy deposit has been burned over and is not suitable for marten. Mink inhabit stream banks, lakeshores, swamps and forest edges (Banfield 1977). None of these habitats exist near the proposed exploration site. However, they are prevalent lower down in the Blind Creek valley. Notwithstanding this, Native trappers from Ross River suggest the terrain in the vicinity of the Dy deposit is productive habitat for marten and mink.

There have been no recently reported trappings or sightings of beaver in this area although they have been sited/trapped in the past.

Game Birds and Small Mammals

The dense brush near the proposed exploration portal site is prime habitat for game birds like grouse and ptarmigan and small mammals like the snowshoe hare. A single 150 m transect walk through this habitat resulted in the sighting of 3 ruffed grouse, 1 spruce grouse, 3 blue grouse, 2 willow ptarmigan and 7 snowshoe hares.

The information provided above, describing the environmental setting and land use for the Dy Property will be supplemented with additional data gathered during field excursions planned for the winter and spring of 1991. The proponent recognizes that more detailed information is required to permit an accurate assessment of the potential project related impacts.

4 - Proposed Mining Plan

4.0 PROPOSED MINING PLAN

4.1 Introduction

Development of the Dy Project has been structured into two phases: advanced exploration and production. The two phases will be separated by a production decision once the economic feasibility of mining is established. The purpose of the advanced exploration phase is to gather information required to carry out the feasibility assessment. This includes details of ore zone geometry and grade distribution to enhance ore reserve estimate reliability and mine layout; information on rock quality, rock conditions and groundwater hydrology to allow final mine design; and, bulk sampling to allow bench and pilot plant testing of metallurgical performance and blending characteristics. During the advanced exploration phase, access to the deposit will be gained by excavation of a 1,700 m long decline. This report deals almost exclusively with the advanced exploration phase; the production phase will be the subject of further investigation and description.

The advanced exploration program will have four components. Earthwork and construction of the surface facilities will be followed by the excavation of the upper decline through non-acid generating rock. Waste will be dumped at the portal to build up the surface site. However, as underground development approaches the ore zone, the waste and ore produced may be acid generating and will require a variation in waste handling techniques. Concurrent with the exploratory work, construction of an access road will begin to permit the haulage of ore and bulk samples to the Faro processing facilities and to facilitate haulage of potentially acid generating waste to a stockpile, if required.

The following sections provide descriptions of each stage of the exploration process of and our understanding of the permitting required, and identifies the environmental issues related to mine development and the mitigative measures which will be adopted to minimize potential impacts.

4.2 Phase I - Advanced Exploration

4.2.1 Surface Setup

4.2.1.1 Description of Activities

Surface activities began in mid-January 1991. Initial work included the construction of a small vehicle access road from the existing Blind Creek Road to the proposed portal site, trenching and levelling at the portal site to facilitate collaring and surface infrastructure development. Excavation of a settling pond below the disturbance will begin when weather permits.

Infrastructure at the portal site will include a small shop facility, diesel power generation, a dry and office trailer complex, fuel storage, explosives magazine and possibly a greywater septic system. There will be no camp on-site; personnel will be transported daily from camp accommodations in the town of Faro. This will reduce the need for domestic water and sewage at the portal and will enable the use of an electric toilet system. The very small amount of domestic water required will be pumped from a small drainage immediately north of the portal.

4.2.1.2 Permitting Required

The area of the Dy Project has been acquired as claims under the Yukon Quartz Mining Act. Surface setup will be conducted under the authority of this legislation. Additionally, Environmental Operating Conditions, similar to those normally part of a Land Use Permit (see Appendix A), will be voluntarily adopted by the company to ensure environmental protection is an integral component of the construction design and implementation.

It is recognized that as the project reaches the production phase, a complete Initial Environmental Evaluation (IEE) may be required to enable further screening under the Environmental Assessment and Review Process (EARP). In the exploration phase, however, it is understood that only a level one screening is required. Such a screening is normally conducted by the initiating department, in this case, the Department of Indian and Northern Affairs Development (DIAND). The quick turnaround of a level one screening would enable the current scheduling of the project and allow collection of data required to proceed to later stages.

4.2.1.3 Environmental Issues and Mitigative Measures

Development of the decline portal site will cause a limited amount of surface disturbance from the portal collaring and the initial access construction.

Development of the site will also subject the area to the possibility of erosion in the advent of spring freshet or summer rainfalls. The runoff, if allowed to leave the site without mitigation, could have implications on the water quality of Blind Creek and the valuable fisheries habitat which it supports. A settling pond designed to collect and clarify flows up to and including a 1:10 year peak instantaneous rainfall event will be constructed immediately below the portal site along with all required drainage ditches to move site runoff to the pond. The pond will be effective in removing all sediments larger than 15 micron particle size (medium/fine silt) at an inflow rate of 530 IGPM; during lower flow events, it will remove even smaller particle sizes as retention time increases. A qualified professional geotechnical engineer will inspect construction to ensure stability of the pond.

The increased access and site disturbance will have an impact on wildlife habitat of the immediate area. However, disturbance will be limited to approximately 0.80 ha of wildlife habitat and every effort will be made to minimize impact to snowshoe hare and upland game bird populations found to be abundant in the area. In addition, a "no hunting" policy will be adopted for all employees and personnel at the site. Native use of the area will not be restricted in any fashion by the personnel or policies at the site. All garbage generated at the site will be collected and hauled to the Faro landfill site for disposal.

Fuel and petroleum products will be stored in accordance with the Environmental Operating Conditions. Impermeable containment areas will be constructed which are capable of holding 110% of the volume of the largest tank. Propane will be stored in a safe open area in accordance to the Fire Prevention Act. The inventory of explosives will be stored in a facility approved by the Chief Mines Inspector and the necessary permitting will be obtained.

4.2.1.4 Impacts of Closure and Decommissioning

Should circumstances prevail whereby there is a permanent cessation of exploration and/or development activities, closure and decommissioning activities would involve removal of all infrastructure and revegetation of areas of surface disturbance.

4.2.2 Upper Decline, Access to the Ore Zones

4.2.2.1 Description of Activities

Advanced exploration will be carried out over a 75 week period beginning sometime in 1991. Access to the orebody will be gained through a straight -20% trackless decline (dimensions approximately 6.20 m wide x 4.12 m high) collared at elevation 835 m approximately 1 km from Blind Creek (see Figure 2-4). This portion of the decline will extend from the portal to a point approximately 1,000 m north of the portal and will be constructed entirely in phyllites and greenstones which are non-acid generating. These benign waste materials will be disposed of at the portal entrance by dumping off the outside edge of the cleared pad.

Trackless mining equipment will be used. Initially there will be one drill jumbo, two 3.8 cubic metre scoop trams and a 13 tonne truck with further trucks added as the decline lengthens. Exploratory operations will be on 3 shifts of 8 hour duration per day. The mining crew will total approximately 26. Crews will be housed at Faro in an existing camp facility; thus, there will be minimal septic requirements at the portal site. Crews will likely be on a 6 weeks in, 2 weeks out rotation.

Groundwater inflows to the decline will initially be minimal and the overall exploration activity will be significantly below the levels which would require a water licence under the Northern Inland Waters Act (NIWA). As the decline lengthens, water usage will remain constant; however, it is anticipated that groundwater inflows will increase. EBA Engineering has estimated that, based on double packer percolation tests in 1990 drill holes, the phyllites will be relatively impermeable (10^{-6} cm/sec) whereas fault zones will be significantly more permeable (10^{-4} cm/sec) and water bearing.

4.2.2.2 Permitting Required

Water utilization throughout this segment of development will be limited to the consumption necessary for operating the jumbo in the drilling exercise and spraying of broken rock piles to suppress the dust while digging the material. The amount will be well below the 50,000 IGPD specified within the NIWA regulations as requiring a water licence.

It is anticipated that level one screening through DIAND would continue to be sufficient for the project at this stage.

4.2.2.3 Environmental Issues and Mitigative Measures

Rock testing is currently underway to verify that waste rock produced from the upper decline will be non-acid generating. This testing program will confirm that waste rock from this segment of the exploration program may be disposed in a dump location at the outside edge of the portal area with no concern for high metal concentrations or acid mine drainage developing in dump seepage water. Water clarification in the settling pond below the portal will be adequate to contain high suspended sediment discharges from site runoff, as well as from the decline, and release water of compatible quality to Blind Creek.

The waste dump design will be subjected to the review of a qualified professional geotechnical engineer to ensure it is constructed in a stable manner and will have no impact on the continued operation of the settling pond immediately below.

Operational guidelines will be developed and enforced to minimize potential releases of spilled petroleum products and uncombusted explosives. Spill contingency plans and approved clean up techniques will be well defined such that these problems may be prevented or immediately addressed within the underground sump system, before the impact reaches the settling pond.

A second and much larger settling pond will be constructed at the surface in preparation for the next phase of exploration activity which will intrude on potentially acid generating rocks (altered phyllites and the orebody). Groundwater inflows to the decline are also expected to be higher during this phase. This facility will incorporate a two-stage settling system with a small pond to receive the initial inflow and settle out the coarse fraction of the suspended materials and a second, deeper pond, with a much larger surface area. This arrangement will allow flexibility to channel discharge from the smaller pond, through a lime treatment plant, which will increase the pH levels sufficiently to allow precipitation of the dissolved metals within the second pond.

A 110 m deep drill hole, located inside the decline approximately 200 m from the portal, has been reamed out and fitted with a casing the full length of the hole. This will act as the main discharge for the decline and will be adequately sized to service the entire underground program and, should a decision be made to proceed with production, throughout the mining period. Pumps will be established in the sump and a 15 cm diameter dewatering line run up the hole to the surface. In this way, underground water can be discharged at the portal collar and flow downhill to the settling and secondary treatment facilities. The settling facility will be designed such that it can be upgraded in stages to handle the dewatering flows. A facility capable of handling 3,000 -5,000 mg/l total suspended solids at a flow rate of 300 - 500 IGPM will be examined. The pond will be designed with the input of a qualified geotechnical engineer.

Storage areas will be constructed to temporarily accommodate potentially acid generating waste rock and ore stockpiles. Ore will be stockpiled only for a short time at the portal before being shipped to the Faro concentrator for processing and will likely be stored in a surge bin to facilitate easy loading on the ore haul trucks.

Waste rock will consist largely of altered phyllites and low grade sulphides. The most cost effective way to handle the waste will be to redeposit it underground. However, a temporary storage pad capable of holding 60,000 tonnes of waste rock will be required to contain the materials generated from the initial excavation, until a suitably large disposal area becomes available underground. At that point, the potentially acid generating waste stored at the surface would be transported back underground. All future waste would be directly placed underground in mined out stopes without coming to the surface. The duration of surface storage is anticipated to be approximately nine months. This plan will ensure no potential exists for long-term chemical impact from the waste rock dumps to Blind Creek. The temporary stockpile area will be sited in an area with limited percolation of water down into the groundwater regime. Portal site drainage will be collected in a main sump on the surface and pumped to the secondary treatment facility prior to its release to the environment.

A regular monitoring program will be implemented to ensure that water discharged from the small settling pond, which will be operational throughout this period, is suitable for release to the Blind Creek drainage basin.

4.2.2.4 Impacts of Closure and Decommissioning

In the event that unforeseen circumstances result in a cessation of exploration and/or development activities and operations were permanently discontinued, closure and decommissioning activities would involve the sealing of the decline for public safety and aesthetic reasons, underground deposition of all potentially acid generating waste rock (or storage in a containment area at Grum or Vangorda), and the revegetation of surface disturbance following removal of all infrastructure.

4.2.3 Exploration in the Ore Zones

4.2.3.1 Description of Activities

The orebody is expected to be reached sometime during the first fifteen months after collaring. Development to a point 1,700 m from the portal will be done in an effort to encounter the main orebody known as the B Zone. Once the B Zone is reached, a drift will be driven to the northwest into the B Zone to permit drilling, test mining and bulk sampling in this area. Drifting to the far end of the B Zone (approximately 600 m) and underground exploratory drilling is expected to be completed 20 months after collaring. B Zone test mining and bulk sampling will start in the thirteenth month after collaring. To the extent possible, the drift will be in ore which will be shipped to the Faro concentrator for processing to support the exploration program.

As soon as sufficient ore can be accessed, an initial test mining operation will be established to finalize production mining methods to determine suitable stope sizes and to secure sufficient ore to assist in determining its metallurgical features for processing. Optimum blending ratios of Dy and Grum ores (to be mined concurrently), that can be most effectively handled in the plant, will also be assessed during test processing.

The bulk sampling program for piloting purposes will involve 100,000 tonnes from the B Zone. A sample size of this magnitude is required considering the size of the pilot plant to be used; namely the Faro Concentrator. The initial operation will begin at 1,500 tonnes per day and will gradually increase to 3500 tonnes per day. It is likely that much of the initial mining will be by room and pillar in areas of shallow dip. Long hole stoping will probably be developed in fold noses. Cut and fill will be used in narrow, high grade areas.

Ventilation raises will also be installed during this component of the exploration program; one will be installed on the decline adjacent to the C Zone, should drifting into that Zone occur, and another will be installed where the drift to the B Zone takes off to the northwest.

A conveyor will be installed in the decline during the development to facilitate the delivery of ore and waste from the excavation and bulk sampling operation to the surface. A final decision on the timing of the conveyor installation has not yet been made.

4.2.3.2 Permitting Required

It is most probable that underground development during this stage will produce groundwater which must be discharged from the decline. It is expected that this volume will, at some time, exceed the 50,000 IGPD specified by NIWA Regulations as the maximum volume which may be used without the acquisition of a water licence. It is further anticipated that, although the water will not be physically "used", the diversion of these volumes from groundwater sources to surface water constitutes the need for a licence. As such, an application will be made to the Yukon Territorial Water Board for an exploration phase water licence within the next few weeks to ensure that a license will be in place when discharged volumes of groundwater exceed the limits specified in the Regulations.

Activities outlined in this phase of operation continue to be exploratory in nature. Thus it is understood that operations may proceed under the Quartz Mining Act and the level one screening as provided by DIAND. Results of the diamond drilling, the test mining and bulk sampling in the C and B Zones will form the basis of a decision whether or not to proceed to full scale production.

4.2.3.3 Environmental Issues and Mitigative Measures

The water which will collect in the underground development will contain substantial levels of suspended solids, total lead, zinc, copper and barium. It is also anticipated that pH may be lowered, while ammonia and dissolved zinc may be elevated. The water will be pumped up the decline to the major sump (described in Section 4.2.2.3) then up to the surface through the cased drillhole. It will then be discharged to the settling pond and, if containing elevated dissolved metals, to the secondary treatment facility. The initial holding pond will remove the coarse fraction of the total suspended solids in an accessible location which may be easily dredged on occasion. The pond will allow for the collection of a suitable volume of effluent to permit running the secondary lime treatment facility if required. The addition of slurried lime will raise the pH to levels which encourage the precipitation and containment within the large settling pond of zinc bearing precipitates. The aeration provided by the pumping and handling through this process, coupled with the inherent warm temperatures of the underground waters, will assist in reducing ammonia levels to within acceptable limits.

Post-treatment outflow from the large settling pond, will be monitored on a weekly basis to ensure the water is safe to discharge to the Blind Creek system. The small settling pond constructed during the surface set-up phase of the operation will continue to operate throughout this period, but inflows to this pond will be dramatically reduced and will consist of limited site and road runoff, none of which will drain acid generating rock, thus none of which is likely to be contaminated. It will, however, serve to reduce the suspended solids content of those flows and will be monitored on a weekly basis.

The modifications to the ore stockpiling location at the portal (as described in Section 4.2.2.3) will be operational during this phase. Drainage will be collected in a small, lined sump near the portal where a pump, equipped with automatic water level sensors, will operate on an as required basis to pump the water to the secondary treatment facility. As this system will only be required during the summer months, freeze protection and winter operation contingencies will not be required.

4.2.3.4 Impacts of Closure

In the unlikely event of closure following the exploration phase a plan similar to that for mine closure will be followed. Closure considerations are greatly simplified by the fact that the entire orebody scheduled for mining and all altered phyllite within the formation are below the elevation of Blind Creek. Upon cessation of operations, the workings will be allowed to flood with stagnant water. This will eliminate acid generation potential and, accordingly, groundwater contamination will not be a significant issue. The surface facilities will be removed and underground openings sealed. Acid generation from mine waste piles will not be a concern since no acid generating materials will be left on the surface. All potentially acid generating mine waste from advanced exploration of the Dy deposit will be replaced underground or removed to another location outside of the Blind Creek drainage basin. Revegetation of surface disturbances will be conducted to reduce the possibility of future erosion.

4.2.4 Access Road

Ore produced during the bulk sampling period will be transported to the Faro concentrator to evaluate its milling characteristics. In order to get large haulage trucks to the portal site or to the shaft collar, the access road must be upgraded to provide suitable grades and configuration. Various access routes are currently being assessed.

Construction will involve the clearing and disposal of vegetation from the route location and initial layout by dozer utilizing cut and fill techniques. The final road surface will be standard haulroad configuration with a 30 m running surface flanked by 1 m safety berms. Crushed rock placement will be required to upgrade and stabilize the final road surface; non-acid generating rock from the Grum operations will be used for this purpose.

The new ore haulroad would join the existing Vangorda Plateau haulroad at the Vangorda deposit. It is possible that a portion of the surface haulage may be by conveyor.

4.2.5 Power Supply

Initial decline excavation will use power generated at the portal by diesel gensets. Eventually, given sufficient grid capacity, it will be desirable to tie the Dy minesite into the local power grid. A number of options could be examined including extension of lines from Vangorda, the Faro townsite or the Campbell Highway. Alternatively, the Dy

Mine might be a logical candidate to draw power from small scale Hydro development in the area.

4.3 Phase II - Production

4.3.1 Final Mine Development and Production

4.3.1.1 Description of Mining

Test mining operations will determine mining methods and suitable stope sizes. Room and pillar development in combination with long hole stoping techniques will be established to produce a maximum annual output of 2.75 million metric tonnes. This translates to an average of 7,800 tonnes daily which will require the use of a shaft to deliver ore to the surface.

Waste rock will be disposed of within a mined out section of the workings. Waste volume will be minimal in the production stage.

4.3.1.2 Permitting Required

Due to the continued need to keep active workings dewatered, pumping will be employed to remove all groundwater inflows from the mine. The volume is expected to be in the range of 350 IGPM and will require a water licence under NIWA. Water quality is expected to be similar to that encountered in the advanced exploration development. A production water licence will be applied for which allows for the increased water volumes generated during mining, compared to the exploration phase.

All activity preceding Phase II will be instrumental in providing sufficient information to decide whether a mine is feasible. Should this decision be positive, a successful screening under the EARP process may be necessary prior to proceeding with the mining phase.

Curragh has been actively collecting baseline environmental information since 1988 and will be preparing more detailed documentation. This should allocate sufficient time for review and discussion of the impacts of the Dy project such that a decision report on the screening may be in the hands of the Minister, before a production water licence is required.

4.3.1.3 Environmental Issues and Mitigative Measures

Water handling during the production stage will be identical to that specified for advanced exploration. The major difference is that volumes are anticipated to increase. A lime treatment facility will likely be in continuous use and the final clarification pond may have to be enlarged from its original design to accommodate increased flow rates.

Acid generating waste will be kept entirely underground during this phase. An ore handling facility will be designed where the shaft surfaces and may require an impermeable base and a collection sump similar to that at the portal site. Any potentially high metal/suspended solid drainage will be directed to the water treatment area by overland pipeline. Interceptor ditches will be established above the site to direct runoff away from the ore handling facility. Sludge and dredged tails can be removed from the site and disposed of in the mined out Faro or Grum pits.

4.3.1.4 Impacts of Closure and Decommissioning

Mine closure will make due consideration of environmental matters. In addition to the measures outlined in Section 4.2.3.4, the shaft will also be closed off upon project decommissioning. A comprehensive closure and decommissioning plan will be developed fully recognizing any environmental sensitivities inherent to the project area.

4.3.2 Conveyor Installation

Underground truck haulage to transport ore from the working faces will not be practical during the production stage owing to of the volume of ore to be delivered to the surface. The ore is very dense and trucking up the 20% decline would be tedious and inefficient. A floor-mounted conveyor system is planned which will be capable of delivering 3,500 tonnes per day to the surface. The actual timing of installation is somewhat uncertain at this point.

4.3.3 Shaft Raising

One of the objectives for the advanced exploration and initial mining phases will be to evaluate the deposit for potential shaft locations close to the deposit center of gravity. Once a suitable site is established and a sufficient reserve base is established, a shaft will be raised from the underground working to the surface and a head frame/hoist system established with sufficient capacity to hoist up to 7,800 tonnes per day. It is likely that the Phase II mining stage will not be reached until two or three years after decline collaring. At that point mining and hoisting of up to 2.75 million tonnes per annum will be possible; hoisting would replace conveying through the decline as the means of bringing mined ore to the surface.

During Phase II shaft mining, the decline will continue to be used for equipment access and ventilation.

5 - Proposed Recovery Process

5.0 PROPOSED RECOVERY PROCESS

All ore mined from the Dy Deposit will be trucked or conveyed from the portal or shaft area to the existing stockpiles near the mill site at the Faro Pit. Processing of the ore to produce lead and zinc concentrates will be in the current Faro concentrator using processes of crushing, grinding, selective flotation, dewatering and drying similar to those in use today. Preliminary testing of the Dy ores indicates that they are similar to the ores of the other deposits of the Vangorda Plateau. Thus, grinding and reagent consumption will be similar to that used for Vangorda, and particularly for Grum ores. Tailings will be disposed of in the mined out Faro pit although the downvalley scheme at Faro may still be employed as a component of the overall tailings deposition and water management plan for the Faro concentrator effluent. The processing of Dy ore and storage of waste materials generated from the processing will have no significant incremental environmental impact on the Rose Creek Basin.

6 - Environmental and Socioeconomic Considerations

6.0 ENVIRONMENTAL AND SOCIOECONOMIC CONSIDERATIONS

6.1 Environmental Program

The principal environmental issues associated with the development of the Dy deposit are anticipated to be:

- protection of the water quality and fisheries resources in Blind Creek;
- potential for waste materials to generate acid mine drainage;
- development of a effective materials handling, waste rock and waste water management plan;
- effects on local wildlife populations; and
- mine reclamation and project decommissioning.

6.1.1 Environmental Considerations

Acid Generation Testwork

A responsible approach is being undertaken by Curragh Resources Inc. to identify and assess the potential environmental impacts of the proposed development such that appropriate mitigative measures can be taken to minimize those impacts. The environmental impacts of principal concern likely to be associated with the development of the Dy Property are related to construction of the portal access and ore haul roads, siting and construction of surface facilities, the treatment and disposal of mine water, the storage and transportation of mined ore, and the storage and disposal of potentially acid generating waste rock. Accordingly, studies have been initiated to assess the baseline environmental conditions in the vicinity of the proposed site and laboratory tests are currently under way to determine, among other things, the acid generation potential of the ore and waste rock to come from the proposed underground mine.

6.1.1.1 Acid Generation Testwork

Based on the similarity of the massive sulphide deposits comprising the Dy ore body to those of the Faro, Grum and Vangorda deposits, it is likely that the ore and some waste rock produced by the mine will be acid generating. Static and kinetic testwork is underway to determine the acid producing capability of all types of waste rock and to estimate the rate of acid generation. It is important to realize that the first 1,000 m of the proposed decline (the upper decline) will be excavated in non-acid generating phyllites and greenstones of the Vangorda formation. This conclusion is based on drilling results, visual identification of lithotypes as being similar to those tested and shown to be net acid consumers at the Grum deposit (CRI 1989), and on the known natural weathering characteristics of the rocks. Altered phyllites, like those that comprise the Vangorda wall rocks (CRI 1989), will not be encountered until excavation reaches the first mineralization.

Acid generation potential will be determined through testwork on each lithology identified for the Dy deposit. Acid-generation tests can be divided into instantaneous "static tests", which provide an approximate indication of acid potential, and longer-term, more intensive "kinetic tests", which directly measure the rate of acid generation, acid neutralization, and metal leaching through time.

The static test is known as acid-base accounting (ABA). An acid-base account attempts to determine the net-neutralization potential (NNP) of a rock by examining the balance between acid-producing components (primarily pyrite, FeS_2) and acid-consuming components (carbonates and other minerals capable of neutralizing strong acids).

The kinetic test employs the humidity cell. Samples are placed in enclosed containers, or cells, and subjected to a weekly cycle of dry and humid air. At the end of each week, each sample is rinsed with deionized water to remove any acid products and leached metals. Chemical analyses of the rinse waters indicate the weekly rates of acid generation, acid neutralization, and metal leaching. Extrapolation of these rates into the future permits the long-term prediction of acid production and consumption of sulphide minerals.

Other Testwork

Other testwork being completed for the Dy project include severe slaking, wet/dry and freeze-thaw tests to evaluate weathering characteristics for materials to be potentially stockpiled.

6.1.1.2 Climate

Climate data such as total precipitation and evaporation are required to permit an accurate assessment of the required design parameters for domestic water supply and drainage facilities. Existing data in the vicinity of Dy is available from three Atmospheric Environment Services (AES) meteorological stations located at Faro (established 1977), a location known as the Anvil site (est. 1967), and at the Grum Camp (est. 1983), where daily measurements of temperature and precipitation have been recorded since their installation. The climate station at the Grum Camp is closest to the proposed Dy Project and is located at latitude 62°18'N and longitude 133°16'W at an elevation of 1,150 metres.

6.1.1.3 Hydrology

Surface Water

The proposed mine site is located on the western slopes of the Blind Creek drainage basin. The southeast facing slope of the property sheds runoff directly into Blind Creek. Temporary storage facilities for ore and waste rock will be sited on these slopes so a knowledge of the surface drainage patterns in this area is critical to ensuring that the water quality of Blind Creek will not be compromised.

Hydrological baseline data for the vicinity of the proposed mine site is available from Water Survey of Canada gauging stations located on the Ross (09BA001) and Pelly (09BC004) Rivers and from selected streamflow gauge sites established on Rose and Vangorda Creeks in conjunction with environmental studies associated with the development of the Vangorda and Grum deposits (which are also located on the Vangorda Plateau). In addition a stream flow gauging station equipped with a continuous streamflow recorder and datalogger supplemented with staff and crest gauges will be established on Blind Creek. Data obtained from this station will permit the development of stage-discharge flow curves which provide a foundation for calculating stream dilutions during both low and high flow periods.

Groundwater

A good understanding of the groundwater flows in the area of the proposed mine is required in order to assess the potential long-term environmental impacts from the underground mining operations and the surface ore and waste rock storage facilities.

Groundwater levels will be obtained from selected exploration holes and samples of groundwater drainage will be collected from each drift. Possible sites for locating piezometers include: in drill holes located inside the portal, at the ore and waste rock storage sites and on the downhill slopes where mine and surface water drainage settling/treatment ponds are to be sited. However, due to the nature of the location of the Dy orebody (below the level of Blind Creek), and the means by which it will be mined, it is likely that piezometers will only be required at the lower end of development (i.e. below the settling pond).

6.1.1.4 Water Quality

The potential impacts to water quality in the Blind Creek drainage associated with the development of the Dy Property may include:

- possible increased acidification and migration of heavy metals in surface and groundwaters caused by exposure of the rock to oxygen in underground workings and surface storage facilities; and,
- Some increased migration of groundwater in the mine zone caused by increased fracturing from mining related activities (phreatic surface drawdown).

The potential for increases in the concentration of heavy metals, ammonia from blasting residues and suspended solids from surface runoff, and the potential for acid generation to affect the aquatic resources in the Blind Creek valley will be examined during the assessment of impacts associated with the mining phase of development.

A water quality monitoring program commenced at the property in September 1990 and will continue in order to characterize pre-development parameters and provide a baseline for comparison with post-development water quality. Given site conditions and the careful environmental considerations included in preliminary development concepts, it is anticipated that there will be no impact on Blind Creek associated with proposed development.

Groundwater samples for water quality will be sampled from piezometer wells. Five surface water quality sampling sites will be established in the Blind Creek drainage as follows: 1) above Swim Creek, 2) in Swim Creek, 3) below Swim Creek but above mine influence, 4) immediately below mine influence, and 5) at the confluence of Blind Creek and the Pelly River.

Field water quality tests will include pH, dissolved oxygen, conductivity and temperature. Laboratory water quality analyses include a 21 metal (total and dissolved) ICP Scan, total and dissolved solids, turbidity, color, pH, alkalinity, hardness, conductivity, dissolved anions, ammonia and other nitrogen species, and phosphorous (total and dissolved).

As discussed previously, initial development into the decline will be in rock which is non-acid generating and may be disposed of at the mouth of the portal. A small settling pond will be constructed below the dump to collect and clarify surface runoff. Further exploration will yield rock which is potentially acid generating. Minewater discharge in this later stage of exploration will likely be high in zinc and possibly copper and lead concentration. It is the proponent's expectation to construct and operate a secondary water treatment facility to mitigate the potential impacts arising from acid mine drainage. The facility will consist of a lime treatment plant which will be designed to remove metallic complexes from mine and surface runoff water and to lower pH prior to the discharge of water to Blind Creek.

6.1.1.5 Aquatic Resources

The only water courses that have the potential to be affected by the proposed development are Blind Creek and the Pelly River, both of which will be recipients of surface runoff water and treated mine water (as discussed below). The potential impacts are likely to be confined to nearly undetectable changes in water quality in the receiving waters. To ensure that adequate data is available to assess these impacts, a comprehensive assessment of baseline aquatic resources will continue.

Benthic Macroinvertebrates

Representative samples of pre-development benthic macroinvertebrate communities will be collected at each of the five water quality stream sites in Blind Creek (discussed above) during the summer of 1991. The samples will be enumerated and individual organisms identified to the level of genera (species where possible).

Periphyton

Periphyton communities are sensitive indicators of changes in water quality. Therefore knowledge of the state of the community is required in order to assess whether operation of the mine is having an impact on water quality. Representative samples of pre-development periphyton communities will be collected at each of the five stations discussed above during the summer of 1991. The samples will be enumerated and individual organisms identified to the level of genera (species where possible).

Fish

Fisheries studies have already been implemented to characterize the existing fisheries resources in Blind Creek. The purpose of this program will be to document the presence/absence of species present in the creek and to categorize their various life stages; determine the spatial distributions and movements of each species in relation to siting of the proposed mine; determine relative abundances of each species; and to locate sensitive habitats that may be affected by altered water quality or other development/operation related effects.

Fisheries studies are planned for April, 1991 to characterize the extent of use of overwintering habitat in Blind Creek. Also, federal and territorial government data on fisheries resources and their use within the proposed development area will be utilized. Preliminary studies have already been conducted during the summers (August) of 1989 and 1990 to characterize the summer fish fauna and their distribution throughout the Blind Creek drainage. In addition, benthic invertebrate studies were undertaken to characterize seasonal changes in abundance and distribution of fish food.

6.1.1.6 Soils, Terrain and Landform

Field excursions will characterize the soil and terrain features of the proposed project site for consideration of mine site reclamation and the location and engineering of mine site facilities. A review of existing soils data will support these efforts. Features that will be considered include slope gradient and stabilities, drainage features, particle size, and parent material origin (e.g. colluvium, alluvium, glacial till, etc.).

Terrain mapping will be conducted for the mine property and access and ore haul corridor routes. Mapping for both soils and terrain will entail the review of existing information, air photo interpretation, and a field program to verify map units and collect samples for laboratory analysis. Soil maps will depict parent material types, landforms, soil texture and depths, soil stratigraphy and sites of active geomorphic processes such as erosion. Terrain maps will depict erosion potentials and potential hazard constraints.

Results from the terrain mapping will be used to evaluate engineering aspects of sites for portal and surface facilities development, access and haul roads, sites for ore and waste rock storage and handling, and sites for water management facilities (settling ponds). Natural hazards will be identified (such as landslide, avalanche and rockfall areas) which could affect operation of the mine and the integrity of waste storage and/or disposal sites.

6.1.1.7 Vegetation

An adequate assessment of the vegetation in the vicinity of the proposed mine is required to ensure a complete understanding of wildlife habitat capabilities of the area.

The vegetation of the area will be assessed and mapped in a form acceptable to the Yukon Territorial Government Wildlife Branch staff. Mapping methods will involve the examination and interpretation of vegetation types from available air photos and from direct ground truthing.

6.1.1.8 Wildlife Resources

The potential impact to wildlife resources of the area associated with the property development will be limited to small and large game habitat loss in the vicinity of the proposed portal and surface plant site as a result of site clearing activities; interference with traditional wildlife migration routes caused by construction and use of the haul road; and noise related impacts.

Evaluation of the wildlife resources in the vicinity of the Dy Project has already been initiated. Studies have been designed to categorize the area in relation to species composition and their spatial and temporal utilization of the area. The evaluation will cover the proposed minesite, the haul and access roads, and the section of the Blind Creek valley downstream from the proposed mine.

Contact has already been established with Yukon Territorial Government staff regarding existing wildlife survey data and hunter harvest data. Field investigations to-date have included helicopter surveys of alpine areas and valley floors, and a ground assessment of late summer habitat capability. Further seasonal wildlife surveys are planned for the winter and spring of 1991 in order to characterize the extent of usage of the area by local wildlife. This will be supplemented by government wildlife data for the area and, information obtained from Natives who hunt and trap in the project area.

6.1.1.9 Closure Plan

A closure plan for the Dy Project will be developed. The plan will examine such options as stabilizing disturbed areas, road ditching, culvert repair and cleanout. Because of the great depth to ore of the Dy Deposit, all potentially acid generating rocks will be flooded after the mine is closed. Consequently, closure issues will be limited to surface facilities.

These and other environmental aspects (e.g. waste management, water management, etc.) related to the proposed project will be investigated in detail during 1991.

6.2 Socioeconomic Considerations

In 1975, Kerr Addison Mines Limited commissioned a socioeconomic profile of the Faro and Ross River area in an effort to assess the potential impacts associated with the development and operation of a new mine and mill complex in the Vangorda Creek area. This study identified numerous potential impacts, both positive and negative, on the residents of both communities and on the Yukon Territory as a whole. However, the proposed Kerr mine never evolved and Curragh Resources Inc. has since acquired the mineral rights to all other known lead-zinc deposits on the Vangorda Plateau. Thus, any socioeconomic impacts associated with the proposed project will be in relation to mine expansion rather than the start-up of a new mine or a new mill and will, therefore, be less substantial. Continued employment as a result of mine life extension, in addition to tax revenues, etc., will provide the principal economic benefits of the project.

The proposed mine lies within the Ross River Group trapping area and, consequently, mine development may have an adverse impact on Native traplines. It is important to note, however, that additional impacts attributable to Dy are likely to be minor since the areal impact associated with development of the Dy Property will be relatively minor compared to the development of the existing mine infrastructure for the Faro Vangorda and Grum ore deposits.

Contact with the Kaska Dena Band Council in Ross River was established in August 1990 and again in September 1990 to address native concerns over the proposed exploration program. Discussions were held concerning future access to traditional hunting, trapping and fishing areas, the potential impacts of exploration activities on wildlife, and locations of sites of archaeological/historical significance to the Ross River Band. These talks are currently ongoing and an atmosphere of cooperative consultation will be afforded priority attention throughout advanced exploration and, ultimately, underground development.

Studies will be undertaken to contemporize earlier efforts and to identify all of the potential socioeconomic impacts associated with the development of the Dy ore body, with particular emphasis on the Native peoples from Ross River.

7 - Preliminary Development Schedule

7.0 PRELIMINARY DEVELOPMENT SCHEDULE

Advanced exploration will commence in late 1991. Underground mine development will begin with initial test mining perhaps as early as ten months later. Phase I mining by decline and conveyor haulage will reach 3,500 tonnes per day by one and one half years after the start of exploration. Shaft hoisting of ore at rates up to 7,500 tpd could begin by two or three years after the start of exploration.

Permit applications required for the exploration project will be submitted in mid-1991 for license in time for the second half of the decline. Approval and licensing for Phase I mining will be required by the anticipated mine startup.

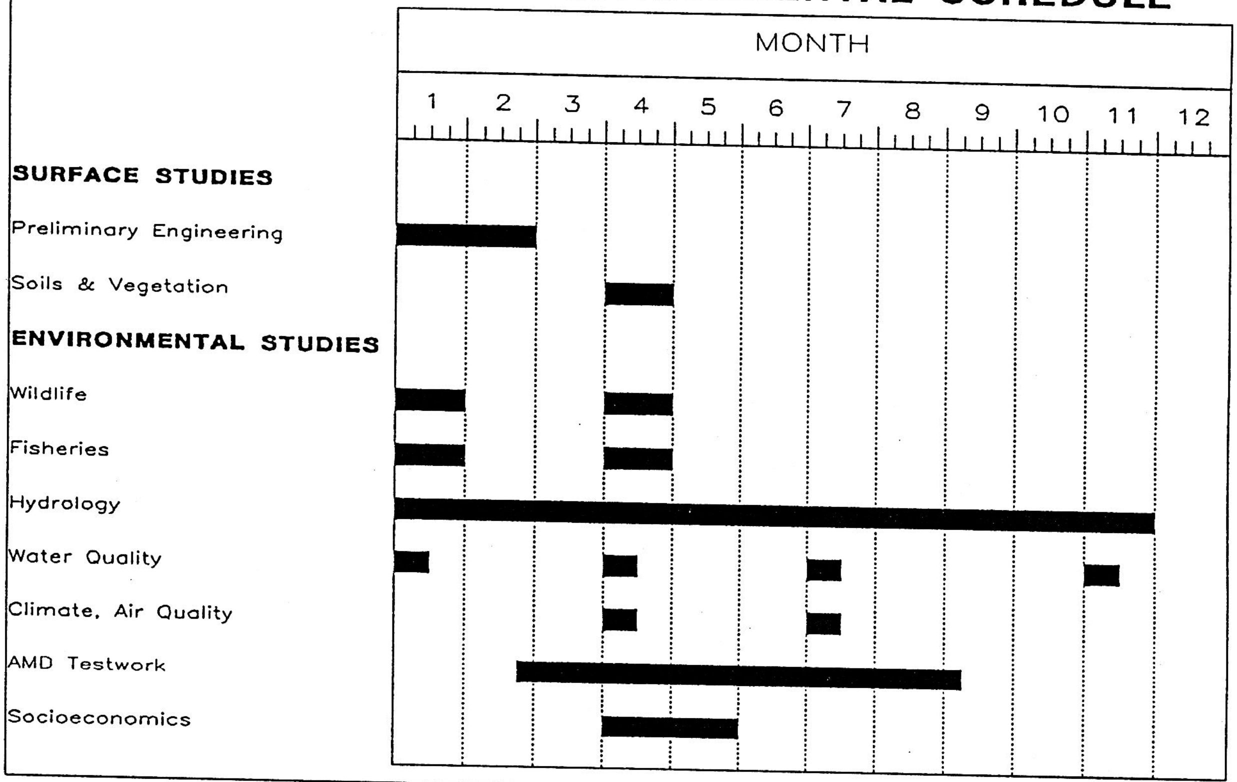
Environmental studies including components such as water quality, fisheries and wildlife resources began in September 1990 and will continue through July 1991. Socioeconomic impact studies are also underway.

The Dy Project advanced exploration and development schedule is presented in Figure 7-1.

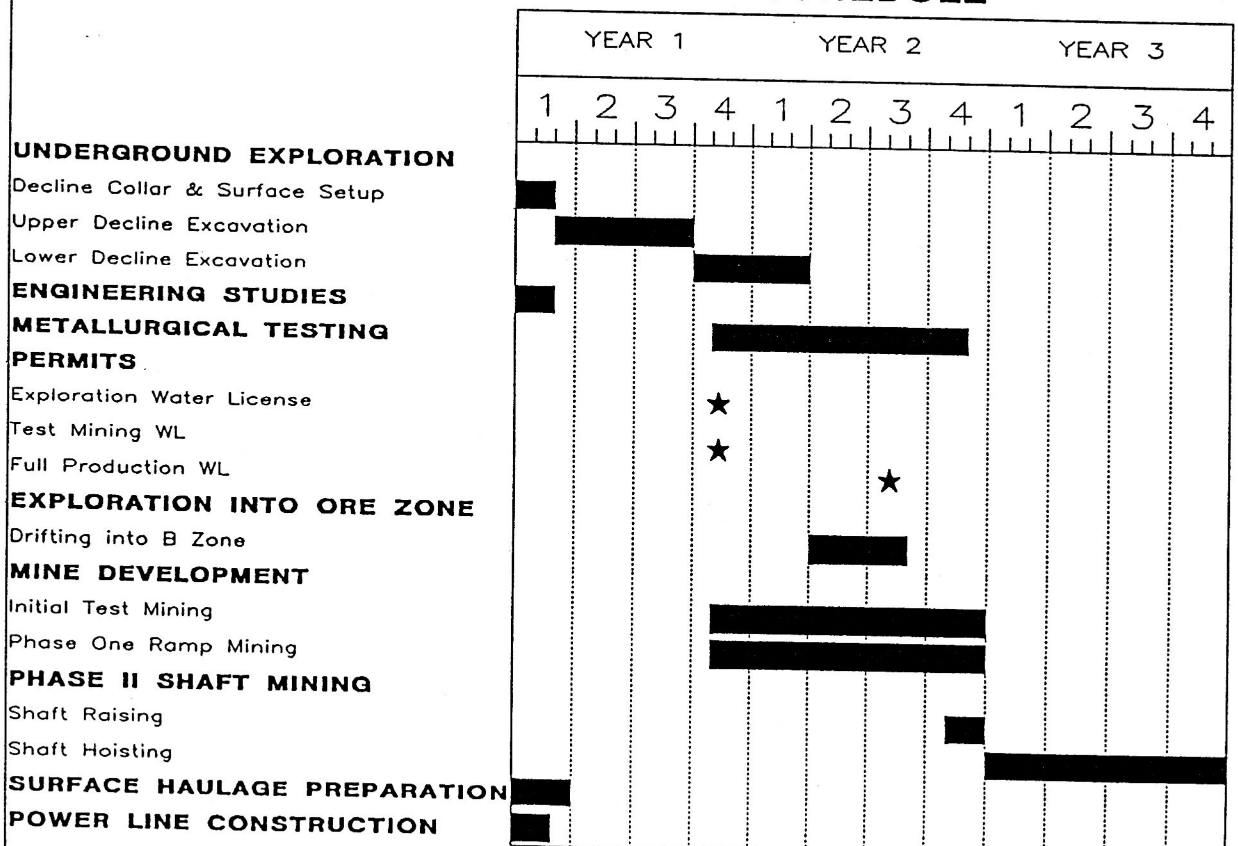
FIGURE 7-1

DY PROJECT

EXPLORATION AND ENVIRONMENTAL SCHEDULE



MINE DEVELOPMENT SCHEDULE



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Appendix A - Environmental Operating Conditions

APPENDIX A

Environmental Operating Conditions

Dy Project

1.0 Petroleum

1.1 The Proponent shall report in writing to the Engineer the location and quantity of all petroleum fuel caches within 10 days after establishment. — REPORT FUEL LOCATION

1.2 The Proponent shall clearly mark with stakes or flags the location of any spill of any petroleum and and forthwith report the time, manner, location, amount and type of spill to the Engineer NAP and the Environmental Protection Service. (For the purpose of this condition reports can be made to the Environmental Protection Service at Phone No. (403) 667-7244, Whitehorse, Yukon). — REPORT PETROLEUM SPILLS

1.3 The Proponent shall not place any Petroleum fuel storage containers within 12 metres of the normal high water mark of any stream. — FUEL BY STREAM

1.4 The Proponent shall construct a dyke around each stationary fuel container or group of stationary fuel containers where any one container has a capacity exceeding 4000 litres. The capacity in the dyked area shall be at least 110% of the container capacity. — DYKE FUEL CONTAINER

1.5 The Proponent shall ensure that the dyke and the area enclosed by the dyke shall be impermeable to petroleum products at all times. — IMPERMEABLE DYKE

1.6 The Proponent shall take every precaution to ensure petroleum fuel or associated products do not escape from storage, distribution or dispensing facilities in such a manner as: — FUEL CONTAINMENT

a) to create a hazard to public health or safety;

b) to contaminate any fresh water source or stream;

c) to interfere with the rights of any person; or

d) to allow entry of a product into a sewer system or underground stream or drainage system.

1.7 The Proponent shall dispose of all combustible waste petroleum products by incineration or removal to an approved disposal site. WASTE PETROLEUM DISPOSAL

1.8 Proponent shall have a Spill Contingency Plan filed with the Engineer in place prior to the movement of any petroleum product, or ensure that the haul contractor can provide for response to and clean-up of any spills of fuel or other hazardous materials. SPILL CONTINGENCY

2.0 Wildlife and Fisheries Habitat

2.1 The Proponent shall not unnecessarily damage wildlife habitat in conducting this Land Use Operation. HABITAT DAMAGE

2.2 The Proponent shall not destroy or damage beaver dams. BEAVER DAMS

2.3 The Proponent shall construct and maintain all structures placed in streams frequented by fish in such a manner that will not obstruct passage of fish. FREE FISH MOVEMENT

3.0 Lines, Trails, R.O.W.'s

3.1 The Proponent shall dogleg lines, trails and rights-of-way that approach quarry locations. DOGLEG APPROACHES

4.0 Forest Fire Prevention

4.1 The Proponent shall have located in a central and accessible location the following fire control equipment in active readiness:

a) 4 backpack bags or cans complete with hand pumps;

b) a minimum of 2 pieces of each of the following: pulaskis, axes, shovels; and

c) 1 power pump c/w 1000 ft of 1½" hose and auxiliary equipment.

5.0 Disposal - Brush and Trees

5.1 The Proponent shall totally dispose of all debris and brush by burning. BURN BRUSH

5.2 The Proponent shall progressively complete disposal of all debris and brush. PROGRESSIVE DISPOSAL

6.0 Disposal - Garbage and Solid Waste

6.1	The Proponent shall remove all garbage and debris from the area of Construction to an approved disposal site.	REMOVE GARBAGE
6.2	The Proponent shall remove all scrap metal discarded machinery and parts, barrels and kegs, buildings and building materials to an approved disposal site.	REMOVE WASTE MATERIAL

7.0 Disposal - Sewage and Liquid Waste

7.1	The Proponent shall deposit all sewage in a sump or as required by Health and Welfare Canada.	SEWAGE DISPOSAL

8.0 Streams

8.1	The Proponent shall remove any obstruction to natural drainage caused by any part of this Land Use Operation.	NATURAL DRAINAGE
8.2	The Proponent shall not clear any brush or trees within 30 meters of the ordinary high water mark of any stream except by hand.	HAND CLEAR CROSSINGS
8.3	The Proponent shall not in any circumstances place or allow any soil debris or deleterious substances to enter into any stream.	DEPOSITING SOIL IN STREAMS PROHIBITED
8.4	The Proponent shall use culverts of a size that will ensure the velocity of the stream flow is not increased.	CULVERT SIZE
8.5	The Proponent shall place the bottoms of all culverts installed in streams inhabited by fish at a level that maintains the natural gradient of the stream.	CULVERT INSTALLATION
8.6	The Proponent shall screen all water intakes.	SCREEN WATER INTAKES

9.0 Erosion Control/Prevention

9.1	The Proponent shall locate all camps on gravel, sand or other durable land.	CAMP LOCATION
9.2	The Proponent shall not construct ditches in permafrost areas.	DITCHES PERMAFROST

9.3	The Proponent shall not allow construction to cause the ponding of water in permafrost areas.	PONDING WATER PERMAFROST
9.4	The Proponent shall use water bars on all slopes exceeding 8% or over 60 metres in length.	WATER BARS

10.0 Restoration

10.1	The Proponent shall replace all excavated material from the test pits on completion of testing.	TEST PITS
10.2	The Proponent shall save the organic soil stripped from excavation areas.	SAVE ORGANIC SOIL
10.3	The Proponent shall place the organic soil over disturbed areas upon completion.	ORGANIC SOIL
10.4	The Proponent shall slope the sides of excavations and embankments, except in solid rock, to two horizontal to one vertical prior to completion of construction.	EXCAVATIONS AND EMBANKMENTS
10.5	The Proponent shall apply grass seed and fertilizer to areas subject to run-off erosion.	REPLANT DESIGNATED AREAS
10.6	The Proponent shall commence and foster revegetation on all parts of the land used, upon completion of the construction phase and upon abandonment.	RE-ESTABLISH VEGETATION
10.7	The Proponents shall fill in any sumps and ensure there is no degradation of the sump camp.	FILL SUMPS