680886

A PROSPECTUS FOR THE ABERMIN CORPORATION, LARA PROPERTY, CHEMAINUS, B.C.

Prepared for:

B.C. MINE DEVELOPMENT STEERING COMMITTEE

Prepared by:

ABERMIN CORPORATION
#1500 - 1075 West Georgia Street
Vancouver, B.C.
V6E 3C9

and:

HATFIELD CONSULTANTS LIMITED
#201 - 1571 Bellevue Avenue
West Vancouver, B.C.
V7V 3R6

February, 1987

TABLE OF CONTENTS

TABLE OF CONTENTS

(Continued)

EXECUTIVE SUMMARY

This Prospectus provides information with respect to an underground mining operation which is proposed for the Lara property located 15 km west of Chemainus on Vancouver Island. The property is being developed by Abermin Corporation (Abermin), as part of a joint venture agreement with Laramide Resources Ltd. Both companies have their head offices in Vancouver, British Columbia.

Since 1983, Abermin has conducted continuous exploration on the property and has outlined to date ore reserves of approximately 923,000 tons grading, 0.095 oz/ton gold, 2.61 oz/ton silver, 3.59% zinc, 0.81% lead and 0.61% copper. Additional exploration is planned for 1987 to further delineate ore reserves. Mineralization containing gold, silver, zinc, copper and lead has been discovered in the northwest portion of the Lara property in the Coronation and Coronation Extension Zones. Mineralization consists of strataform massive to disseminated sulphides made up of sphalerite and pyrite with lesser amounts of chalcopyrite, galena and tetrahedrite. Locally, massive sulphides occur. However, the predominant form of mineralization contains about 25% sulphides in a gangue of quartz and carbonate. The mineralized zones are conformable to the volcanic stratigraphy and are about 5 m in true thickness. The highest grade massive sulphides encountered to date on the property occur near the surface in the Coronation Zone. This zone has an average grade of 0.238 oz/ton gold, 6.71 oz/ton silver and significant concentrations of zinc, lead and copper over an average true width of approximately 3.4 m. Mining will be by underground methods. The initial daily production rate will be 680 tonnes per day on a 365 day per year basis.

Noting that an underground mine is planned, surface disturbance will be minimal. The most important surface features will be the mill and the tailings impoundment area. The exact locations for these facilities have yet to be finalized. No metallurgical work has been carried out to date. However, it should be noted that the Lara ore is very similar to that of Westmin Resources Limited, Lynx mine and a similar milling process may be employed. The subaerial method of tailings disposal, used successfully at Westmin's Buttle Lake operations, will be thoroughly examined for use at the Lara site.

This Prospectus addresses the socio-economic and environmental issues associated with this proposed development and discusses the Stage 1 programs that will be implemented. There is considerable enviromnontal information available for the Duncan/Chemainus area from government and private sources. However, this information is not specific to the mine site or in sufficient detail to meet the requirements of a Stage I Report. The salient information highlighted in this Prospectus forms the basis for determining the proposed field studies that will be eompleted during the Stage I studies. The Stage I studies are designed to provide site-specific information to a level of detail to satisfy the Stage I Report requirements. They are designed recognizing the need to fill data gaps revealed by the compilation of existing regional information. These studies are important in the determination of the mitigative measures necessary to minimize environmental impacts and to ensure project approval-in-principle. Noting the proximity of the mine site to the Chemainus River, the importance of the fishery resources of this system and that there are other users of this system, aquatic environmental issues are considered to be the most important. However, possible impacts upon other environmental resources such as wildlife and wildlife habitat, heritage and archaeological resources, vegetation and forestry resources, etc., will also be addressed thoroughly.

With respect to the socio-economic data base, it is important to note that the Lara site is within the Cowichan Valley Regional District and that community profiles have been prepared that will serve as a basis for developing a project related socio-economic evaluation during the Stage I study. Information currently available addresses subjects such as unemployment, labour force skills, community services and facilities, availability of goods and services, etc. In preparing the socio-economic evaluation for this proposed development, it will be necessary to update the existing information with more recent unpublished information that will be obtained through a comprehensive interview program. The following points will be taken into consideration with respect to the Lara project:

1. A new townsite to serve the operating mine will not be required.
2. Three established communities (Ladysmith, Duncan and the District of North Cowichan) will be affected, either positively or negatively, as a result of this proposed development.

3. Noting the location of the proposed mine development and that other industrial activities have taken place and are taking place in the area of the proposed mine, the required infrastructural changes will be minor in nature.

Abermin are committed to providing a public participation and information program to help ensure that government approval-in-principle is not granted in isolation of public acceptance of the project. In order to ensure that this program is comprehensive, Abermin have retained the services of specialist consultant for this phase of the project. An "Open House" program will be implemented and will provide an opportunity for interested people to obtain information about the project and to input their views concerning the design of the proposed project.

1.0 INTRODUCTION

1.1 GENERAL

Exploration in the project area dates back to the late 1800's when massive sulphides were discovered on Mount Sicker. Between 1898 and 1909, these deposits produced 253,000 tons of ore grading 0.14 oz/ton gold, 2.92 oz/ton silver, and 3.77% copper. Zinc and lead were also present but were not recovered. The mines closed due to dwindling reserves, low copper prices, and a smelter penalty for the high zinc content. Several unsuccessful attempts have since been made to reactivate these mines.

The Lara property was staked by Laramide Resources Ltd. in May 1981 and optioned to Abermin Corporation (Abermin) in September, 1982. Since that time, Abermin has carried out an exploration program over much of the property. Detailed exploration resulted in the discovery of the Coronation Zone in December, 1984. The Coronation Zone was tested extensively by diamond drilling in 1985 and this program resulted in the discovery of the Coronation Extension Zone.

This Prospectus has been prepared by Abermin as a first step in obtaining approval for the development of a mining operation at the Lara site. Abermin exploration programs have delineated sufficient reserves to warrant the initiation of detailed environmental studies leading to the preparation and submission of a Stage I Report.

1.2 LOCATION AND ACCESS

The Lara property is located approximately 15 km west of Chemainus, approximately 75 km north of Victoria, and approximately 35 km south of Nanaimo. Access to the property is via an all weather two lane gravel road from the Island Highway near Chemainus. This road was developed initially as a logging road and provides good road access to the Lara property. The same road provides access to the Chemainus River Provincial Park. The Lara property is within easy driving distance of a major highway (the Trans Canada Highway), an airport (the Nanaimo Cassidy Airport), the Duke Point industrial park and marine terminal site, and the communities of Duncan, Ladysmith and the District of North Cowichan.

2.0 THE LARA PROPERTY

2.1 LOCATION AND LAND TENURE

Land with mineral potential in the project area is Crown Land where subsurface or mineral rights have been allotted by way of claims, Crown Grants or leases.

Forestry resources to the south of the property are owned by the Crown and are a portion of the "Vancouver Island Plantation Forest Reserve". Areas to the north are wholly owned by Pacific Forest Products Ltd. (CIP Inc.) as "Private Lands for Forest Production" under Certified Tree Farm No. 7. Similarly, some areas to the west are held by MacMillan Bloedel Ltd. under Certified Tree Farm No. 19.

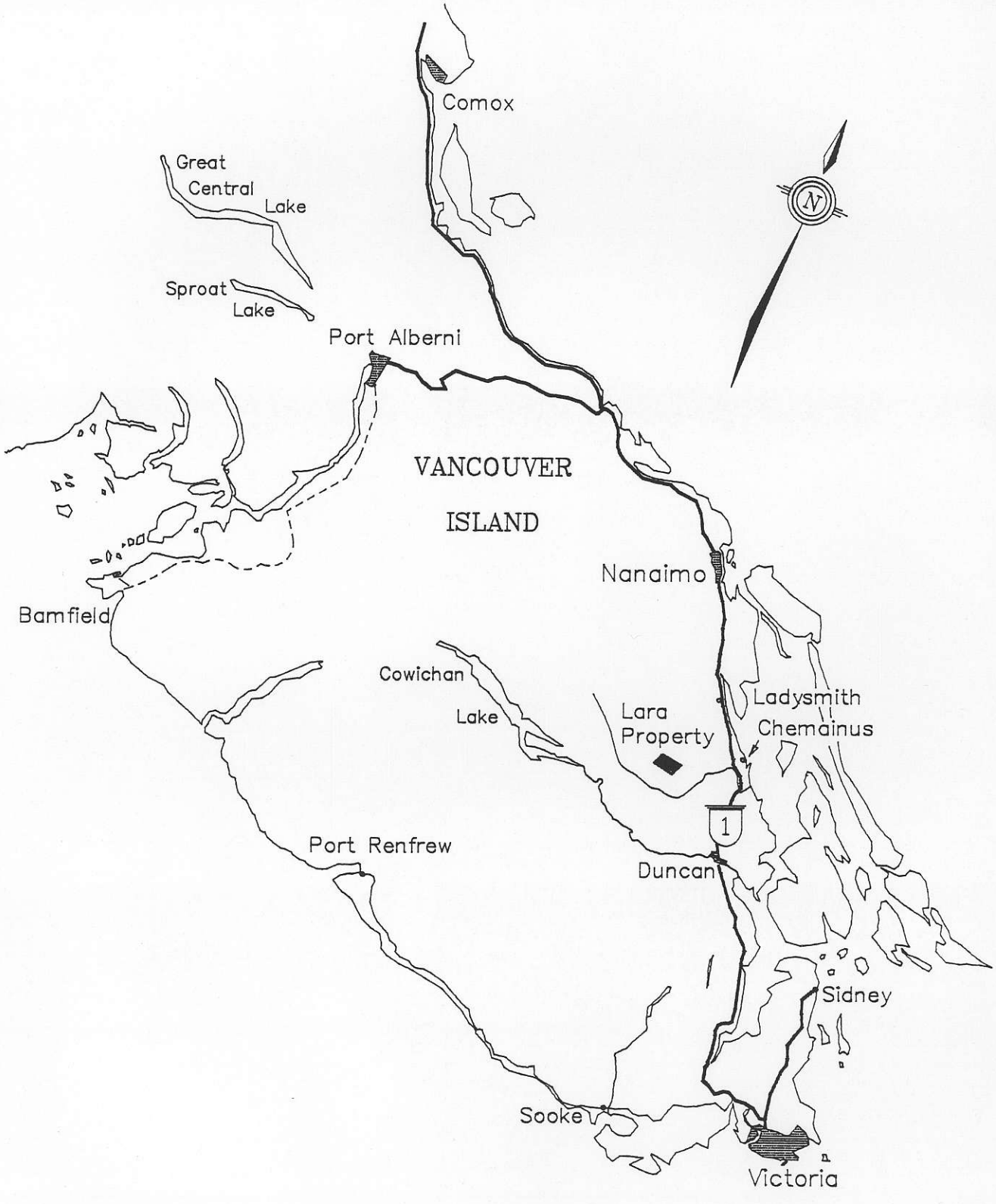
Chemainus River Provincial Park, which encompasses 80 hectares, is accessible by 11 km of gravel road from Highway No. 1 and is located south of the Lara property at the junction of Humbird Creek and the Chemainus River. The location of the property is illustrated in Figure 1.

2.2 HISTORICAL OVERVIEW

Exploration in the project area dates back to the late 1800's when massive sulphides were discovered on Mount Sicker (Tyee, Lenora and Richard III Mines). Between 1898 and 1909, these deposits produced 253,000 tons of ore grading 0.14 oz/ton gold, 2.92 oz/ton silver, and 3.77% copper; zinc and lead were also present but were not recovered. The mines closed because of dwindling reserves, low copper prices and a smelter penalty for the high zinc content. Several unsuccessful attempts have since been made to reactivate these mines.

A number of small pits and adits occur on the Lara property. These are not well documented but are probably related to prospecting carried out at the turn of the century. Underground work was carried out on a copper-bearing shear zone immediately north of the Lara property by Sharon Copper Mines Ltd. in 1962. Between 1965 and 1979, grass roots exploration was undertaken on what is now the Lara property by a number of mining groups including Cominco (1965 - 1966) and Umex (1978 - 1979).

FIGURE 1 General Location of the Lara Property



The Lara property was staked by Laramide Resources Ltd. in May, 1981 and optioned to Abermin Corporation in September 1982. Abermin carried out a program of linecutting, geological mapping, geophysics and soil geochemistry over much of the property. Detailed follow-up in prospective areas consisted of additional surveys, backhoe trenching and diamond drilling which resulted in the discovery of the Coronation Zone (DDH 84-12) in December 1984. The Coronation Zone was tested extensively by diamond drilling in 1985. This program resulted in the discovery of the Coronation Extension Zone (DDH 85-40) on strike and to the east of the Coronation Zone and traced the two zones over a total strike length of 1,600 meters. In 1986, high grade massive sulphides were discovered in the Coronation Zone in Trench 86-43. This high grade zone was tested by eight drill holes and traced over a strike length of 160 meters.

3.0 GEOLOGY AND MINERALIZATION

3.1 GEOLOGICAL SETTING

The rocks underlying the Lara property form part of the Cowichan-Horne Lake Uplift, a tectonically uplifted belt of Paleozoic age rocks known as the Sicker Group. This belt of rocks forms an arcuate zone approximately 130 kilometers long extending from Saltspring Island to Port Alberni.

The northern part of the Lara property is underlain by volcanic flows and pyroclastic rocks which are rhyolitic to andesitic in composition and dip steeply to the north. Similar rocks host the massive sulphide deposits at Mount Sicker immediately east of the Lara property. These rocks are thought to be analogous to the Devonian age Myra Formation which hosts Westmin's gold, silver, zinc, copper, and lead deposits at Buttle Lake, 150 kilometers to the northwest. The Devonian age volcanic rocks have been thrust over Early Cretaceous age Nanaimo Group sedimentary rocks which are exposed on the southern half of the Lara property.

3.2 MINERALIZATION

Mineralization containing gold, silver, zinc, copper and lead has been discovered on the northwest portion of the Lara property in the Coronation and Coronation Extension Zones. These zones are hosted by quartz-feldspar porphyritic rhyolite of the Myra Formation. At least five intervals of porphyritic rhyolite occur on the northern part of the claim group; these are highly prospective for massive sulphides.

The Coronation and Coronation Extension Zones have been traced for a strike length of approximately 1,600 meters to a maximum depth of about 300 meters. The two zones are on strike with one another, dip about 60° to the north and are hosted by the same quartz-feldspar porphyry rhyolite unit.

Mineralization consists of strataform massive to disseminated sulphides made up of sphalerite and pyrite with lesser amounts of chalcopyrite, galena and tetrahedrite. Locally, massive sulphides occur, however, the predominant form of mineralization

contains about 25% sulphides in a gangue of quartz and carbonate. The mineralized zones are conformable to the volcanic stratigraphy and are about 5 meters in true thickness.

The highest grade massive sulphides encountered to date on the property occur near surface in the Coronation Zone where massive sulphides have been traced over a strike length of 160 meters in eight diamond drill holes and one trench. This zone has an average grade of 0.238 oz/ton gold, 6.71 oz/ton silver, 14.91% zinc, 3.07% lead, and 1.48% copper over an average true width of 3.4 meters.

3.3 PRELIMINARY GEOLOGICAL ORE RESERVES

Preliminary geological reserves for the Coronation and Coronation Extension Zones include 923,000 tons grading 0.095 oz/ton gold, 2.61 oz/ton silver, 3.59% zinc, 0.81% lead, and 0.61% copper.

4.0 CONCEPTUAL DEVELOPMENT PLAN

The following conceptual mine, milling and waste disposal plans are preliminary and are presented primarily for initial review by the Mine Development Steering Committee. These plans will be modified during the engineering and design phase as more detailed information becomes available regarding the ore bodies, metallurgy and geotechnical and environmental factors pertaining to the tailings disposal site.

4.1 CONCEPTUAL MINE PLAN

The ore bodies on the Lara property are generally steeply dipping, high grade lenses which are suitable for mining by underground methods. The initial daily production rate will be 680 tonnes of ore per day on a 365 day per year basis.

The access decline, measuring 4.57 m wide by 4.27 m high, would be driven at -15% from a point approximately 200 meters south of the outcrop of the Coronation Zone and in the footwall. The mining method utilized would be overhand cut and fill using diesel powered trackless equipment. Broken ore would be hauled to the surface with 32 tonne capacity trucks. A main downcast ventiletion raise will be bored from underground to serve both as the main air inlet to the mine and as a second outlet for personnel. The raise will be 3.5 meters in diameter and fitted with ladders and landings. The ventilation requirement would be approximately $70m^3$/sec (150,000 CFM). Backfill requirements would be supplied partly from development headings with the balance coming from tailings sand.

4.2 CONCEPTUAL MILLING PLAN

For reasons of economy and efficiency, the crushing and concentrating facility will be located in close proximity to the mine portal. A preliminary mineralogical examination of drill cores from the Coronation Zone and the Coronation Extension Zone of the Lara property has been carried out by CANMET and the results have been assessed in a report by Coastech Research Inc. The mill would be designed to operate on the basis of 680 tonnes per day, seven days per week, 24 hours per day. The average hourly rate would be 28.3 tonnes per hour.

No metallurgical test work has been carried out to date. However, it should be noted that the Lara ore is very similar to that of Westmin Resources Limited, Lynx mine. Although a specific flow sheet has not yet been designed, it is probable that the Lara flow sheet will be very similar to that of the Westmin's former operations as illustrated in Figure 2. In the mill, minerals from the broken ore would be concentrated by eliminating most of the waste rock and pyrite (iron sulphide) associated with the ore. The mill would produce a zinc concentrate assaying about 55% zinc in the form of zinc sulphide, which would be sold to a smelter in either Trail, B.C. or Japan. The mill would also produce a copper concentrate assaying about 30% copper metal in the form of copper sulphide which would be shipped to smelters in Japan. Depending upon the grade of lead in the ore, it may or may not be beneficial to produce a separate lead concentrate.

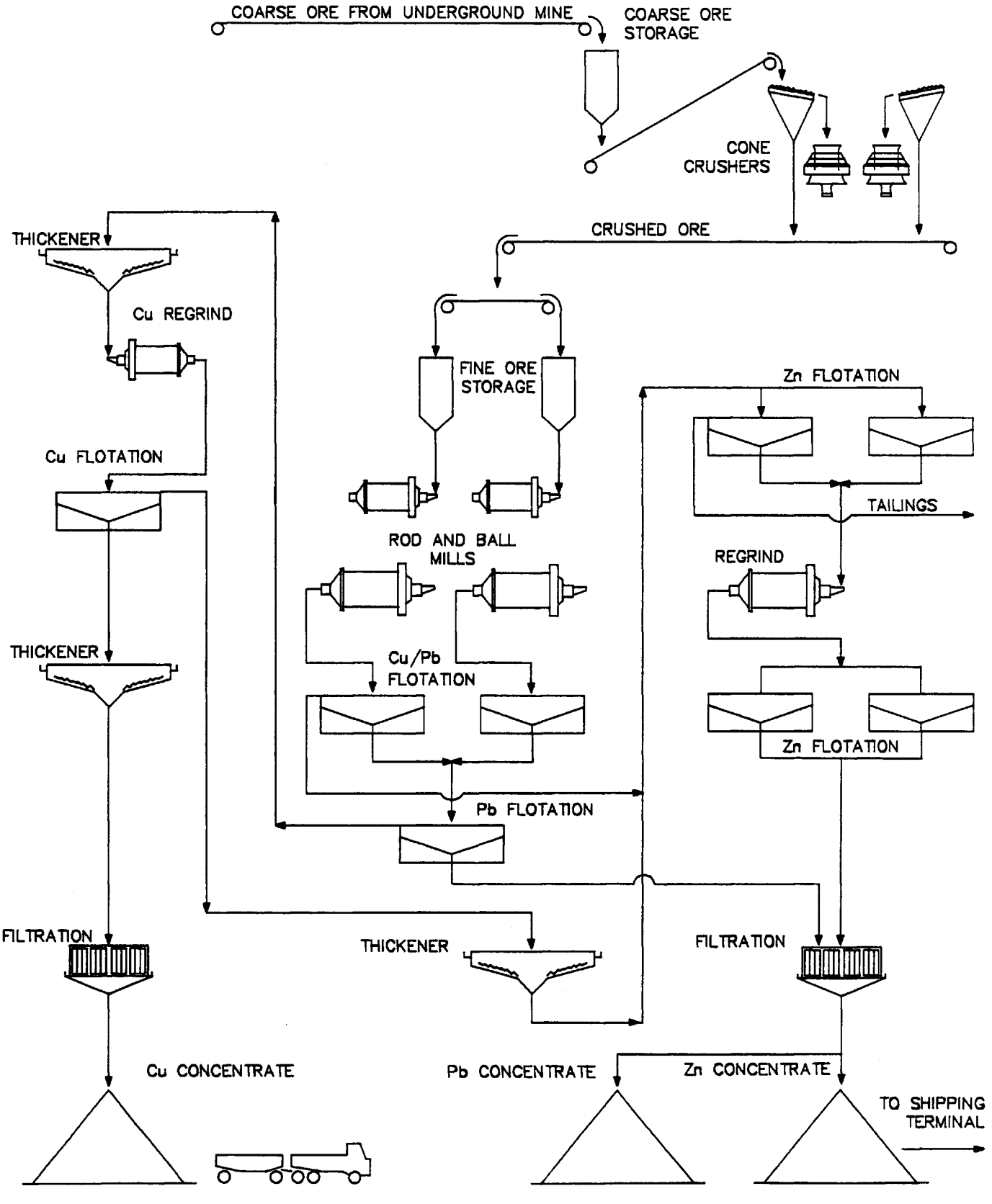
The concentration process will consist of grinding in a rod mill - ball mill circuit, followed by flotation to selectively separate sphalerite (Zn S) from the copper-lead minerals. A finer grind is required to separate the copper from the lead. The concentrates would be dewatered to 6% moisture by pressure filtration. The resulting concentrates would be trucked to a covered storage bin, easily accessible to rail and ship loading facilities. These facilities would be located in close proximity to a deep sea dock on the coast between Chemainus and Nanaimo. Gold and silver would not be separated at the mine, but shipped with the base metal concentrates and ultimately recovered at the smelter and refinery.

4.3 ANCILLIARY FACILITIES

The proposed ancilliary facilities will consist of an administration building, change houses, mine equipment maintenance shop/warehouse complex, metallurgy/assay laboratory, water supply and distribution system.

Process water would be obtained from the underground mine. This water would be pumped to storage tanks at the mill site. Domestic and fire water would be obtained from a nearby creek. An application for a water licence will be submitted in the near future.

FIGURE 2 Abermin Corporation Lara Project Conceptual Milling Process



Electric power would be obtained from the B.C. Hydro Sahtlam Substation. A 25Kva power line may be constructed for a distance of 13.5 km north to the proposed mine site along the existing 115 m B.C. Hydro right-of-way. The Demand Load is estimated at 3000 kw.

4.4 CONCEPTUAL TAILINGS DISPOSAL PLAN

The most economical site for the tailings disposal area is in the Solly Creek valley below the proposed mill site. The environmental studies and geotechnical investigations will be undertaken in order to determine the most appropriate site.

Tailings from the flotation process will be cycloned in a sizing plant for recovery of the coarse portion for mine backfill. The subaerial method of tailings disposal, used successfully at a number of other mine sites, will be thoroughly examined for use at the Lara site. With this method, the finer tailings in a slurry are diseharged through spray bars onto the high end of a gently sloping "beach"; the slurry then flows down the beach forming a uniform tailings layer about 100 mm thick. Once a section is covered, the discharge is moved to another portion of the beach. The newly deposited layer is left to settle, drain, bleed and air dry before being covered with a subsequent tailings layer.

5.0 DEVELOPMENT SCHEDULE

The exploration program for 1987 will consist of surface drilling to further explore the Coronation Zone and continue general reconnaissance exploration. The total diamond drilling program will be approximately 9000 meters.

In addition, an Environmental Impact Study will be completed and some preliminary metallurgical tests will be carried out on ore samples from the Coronation Zone.

Subject to a successful 1987 exploration program, an underground exploration and development program would be initiated in 1988 which would provide a bulk sample and establish the necessary data base for the preparation of a feasibility study.

Under the most optimistic scenario, the Lara Joint Venture could be in a position to make a production decision by the spring of 1989 and be in production by the spring of 1990.

6.0 PUBLIC PARTICIPATION AND INFORMATION PROGRAM

Abermin Corporation is committed to providing a "Public Participation and Information Program" to help to ensure that Government Approval-in-Principle is not granted in isolation of public acceptance of the project; specifically the local communities affected by the project. In order to ensure that this program is comprehensive, Abermin have retained the services of specialist consultants to assist in this phase of the project. The program as outlined below will provide an opportunity for interested people to obtain information about the project and contribute their views in a positive manner such that the proposed development is understood and accepted by most of those affected by it. Secondly, the program is designed to set the basis for a cooperative relationship with people and authorities in the area.

The proposed program of work will consist of the following elements:

1. Preparation of a social profile of the adjacent communities.

2. Preparation and publication of an introductory description of the project in the local press with a response coupon.

3. Organize and hold an "Open House" so that those interested can talk with company representatives.

4. Preparation of a brief report summarizing the results of the "Open House" program for inclusion in the Stage I Report. Requirements for follow-up activities will also be identified.

7.0 AVAILABLE INFORMATION

There is considerable socio-economic and environmental information available for the Duncan/Chemainus area from Government and private sources. However, this information is not specific to the mine site or in sufficient detail to meet the requirements of a Stage I Report. The salient information has been highlighted in the following sub-sections and it forms the basis of the proposed field studies described in Section 8.0.

7.1 ENVIRONMENTAL

7.1.1 Physiography

The Lara property falls on the boundary of two physiographic subdivisions of the Western System of the Canadian Cordillera; the Coastal Trough and the Outer Mountain Area. More specifically, the eastern portion of the property lies within the Nanaimo lowlands of the Georgian Depression and the western portion lies within the Vancouver Island Mountain Range of the Insular Mountains.

The Vancouver Island Ranges are composed of a heterogeneous group of pre-Cretaceous sedimentary and volcanic rocks intruded by numerous granitic batholiths. The Nanaimo Lowlands are largely underlain by sedimentary rocks of the Upper Cretaceous period (Holland, 1976).

7.1.2 Climate

Precipitation and temperature records for several nearby stations have been maintained by the Atmospheric Environment Service (1980), for the most part, over 30 years.

The available data is summarized below. In general, the communities of Duncan and Chemainus receive between 900 to 1,000mm of rainfall and 500 to 700mm of snow over 150 days per year, with the majority of precipitation occurring in the months of November to February. There is a corresponding increase in both rain and snow with an increase in elevation. Daily temperatures average 9.5°C with maximums occurring in July/August and minimums
occurring in December/January.

TABLE 1: CLIMATIC NORMALS FOR TEMPERATURE AND PRECIPITATION AT SELECTED STATIONS NEAR THE LARA PROPERTY

(Source: Environment Canada, 1980)

STATION	TEMPERATURE (°C)			PRECIPITATION (mm)			
	Avg.	Min.	Max.	Rain	Snow	Total	Days
Chemainus (48°56'N 123°44'W el 53m)	-	-	-	1,187	753	1,263	155
Cowichan Bay (48°44'N 123°34'W el 104m)	9.5	-16.1	35.6	935	665	1,001	159
Cowichan Lake Forestry (48°50'N 124°8'W el 177m)	9.1	-17.8	37.8	1,971	1,521	2,123	173
Cowichan Wier (48°50'N 124°4'W el 163m)	9.1	-15.0	36.7	1,962	1,103	2,069	176
Duncan Forestry (48°47'N 123°41'N el 6m)	9.4	-21.7	37.2	986	567	1,042	152
Youbou (48°53'N 124°13'W el 174m)	10.0	-13.9	37.2	1,757	732	1,874	187

7.1.3 Hydrology

Water Survey of Canada have operated a flow gauge on the Chemainus River (Station Number 08HA001) near Westholme (drainage area: 355 km^2) for the years 1914 to 1917 inclusive and 1952 to 1986 inclusive. Average discharge for the period of record is 19.9 m^3/s with low flows normally occurring in August (1.18 m^3/s) and peaking in December (44.6 m^3/s) of each year. A maximum daily discharge of 537 m^3/s was recorded in February 1983, and a minimum daily discharge of 0.071 m^3/s was recorded in December 1956 (Environment Canada, 1984).

7.1.4 Fishery Resources

The Chemainus River is located in Conservation District 3 of Statistical Area 17. The river is accessible to fish for approximately 13km from the mouth at which point there are impassable falls at Copper Canyon. Escapement records from 1947 to 1980 indicate that three species of salmon, coho (Oncorhynchus kisutch), chum (O. keta) and chinook (O. tshawytscha) as well as steelhead trout (Salmo gairdneri) utilize the river for spawning and rearing. An average 74 chinook, 1,688 coho and 21,962 chum return to spawn between early September and mid January. In some odd numbered years, pink salmon (O. gorbuscha) have also been recorded. In 1970, the Chemainus River above Copper Canyon Falls was identified as having underutilized habitat for salmon and steelhead so some 150,000 coho fry transplants and steelhead trout were released to selected areas above the Copper Canyon Falls (Fisheries and Oceans Canada). Resident trout and char can be expected throughout the lower reaches of the Chemainus watershed. Stream sport fishing can be described as moderate.

In response to declining returns of chinook stocks, the Department of Fisheries and Oceans undertook in 1979 to rebuild the runs with the use of a small private hatchery (located immediately to the west of Island Highway) now owned and operated by Sea Spring Salmon Farms. Since the program was initiated, this hatchery provides fisheries with approximately 200,000 chinook and 100,000 coho eggs per year from transplant in the Chemainus River (Fisheries and Oceans Canada, 1984).

There are three Indian Bands in the area with aboriginal title to a food fishery from the Chemainus River. This fishery is restricted to catches utilizing spear, gaff or jigs.

7.1.5 Water Quality

The B.C. Ministry of Environment has maintained a water quality monitoring station on the Chemainus River since 1971. Samples have been collected approximately twice annually and analyzed for a relatively comprehensive range of parameters. The data, which is summarized in Appendix Table 1, indicates that the Chemainus River is relatively pristine, low in metal content, relatively soft (Total Hardness = 17.4 mg/L), and neutral in pH (7.28). The watershed is clear (colour 6.5), low in residue content (Total Residues = 35.6 mg/L) and relatively low in nutrients such as nitrates and phosphates.

7.1.6 Vegetation

The main forest cover of the mine site lies within the Douglas fir-arbutus sub zone of the Douglas fir Bioclimatic Zone. These are generally immature stands of secondary growth under Tree Farm or Crown management. The forests typically consist of Douglas fir with an admixture of other conifers such as western red cedar, western hemlock, amabilis fir, grand fir and several deciduous species including red alder, arbutus, and maple. The understory is usually composed of a salal-swordfern association which does well in dry shallow soils (B.C. Hydro, 1980). The B.C. Ministry of Forests report that the forestry resources of Crown Lands and private lands in the mine site area have been mapped in detail.

7.1.7 Wildlife

Because of increasing urbanization and forestry, the capability of the eastern uplands of southern Vancouver Island to support wildlife has declined. However, several more sensitive species such as the Vancouver Island marmot, wolf, and elk are found in

the area. The mine site area particularly lower Chipman Creek is regarded as being winter range for ungulates and is classified as 2W which indicates that snow depth is the major limiting factor. Second growth Douglas fir is also of lesser value to wildlife. Typical species of these forests are black tailed deer, black bear, red squirrel, racoon, and grouse (CLI, 1975).

Migratory waterfowl, such as black brant, trumpeter swans, Canada geese and mallards tend to use the lowlands in particular such as the Chemainus estuary. These areas are classed as 3M or areas important for production and migration (CLI, 1975).

7.1.8 Recreation

Lands within the mine site area are classified as having low to moderately low capability for recreation (Class 5 and 6 lands). However, the property is utilized for hunting and salal cutting and the Chemainus River is accessible at a number of sites for day camping, fishing and sightseeing.

7.1.9 Archaeological and Heritage Resources

Numerous archaeological or heritage sites are known to occur in the Chemainus estuary area (B.C. Heritage Conservation Branch, 1986) and there is a relatively high probability that unrecorded sites exist in the study area. A pre-Salish population inhabited the area from early times but were absorbed by the more highly developed Halkomelen (Cowichan) Indians who in themselves, adopted much of the renowned Kwakiutl culture after migrating to the area from the mainland (B.C. Hydro, 1980).

7.2 SOCIO-ECONOMIC

With respect to the existing socio-economic data base, it is important to note that the Lara site is within the Cowichan Valley Regional District and that "community profiles" have been prepared that will serve as a basis for developing a project related socio-economic evaluation during the Stage I Study. Information currently available

addresses subjects such as unemployment, labour force skills, community services and facilities (e.g., police and fire protection, health care, recreation, etc.), availability of goods and services, public interest groups, etc. During the Stage I Study, it will be necessary to update the "community profile" data with more recent, unpublished information that will be obtained through a comprehensive interview program. This subject is discussed in greater detail in Section 8.2.

8.0 STAGE I REPORT & PROPOSED STUDIES

Stage I studies outlined in the following subsections are designed to provide site-specific information to a level of detail to satisfy the Stage I Report requirements. They are designed recognizing the need to fill data gaps revealed by a compilation of existing regional information. They are also important in the determination of the mitigative measures necessary to minimize environmental impacts and to ensure project Approval-in-Principle.

8.1 ENVIRONMENTAL STUDIES AND INVESTIGATIONS

8.1.1 Physiography, Soils and Seismic Risk Analysis

A generalized mapping of soils and surficial geology of the study area will be undertaken at a scale of approximately 1:10,000 on topographic base using E.L.U.C. terrain classification system. General surficial features and soils resources will be identified and followed up by ground proofing.

A ground survey of the mine and mill site areas be conducted to assess the stability of the adjacent slopes, particularly above proposed facilities. All occurrences of rock screes, snow slide activity, slope scouring, colluvial material, and any other indications of slope instability will be noted on a site map. Available bore hole log data will be examined for evidence of "loose ground", fracturing, buried wood, or other such evidence. The above site investigation will be supplemented with a stereographic examination of aerial photographs of the project area. These data are to be used for planning roads, and locating site facilities.

Samples of local soil materials will be collected, returned to Vancouver for analyses and submitted to a competent soils laboratory for the following analyses:

- Sand, silt and clay size fractions
- pH
- Total N and Available P
- Electricdl conductivity
- Cation exchange capacity

- Exchangeable cations Ca, Mg, Na, and K
- Available metals, Cu, Zn, Fe, Mn, and Al
- Total sulphur

The Stage I Report will document field collections, method of soil analyses, discussion covering soil textures, a full interpretation of soil chemistry, and fertilizer and lime requirements. This information is required for engineering and design and preparing a final reclamation plan.

Historical information on seismicity for the mine site area will be obtained from the Earth Physics Branch of the Pacific Geoscience Centre at Sidney, B.C. The Stage I Report will include a record of the experienced shock intensity for the actual mine site in terms of ground acceleration as a percentage of gravity and Modified Mercalli Intensity Scale. Predictions of future events, including peak horizontal displacements and intensity for various return periods will be determined utilizing the extreme value method and new Cornell-McGuire method of predicting seismic risk.

A summary analyses including tabulation of data and seismic zoning map, will be provided. These data are to be used in support of a tailings dam and building design.

8.1.2 Acid Generation Potential Tests

Representative samples of ore, development muck, hanging wall and foot wall rock will be collected and returned to Vancouver for Acid Generating Potential testing. Samples of potential tailings from metallurgical test work will also be tested. An initial test and confirmation test (if necessary) will be undertaken. These data will be incorporated into the Stage I Report and used to support a tailings and waste rock disposal strategy (Waste Management Plan) and to assess the potential for acid mine drainage.

8.1.3 Meteorology and Air Quality

The Atmospheric Environment Service of Environment Canada has maintained long term records for several climatic sites within a 20km radius of the proposed mine

site. These records include extensive data on precipitation, temperature, evaporation and wind speed and direction. There are also several stations located between Victoria and Nanaimo at similar elevation to the mine site from which data can be compared. A study will be undertaken to review, compile and interpolate existing data, by selected paired adjustment and data reconstruction techniques for application to the mine site.

It is also possible that the existing climatological data base could be expanded with the assistance of Environment Canada by provision and installation of meteorology equipment at the site to more specifically define precipitation, temperature extremes, etc., for the site.

8.1.4 Surface and Groundwater Quality

A surface and groundwater quality monitoring program has been initiated and samples will be collected on a frequency of approximately every six weeks for a period of one year. Stream sample locations are shown in Figure 3 and the analyses to be performed and the detection limits are provided in Table 2.

Samples of groundwater will also be obtained where feasible from drill holes, exploration adits and/or open trenches, and submitted to the laboratory for similar analyses. Quantities will be estimated where groundwater sources lead to or have the potential of entering surface flows.

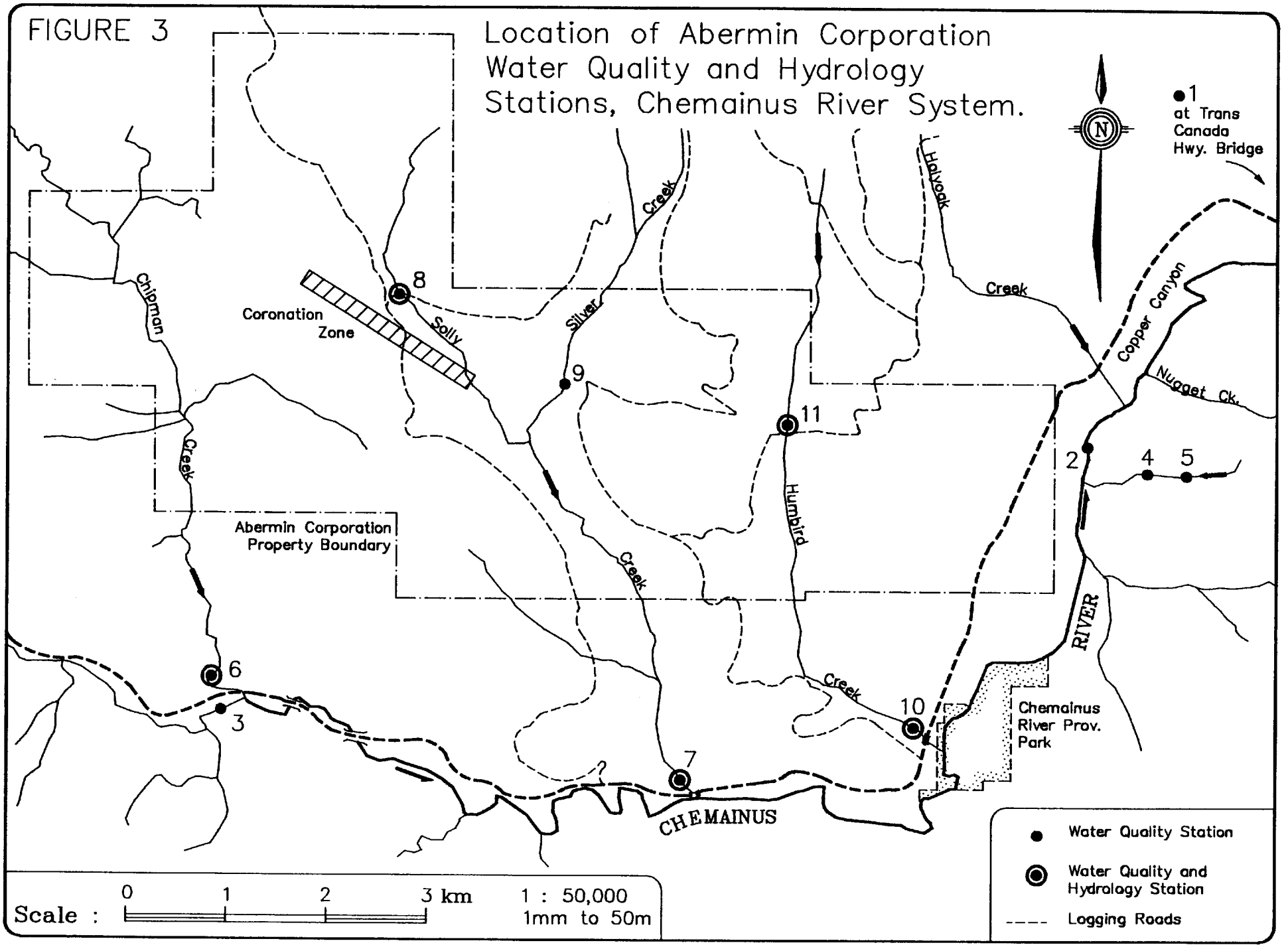


FIGURE 3
Location of Abermin Corporation
Water Quality and Hydrology
Stations, Chemainus River System.
N
1
at Trans
Canada
Hwy. Bridge
Holyoak
Creek
Silver
Creek
Solly
Coronation
Zone
Chipman
Creek
8
9
11
Copper Canyon
Nugget Ck.
2
4
5
Humbird
Creek
Abermin Corporation
Property Boundary
Creek
RIVER
6
3
Creek
10
Chemainus
River Prov.
Park
7
CHEMAINUS
Water Quality Station
Water Quality and
Hydrology Station
Logging Roads
Scale :
0
1
2
3 km
1 : 50,000
1mm to 50m

TABLE 2: PROPOSED STAGE I WATER QUALITY MONITORING PROGRAM

CHARACTERISTICS	DETECTION LIMITS
Temperature	Field
pH	Field
Dissolved Oxygen	Field
Suspended Solids	1 mg/L
Turbidity	0.1 NTU
Total Dissolved Solids	1 mg/L
Total Hardness	1 mg/L
Total Alkalinity	1 mg/L
Sulphate	1 mg/L
Nitrate	20 ug/L
Nitrite	5 ug/L
Ammonia	10 ug/L
Total Dissolved Phosphorous	3 ug/L
Total Cyanide	1 ug/L
Total Mercury	0.05 ug/L
TOTAL AND DISSOLVED METALS	
Aluminum	10 ug/L
Arsenic	5 ug/L
Barium	100 ug/L
Cadnium	0.5 ug/L
Copper	1 ug/L
Iron	30 ug/L
Lead	1 ug/L
Molybdenum	1 ug/L
Nickel	10 ug/L
Selenium	1 ug/L
Silver	5 ug/L
Zinc	5 ug/L

8.1.5 Surface and Groundwater Hydrology

There are no long term records of flow for the adjacent watersheds of Solly, Chipman, Humbird, or Silver Creeks. A hydrology program has been started which consists of two components: a one-year collection of data for these creeks and an examination of regional data for Chemainus River (Station No. 08HA001) to allow extrapolation of these data into long term records for engineering and design and in support of Water Licence Applications. Staff gauge locations are shown in Figure 3.

The regionalization of hydrology is a comparison of nearby long term records coupled with climatic information and site-specific data. This approach provides a basis for extrapolation of on-site data for estimates of average and extreme annual discharges, estimation of flood recurrence intervals, minimum flow recurrences, and unit discharges.

As part of the program to examine the possible effects of changes in water quality and quantity, downstream users will be identified and mapped.

Information such as falling head tests, permeability tests, borehole log data and pump tests from geotechnical and groundwater investigations, relating to tailings dam design, foundation investigations, or piezometer installations will be used to facilitate mapping of groundwater levels, recharge and discharge zones.

8.1.6 Vegetation and Forestry Resources

Major vegetation communities will be plotted on 1:10,000 topographical maps from stereo-examinations, and interpretation made for wildlife habitat suitability, forestry capability and reclamation species. This mapping will incorporate information gathered by the B.C. Surveys and Resource Mapping Branch and the Canada Forestry Service.

A ground proofing survey and assessment will be conducted, consisting of transect documentation of understory and ground cover species. Larger tree species will be identified and measured with DBH Calipers to verify airphoto interpretation of forestry resources.

8.1.7 Wildlife Resources

A wildlife habitat survey will be undertaken during the spring and fall site surveys. A brief survey will also be included during the winter site visit to document any winter habitat utilization.

The field program will involve an assessment of representative habitat units, available food vegetation mapping, wildlife observations, feces counts, and recording of game trails, dens, nests, licks, and other important features. Wildlife habitat description, assessment of ungulate range, status of furbearers and predators, and location and description of particularly sensitive areas will be documented. This study will also incorporate existing data from various government information sources.

A Wildlife Observation Log will be maintained by a designated Abermin field person and incidental wildlife observations during the period of study will be recorded.

8.1.8 Fisheries and Aquatic Resources

Three major species of salmon (chinook, coho and chum) as well as steelhead trout utilize the lower reaches of Chemainus River for spawning and rearing. There are impassable falls at Copper Canyon approximately 13 km upstream from the mouth. However, coho and steelhead have been transplanted above these falls. Consequently, fisheries investigations will be carried out during early spring before fry migration (May), and during peak spawning period (October to December). Observations of spawners will be made primarily between the Copper Canyon Falls and the Island Highway Bridge (the upper limit of the main chum spawning area).

Fish sampling and fish habitat assessments will be conducted on the mine site watersheds to identify areas of spawning, overwintering, rearing, food production and inaccessability. Emphasis will be placed on the relevant tributaries of the Lara property. Fish sampling will establish species presence, species composition, and population characteristics (i.e., length, weight, age and growth). Habitat assessments will be based

on the inventory methods used by the provincial Fisheries Branch and fish sampling will utilize accepted fisheries collection methods. The exact field methods used will be governed by flow, visibility and substrate conditions that exist at each sample location.

A baseline survey of benthic organisms (fish food organisms) at each water sample site will be conducted during the summer survey utilizing a surber sampler. Population, abundance and species composition will be determined and related to watershed productivity and water quality. This will result in the availability of important predevelopment baseline data that will be available for comparative purposes during the operating phase of the mine. A small number of fish stomach samples will be collected to compare fish feeding behaviour with the major taxa identified in the benthic community. Instream vegetation, including periphyton, evident at sample sites will also be recorded.

8.1.9 Land Capability and Historic Use

An assessment of the property's historic use and resource capability will be documented. This evaluation will include present land use and tenure, agriculture, forestry, hydroelectric power development, recreation, hunting, fishing, guiding and trapping.

8.1.10 Archaeological and Heritage Resources

A review of the potential archeological and heritage resources will be undertaken. This will consist of two components:

- an office study to review existing information in government files as well as other sources such as local museums; and

- a site visit to document specific heritage potential in the mine vicinity.

Heritage potential will be rated based on the literature review and site conditions for the mine development.

8.2 SOCIO-ECONOMIC

In preparing a socio-economic evaluation for this proposed development, the following important points will be taken into consideration:

1. A new townsite to serve the operating mine will not be required.

2. Three established communities (Ladysmith, Duncan, District of North Cowichan) will be affected, either positively or negatively, as a result of this proposed development.

3. Noting the location of the proposed mine development, and that other industrial activities have taken place and are taking place in the area of the proposed mine (e.g., forest industry activities), the required infrastructural changes (e.g., roads, power supply, etc.) will be minor in nature.

The mine site is located within the boundaries of the Cowichan Valley Regional District, Area F, and it should be noted that many of the benefits associated with this project will accrue to individuals and companies within the boundaries of this Regional District. Benefits could accrue in the form of new job opportunities and as a result of the purchasing of goods and services within this Regional District.

It is the intention of Abermin Corporation to purchase local goods and services in instances where the local goods and services are available and are competitive on the basis of cost and quality. It is believed that this mine development during the operational phase will employ between 75 and 85 people. Most positions will be filled through local hiring. Positions that cannot be filled locally will be filled from within the British Columbia labour force. In many instances, this will result in jobs for unemployed individuals.

Recognizing the requirements of the Stage I review process, the socio-economic evaluation will address possible negative impacts of the mine development upon the communities. Negative impacts could be associated with a project related increase in population in these communities. The resultant effects upon various community services,

such as health care, water and sanitation, police and fire protection, schools, recreational facilities, etc., will be addressed and any negative impacts identified. The implications of the proposed development relative to the upgrading of transportation systems in the area will also be addressed. Noting the size of the proposed development and that a significant increase in population in the area is not anticipated as a result of the proposed development, it is expected that negative impacts upon the communities will be minor and that the job creation and other positive impacts associated with the project will be far more important to the local communities.

Community profiles have been prepared by the Cowichan Valley Regional District and by the Canada Employment and Immigration Centre in Duncan and these profiles, supplemented with specific information gathered in the communities of Duncan, Ladysmith and the District of North Cowichan, will provide the information base required for this overall evaluation. Abermin Corporation are prepared to work with Canada Employment and Immigration Centre by identifying training program needs if deemed necessary at a later stage in the overall project development.

8.3 ENVIRONMENTAL PROTECTION AND WASTE MANAGEMENT PLANS

A major section of the Stage I Report will be devoted to Environmental Protection and Waste Management Planning. These sections of the report will be prepared during the development of the project plans and iaclude sections dealing specifically with:

(a) Waste Management Plans: The disposal and management of tailings, waste rock, mine water, process effluents, sewage, industrial and domestic refuse.

(b) Water Management Plans: The protection of natural surface flows transecting the property; segregation, collection and treatment of affected waters before return to the natural environment; and incorporation of re-cycle where appropriate.

(c) Spill Contingency Plans: Facilities and measures incorporated into the overall development plans for the isolation and containment of accidental losses of material.

(d) Environmental Monitoring Plans: Recommendations on a comprehensive monitoring program to be incorporated into operating permits and implemented during the development and operational stages of mine life.

(e) Conceptual Reclamation Plan: Plans for the decommissioning and final abandonment of the proposed development in order to return the mine site to its original land use.

These components of the Stage I Report can not be finalized until potential design and environmental resource conflicts are identified and resolved during the environmental and preliminary engineering studies. Negative environmental impacts will be mitigated at an early planning stage.

REFERENCES

B.C. Hydro, 1980.

Corridor and Route Nomination for Vancouver Island Natural Gas System. Text Volume. Gas Engineering Division.

CLI, 1975.

Land Capability for Wildlife - Waterfowl. Canada Land Inventory. Environment Canada. Maps 92 B,C.

CLI, 1975.

Land Capability for Wildlife - Ungulates. Canada Land Inventory. Environment Canada. Maps 92 B,C.

CLI, 1975.

Land Capability for Recreation. Canada Land Inventory. Environment Canada. Maps 92 B,C.

Employment & Immigration Canada, 1985.

Community Profile and Economic Strategy for the Cowichan Valley.

Environment Canada, 1980.

Canadian Climate Normals 1951 - 1980, Temperature and Precipitation, British Columbia. Atmospheric Environment Service.

Environment Canada, 1984.

Historical Stream Flow Summary for British Columbia to 1984. Water Survey of Canada.

Fisheries and Oceans Canada.

Preliminary Catalogue of Salmon Spawning Streams, Statistical Areas 17 and 18.

Fisheries and Oceans Canada, 1984.

Salmonid Enhancement Program. Annual Report 1984.

Hatfield Consultants Limited, 1983.

Environmental Impact Statement, Inland Natural Gas Co. Ltd. Proposed Vancouver Island Natural Gas Pipeline. Prepared for Inland Natural Gas Co. ltd.

Holland, S.S., 1976.

Landforms of British Columbia. A Physiographic Outline. B.C. Ministry of Energy, Mines and Petroleum Resources. Bulletin 48.

Stevenson & Kellogg, 1979.

Economic Profile of the Cowichan Valley Regional District.

APPENDIX TABLE 1: WATER QUALITY DATA SUMMARY FOR THE CHEMAINUS RIVER (SITE NO. 0120780) FOR THE PERIOD MAY 1971 TO MARCH 1984

(Source: B.C. Ministry of Environment)

PARAMETER	UNITS	AVERAGE (NO. OF SAMPLES)		MAXIMUM	MINIMUM
Colour	Relative Units	6.5	(26)	26	L 5
pH (lab)	Relative Units	7.28	(24)	7.9	6.5
Total Residues	mg/l	35.6	(26)	72	20
Specific Conductance	us/cm	46.78	(23)	115	23
Turbidity	N.T.U.	1.64	(27)	14	0.1
Total Alkalinity	mg/l	17.03	(9)	23.5	9.0
Total Organic Carbon	mg/l	1.33	(3)	2	L 1
Dissolved Chloride	mg/l	2.25	(8)	3.9	0.9
Dissolved Hardness	mg/l	16.2	(24)	27.7	9.01
Total Hardness	mg/l	17.4	(4)	25.5	12.8
Dissolved Ammonia	mg/l	0.005	(16)	0.007	L 0.005
Dissolved NO_2/NO_3	mg/l	0.047	(17)	0.16	L 0.02
Dissolved Nitrate	mg/l	0.031	(14)	0.08	L 0.02
Total Nitrate	mg/l	0.052	(13)	0.16	L 0.02
Dissolved Nitrite	mg/l	L 0.005	(27)	L 0.005	L 0.005
Organic Nitrogen	mg/l	0.095	(4)	0.2	0.04
Kjel. Nitrogen	mg/l	0.075	(19)	0.2	L 0.01
Total Nitrogen	mg/l	0.109	(19)	0.28	0.04
C.O.D.	mg/l	9.94	(24)	18	2.7

APPENDIX TABLE 1 (Cont'd.)

PARAMETER	UNITS	AVERAGE (NO. OF SAMPLES)		MAXIMUM	MINIMUM
Total Phenol	mg/l	L 0.002	(7)	0.002	L 0.002
Dissolved Ortho. Phosphate	mg/l	L 0.003	(17)	L 0.003	L 0.003
Total Dissolved Phosphate	mg/l	0.004	(3)	0.005	L 0.003
Total Phosphate	mg/l	0.007	(28)	0.031	L 0.003
Dissolved Silica	mg/l	4.74	(15)	6.1	3.1
Dissolved Sulphate	mg/l	4.77	(24)	6.5	1.9
Total Coliform	MPN	47.9	(22)	240	L 2
Total Metals					
Aluminum	mg/l	0.05	(4)	0.09	L 0.02
Chromium	mg/l	L 0.01	(7)	L 0.01	L 0.005
Copper	mg/l	L 0.01	(28)	L 0.01	L 0.001
Iron	mg/l	0.218	(28)	1.19	L 0.02
Lead	mg/l	L 0.01	(29)	L 0.1	L 0.001
Magnesium	mg/l	0.65	(12)	0.87	0.42
Manganese	mg/l	0.014	(10)	0.03	L 0.01
Mercury	mg/l	L 0.0001	(22)	L 0.0001	L 0.00005
Molybdenum	mg/l	0.01	(4)	0.01	L 0.01
Nickel	mg/l	0.023	(12)	L 0.05	L 0.01
Zinc	mg/l	0.009	(27)	0.04	L 0.005

L = Less than.