ALASKA LEGISLATURE COMMITTEE FILES 1985-1986 8672

3530 HRES COMINCO RED DOG PROJECT--OVERVIEW

406

RED DOG PROJECT

STATE INCOME

(Over 30 Years)

1985 DOLLARS

	$ Million Over 30 Years
Direct Taxes to State	360
Toll Fees to AIDA	260
	$620

Cominco Alaska

11. STATE GOVERNMENT INCOME

THE PROPOSAL PROVIDES FOR REPAYMENT OF THE CAPITAL COSTS OVER A 30 YEAR PERIOD. BASED ON THE PRESENT COST ESTIMATES, THE PROJECTIONS SHOW THAT DURING THIS PERIOD COMINCO ALASKA WILL PAY ALASKA TOLL FEES OF ABOUT $260 MILLION, WHICH WILL RECOVER THE $150 MILLION INVESTMENT, PLUS $110 MORE. IN ADDITION, COMINCO ALASKA AND THE REGIONAL CORPORATIONS WILL PAY TAXES TO THE STATE GOVERNMENT OF $360 MILLION.

ALL OF THIS AMOUNTS TO OVER $600 MILLION, SO THE STATE WILL RECOVER THEIR INITIAL INVESTMENT MORE THAN FOUR TIMES OVER. AND THIS DOES NOT INCLUDE ALL THE SPIN-OFFS FROM THE $3 BILLION THAT RED DOG WILL INJECT INTO THE ALASKAN ECONOMY DURING THE PAYBACK PERIOD.

RED DOG PROJECT

REGIONAL BENEFITS

- Increase Income
- Reduce Transfer Payments
- Less Dependence on Government
- Reduce Unemployment
- Provide Economic Base

12. REGIONAL BENEFITS

THE PROJECT WILL PROVIDE JOBS, OPEN UP MARKETS AND TRADE TO THE PACIFIC RIM, AND GENERATE NEW BUSINESS IN ALASKA.

AND, THERE WILL BE, PARTICULARLY IN NORTHWEST ALASKA:

- INCREASED INCOME DUE TO THE NEW JOBS BEING CREATED
- A REDUCTION IN TRANSFER PAYMENTS FROM THE STATE
- LESS DEPENDENCE ON WELFARE AND GOVERNMENT EMPLOYMENT
- A DRAMATIC DECLINE IN THE UNEMPLOYMENT RATE
- A NEW ECONOMIC BASE PROVIDED FOR THE PEOPLE OF THE REGION AND FOR THE STATE OF ALASKA

THIS MAY APPEAR TO BE LESS IMPORTANT, BUT WHEN PERSONAL INCOME IN THIS REGION IS 88% DEPENDENT ON THE STATE AND FEDERAL GOVERNMENTS, IT IS INDEED SIGNIFICANT.

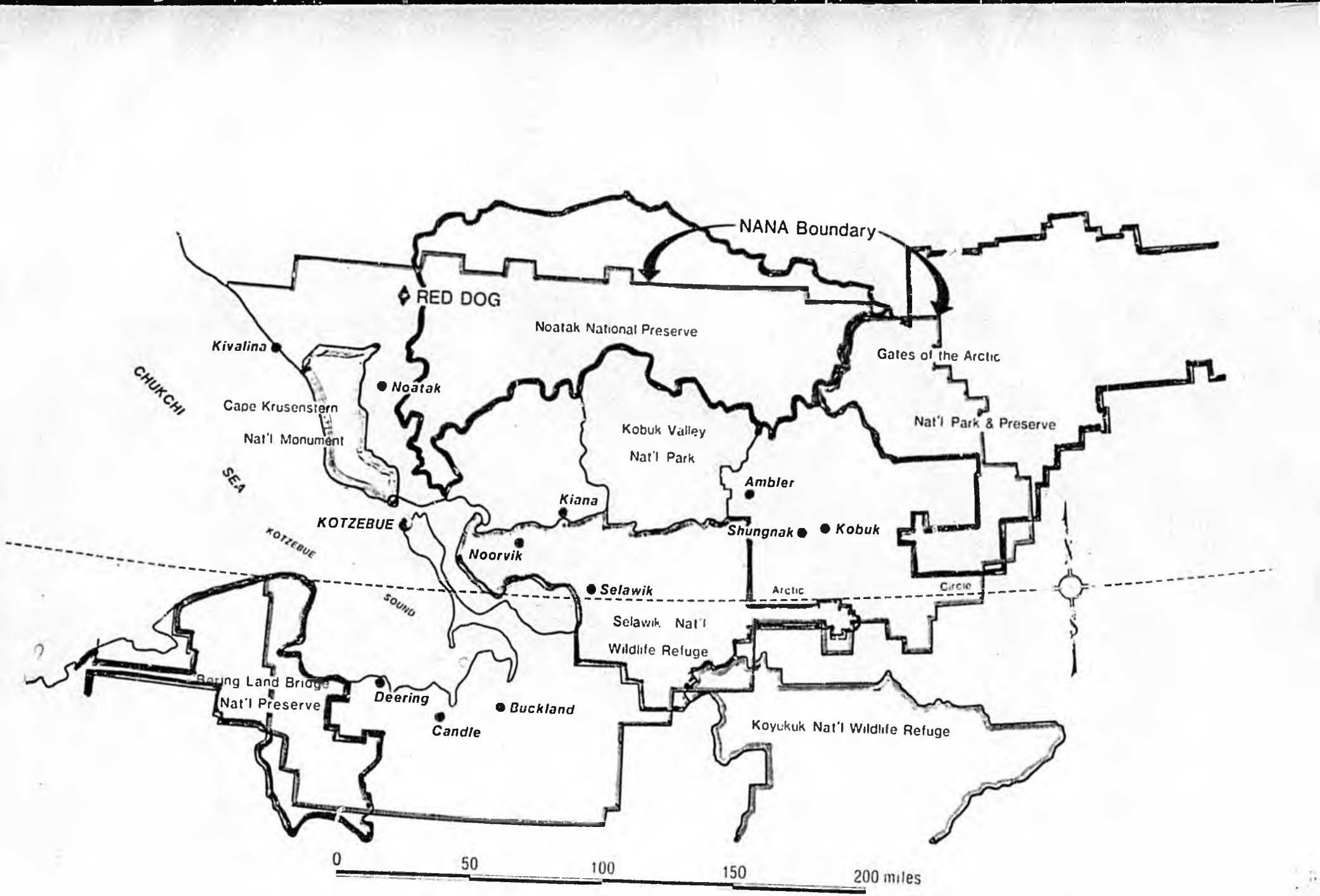
RED DOG PROJECT
COMINCO ALASKA EXPENDITURES

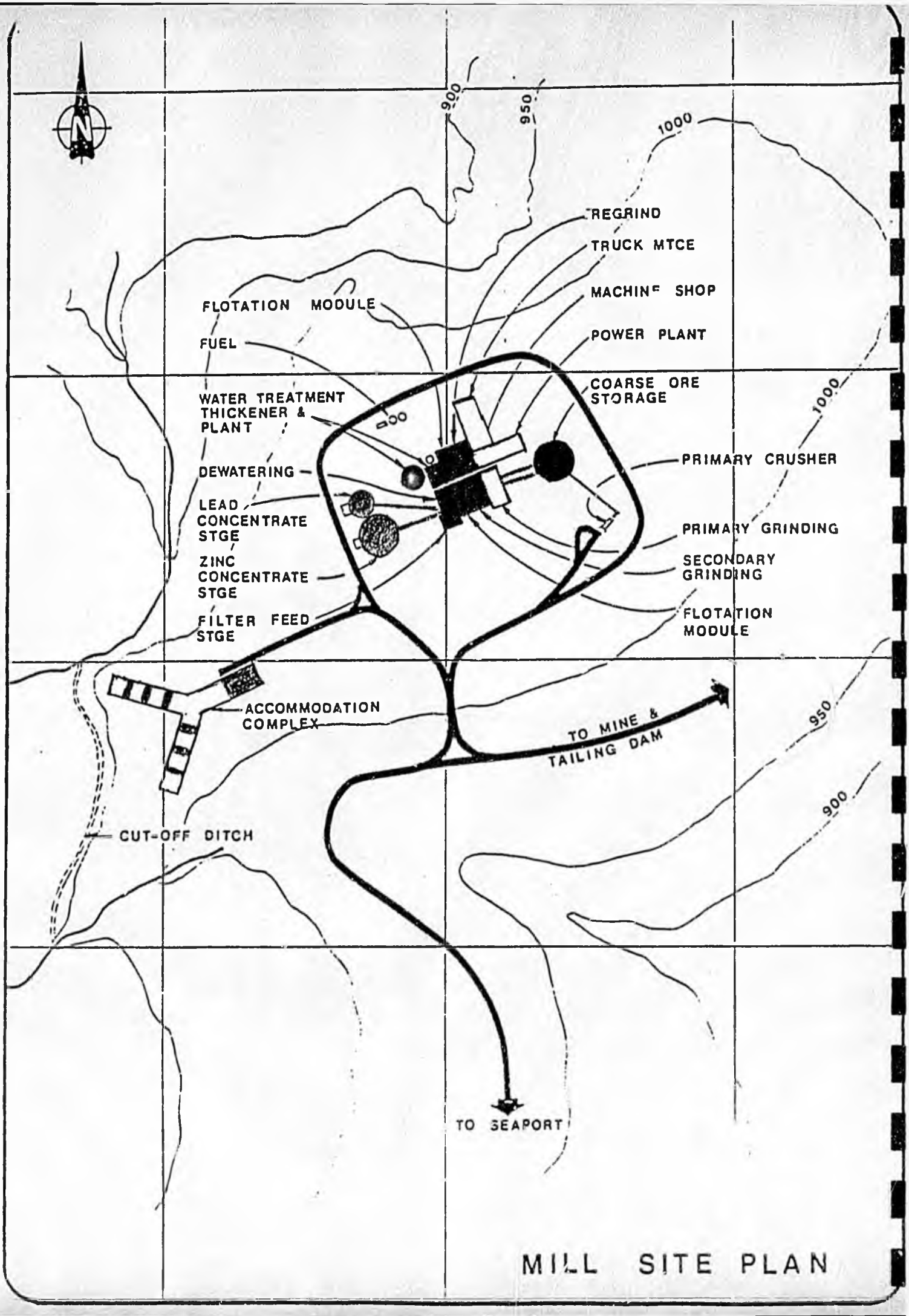
To End 1984	$25 Million
1985 Plan	15+ Million
To End 1985	$40+ Million

Cominco Alaska

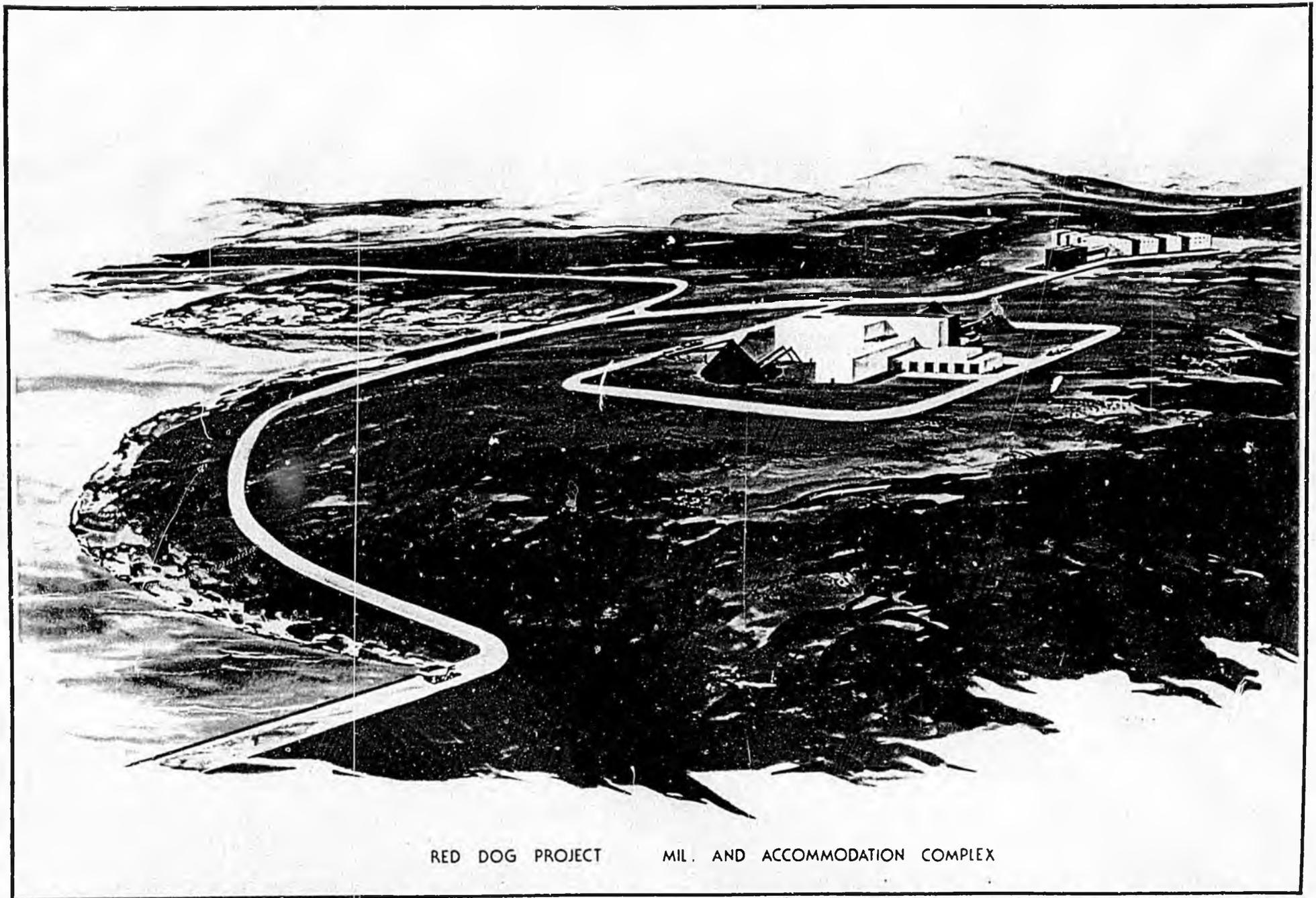
13. COMINCO ALASKA INVESTMENT

COMINCO ALASKA IS ENTHUSIASTIC ABOUT THE RED DOG PROJECT. IF THE STATE OF ALASKA CAN ASSIST THE PROJECT IN THE FINANCING OF THE ROAD AND PORT, COMINCO ALASKA IS PREPARED TO MOVE AHEAD AND BRING THE MINE INTO OPERATION BY THE END OF THIS DECADE. AS AN INDICATION OF COMINCO'S DEDICATION TO RED DOG, AND CONFIDENCE IN THE FUTURE VIABILITY OF THIS MINE, COMINCO ALASKA HAS INVESTED OVER $25 MILLION IN THE PROJECT, OVER THE LAST THREE YEARS, AND PLANNED EXPENDITURES IN 1985 WILL BRING THE TOTAL INVESTMENT TO OVER $40 MILLION BY THE END OF THE YEAR.

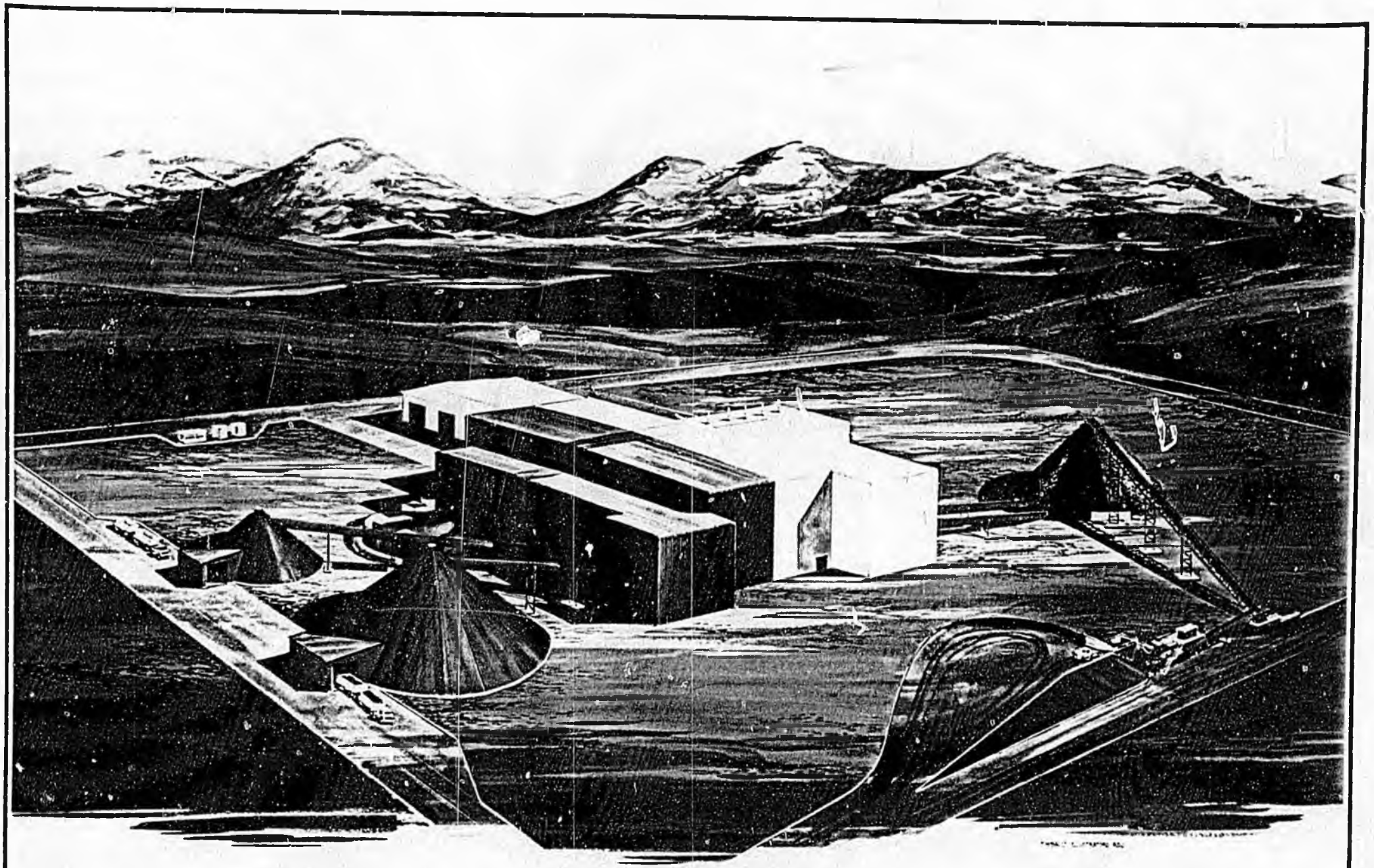

NANA Boundary
RED DOG
Noatak National Preserve
Gates of the Arctic
Kivalina
Noatak
CHUKCHI
SEA
Cape Krusenstern
Nat'l Monument
Kobuk Valley
Nat'l Park
Nat'l Park & Preserve
Ambler
Kiana
KOTZEBUE
KOTZEBUE
Shungnak
Kobuk
Noorvik
Selawik
Arctic
Circle
SOUND
Selawik Nat'l
Wildlife Refuge
Bering Land Bridge
Nat'l Preserve
Deering
Buckland
Candle
Koyukuk Nat'l Wildlife Refuge
0
50
100
150
200 miles



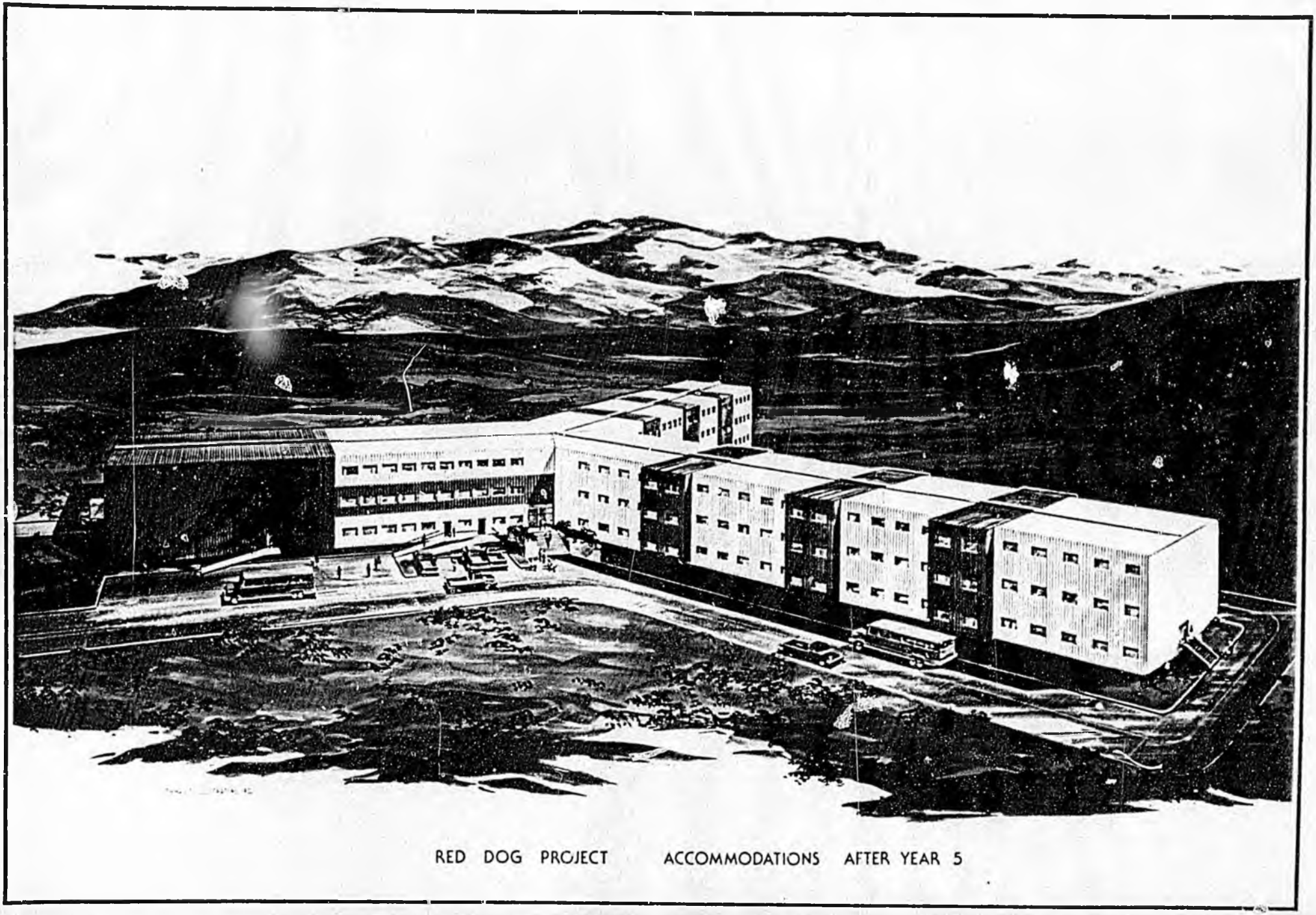
MILL SITE PLAN



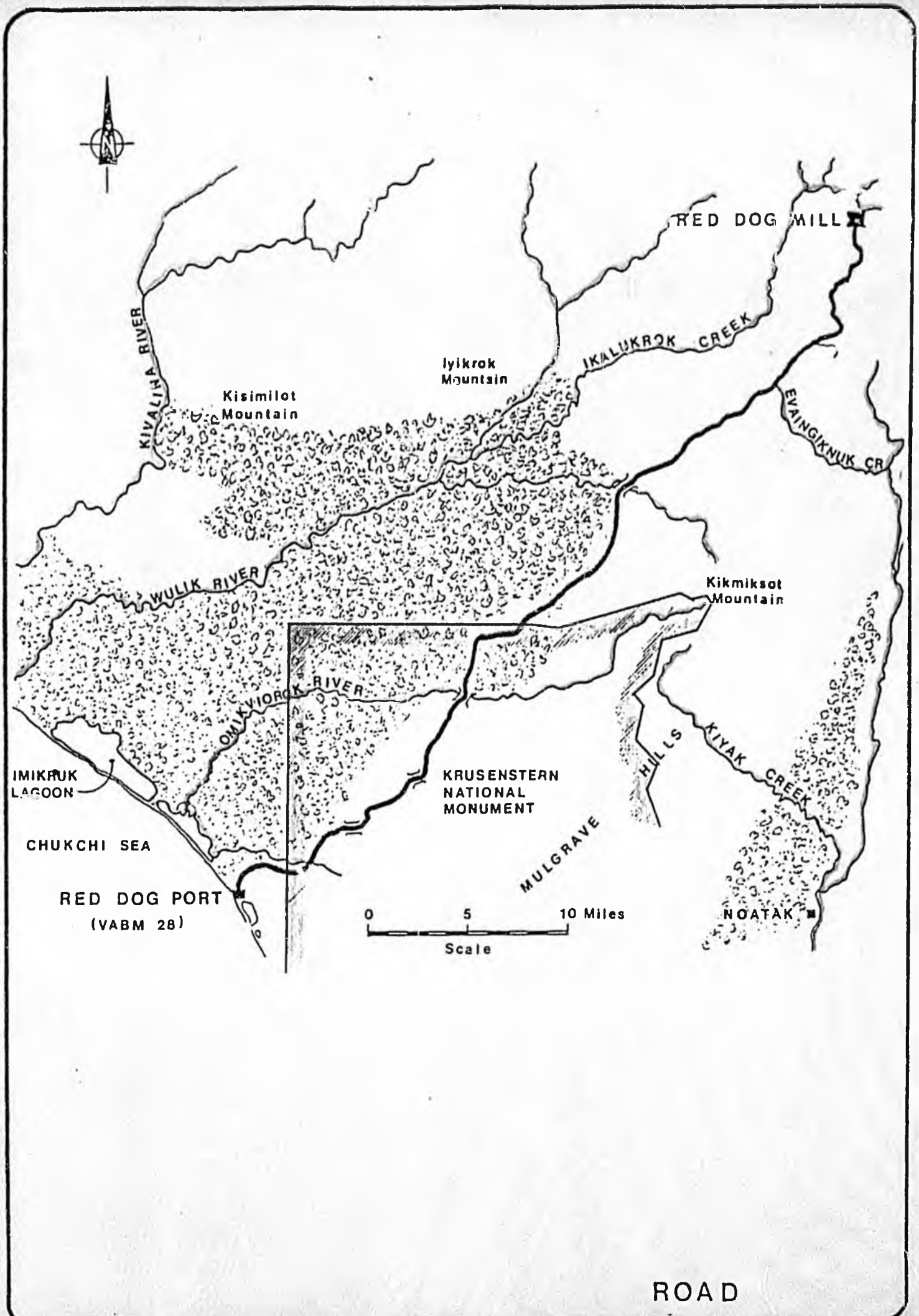
RED DOG PROJECT MIL. AND ACCOMMODATION COMPLEX

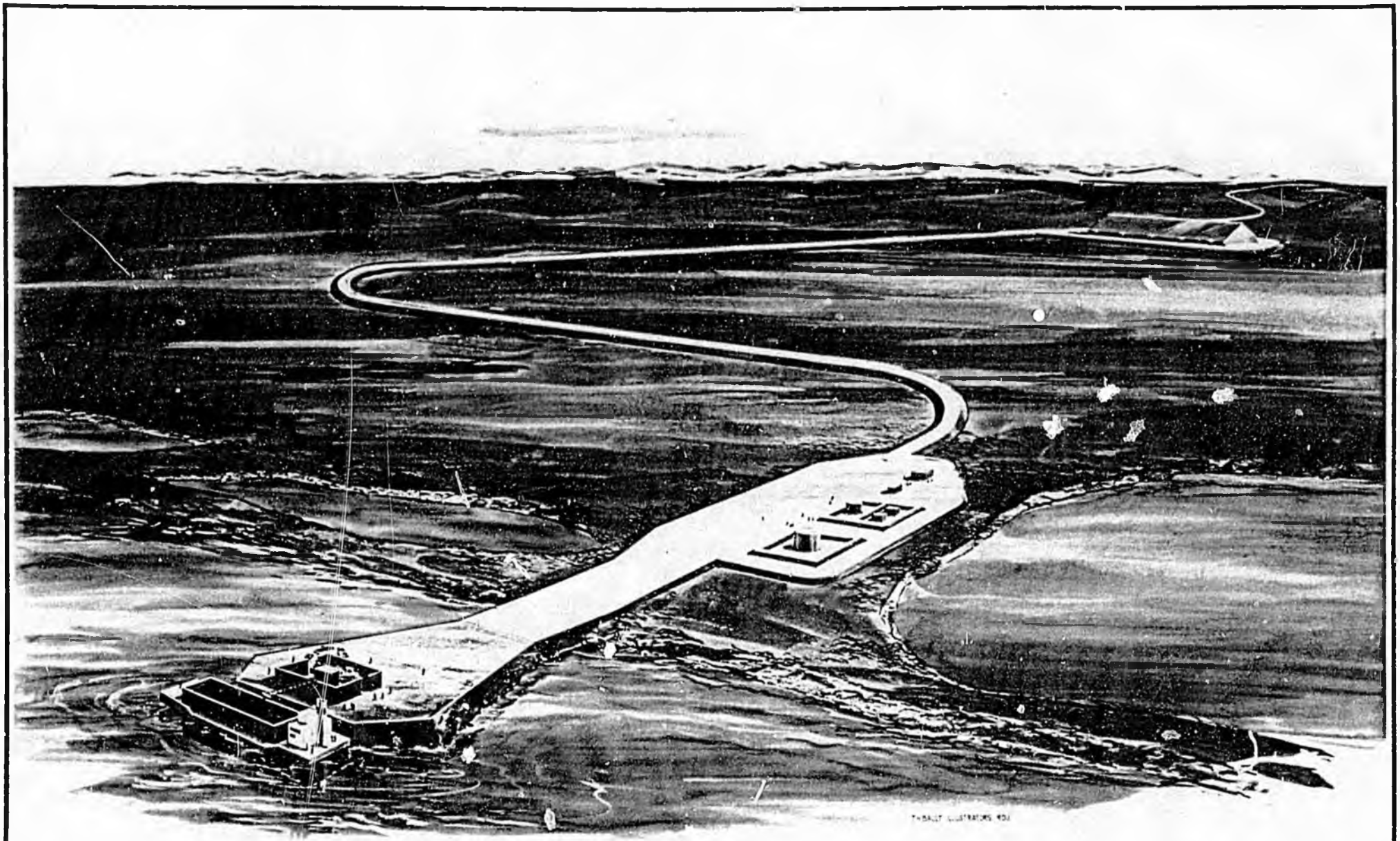


RED DOG PROJECT MILL COMPLEX

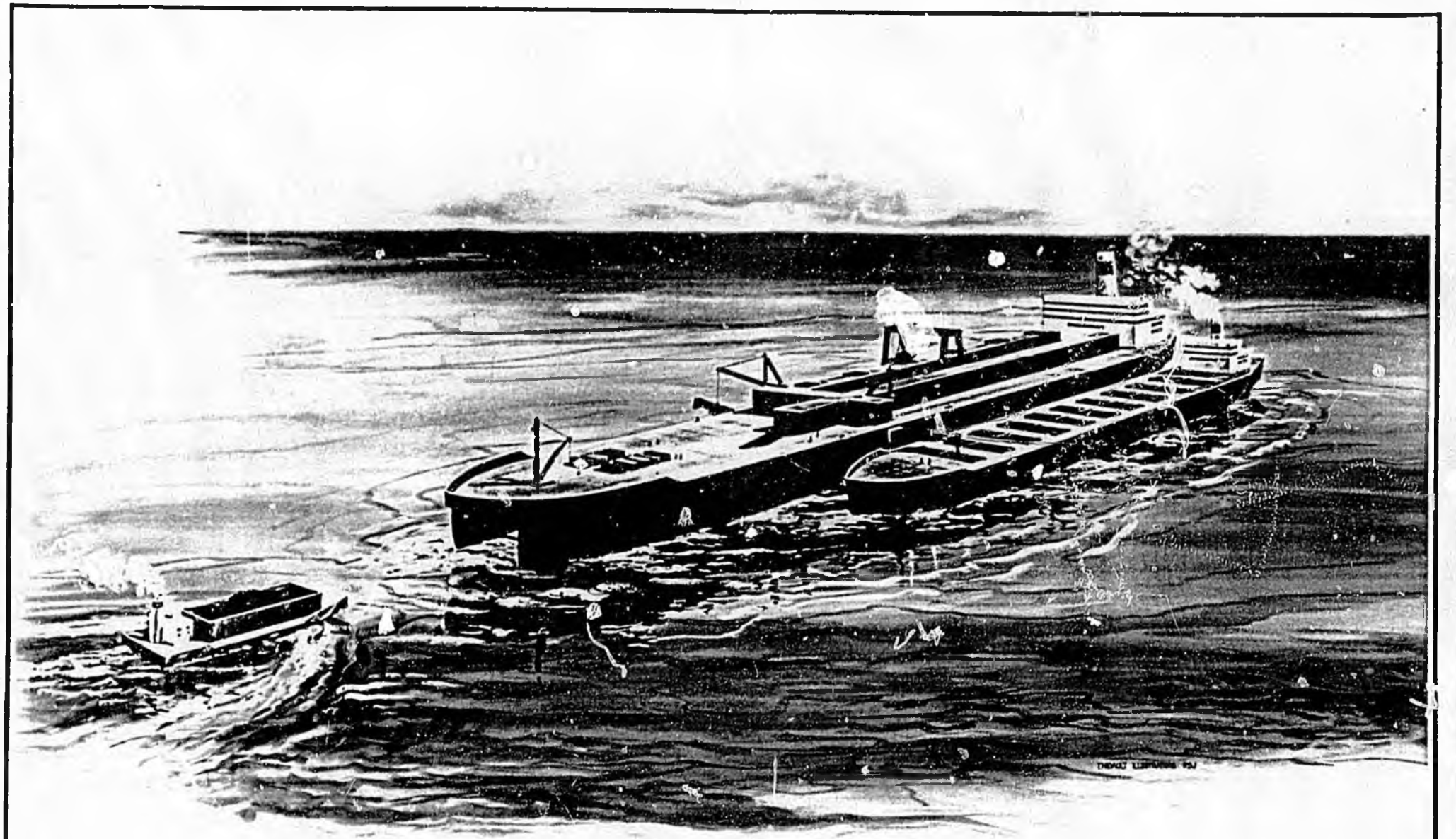


RED DOG PROJECT ACCOMMODATIONS AFTER YEAR 5

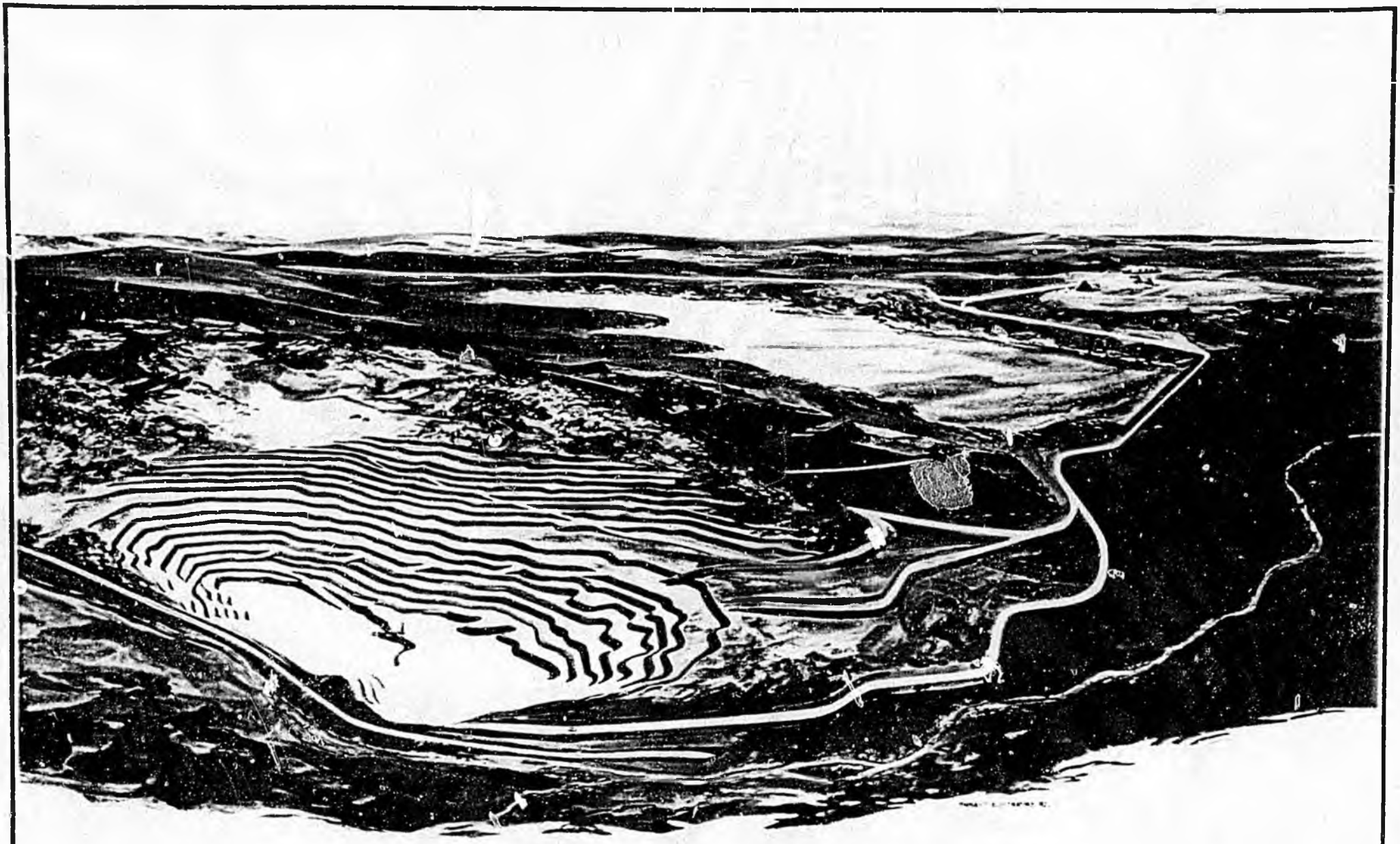

RED DOG MILL
KIVALINA RIVER
Iyikrok Mountain
IKALUKROK CREEK
Kisimilot Mountain
EVAINGIKNUIK CR
WULIK RIVER
Kikmiksot Mountain
OMIKVIOROK RIVER
IMIKRUK LAGOON
KRUSENSTERN NATIONAL MONUMENT
HILLS
KIYAK CREEK
CHUKCHI SEA
MULGRAVE
RED DOG PORT
(VABM 28)
0 5 10 Miles
Scale
NOATAK
ROAD



RED DOG PROJECT PORT SITE



RED DOG PROJECT DEEP WATER DOCK



RED DOG PROJECT MINE AREA YEAR 20

1. KEY DATA

NOTE: The following key data is based on installed plant capacities.

1.0 LOCATION

A. OREBODY/MILL COMPLEX

The orebody is located 57 miles from the Chukchi Sea, east-north-east of Kivalina at the base of Deadlock Mountain; and 90 miles north of Kotzebue.

B. SEAPORT

The proposed location of the seaport is in the vicinity of VABM 28 about 17 miles southeast of Kivalina.

2.0 CLIMATIC DATA

Date	Max. Temp (°F)	Min. Temp (°F)	Snowfall (Inches)	Max. Wind (MPH)	Hours of Sunlight
1982 Oct	+ 30	- 12	12	N @ 40	9.3
Nov	+ 30	- 20	21	SE @ 50	5.0
Dec	+ 28	- 28	7	E @ 30	0.0
1983 Jan	+ 30	- 34	1	NW @ 30-40	2.5
Feb	+ 29	- 20	1	NE @ 30	7.3
Mar	+ 33	- 10	9	NE @ 35	11.5
Apr	+ 31	- 1	3	N @ 20	15.5
May	+ 60	+ 12	--	S @ 30	20.2
Jun	+ 82	+ 22	7	S @ 30	24.0
Jul	+ 92	+ 38	--	NE @ 30	24.0
Aug	+ 59	+ 19	--	N @ 20	17.5
Sep	+ 46	+ 8	--	SW @ 30	13.5
Oct (not recorded)	--	--	--	--	9.3
Nov	+ 52	- 25	14	NE @ 50	5.0
Dec	+ 51	- 30	--	SE @ 45	0.0
1984 Jan	+ 36	- 45	10	NW @ 30	2.5
Feb	+ 5	- 48	--	NW @ 30	7.3
Mar	+ 36	- 12	1	N @ 15	11.5

3.0 ORE RESERVES

	Tons	% Pb	% Zn	oz/ton Ag
Published Data	85 x 10^6	5.0	17.1	2.4

4.0 PRODUCTION SCHEDULE

	Feed Tons		Feed Grade		Concentrate Tons/Yr			Design
Years	Day	Year	% Pb	% Zn	Pb	Zn	Total	Tons/Day
1	--	1,000,000	6	21	70,000	315,000	385,000	6,400
2 and 3	5,150	1,800,000	6	21	125,000	580,000	705,000	6,400
4 to 20	5,700	2,000,000	5	19	115,000	580,000	695,000	6,400
21 to 30	5,700	2,000,000	5	16	115,000	490,000	605,000	6,400

5.0 WORK SCHEDULES -- OPERATIONS

a) All employees:

-- 7 days per week

b) Mine:

-- 10 hours per shift, 2 shifts per day, 700 shifts/year

c) Concentrator, Power Plant:

-- 12 hours per shift, 2 shifts per day, 700 shifts/year

d) Seaport:

-- 12 hours per shift, 2 shifts per day, 240 shifts/year Summer operation.

-- 12 hours per shift, 2 shifts per day, over the Winter period.

6.0 MINE -- FACILITIES

Primary Crusher - skid mounted, 300 HP Minpro Mineral Sizer.

7.0 CONCENTRATOR

	Length feet	Width feet	Height feet	Wt. tons	Plan Area Sq. Ft.
Modular Construction					
Primary Grinding Module #1	74	63	84	900	4,662
Primary Grinding Module #2	74	63	84	620	4,662
Secondary Grinding	130	63	84	1,390	8,190
Regrind	120	63	84	1,200	7,560
Flotation Module #1	74	64	70	890	4,736
Flotation Module #2	56	64	70	720	3,584
Flotation Module #3	120	64	59	1,090	7,680
Dewatering	96	60	69	1,400	5,760
Power Plant	132	66	46	1,450	8,712
Water Treatment	120	60	59	800	7,200
Subtotal				10,460	62,746
Conventional Construction					
Mill Shop	66	63	84	--	4,158
Warehouse (utilizes space under modules)	--	--	--	--	50,600
Vehicle Repair Shop	200	80	varies	--	16,000
Subtotal					70,758

8.0 CONCENTRATE STORAGE -- MILL SITE

Dome Structure 180 ft. dia. x 70 ft. high for Zn
(adequate for 3 weeks storage)
Dome Structure 100 ft. dia. x 42 ft. high for Pb
(adequate for 3 weeks storage)

9.0 MISCELLANEOUS MILL SITE

Fuel Storage	2 x 200,000 USG
Fresh Water Storage	350,000 USG
Coarse Ore Storage	6,000 ton

10.0 THICKENER

Water Treatment	90 ft. dia.

11.0 POWER SYSTEM

Demand: Nominal 13,900 kW ±10%
Peak 15,300 kW

Generators:	Main	Emergency
Number of units	5	3
Cylinders/unit	6	12
BHP -- full load	5,310	
Kw -- full load/unit	3,800	500
-- total installed	19,000	1,500
RPM	600	1,800
Voltage	4,160	480

12.0 ACCOMMODATIONS

Modules	Length feet	Width feet	Height feet	Weight tons
Living (4 modules)*	144	52	50	1150 x 4
Communal	164	78	50	1400
Services	130	78	50	1100
TOTAL				7100

* Living modules will not be installed until year 5. Initial sleeping quarters will utilize the camp facilities left over from construction.

Facilities (after installation of final living modules)

- 111 single rooms
- 112 single (or 56-2 room suites), 8 two-roomed suites
- Dining capacity -- 235 people
- Gymnasium -- 90' x 78' x 24' high

12.0 ACCOMMODATIONS (continued)

AREA	SQ. FT.
Building Services	7,500
Storage	10,900
Laundry	1,100
Accommodations	59,150
Commons	39,370
Dining & Serving	3,520
Kitchen	1,600
Kitchen Storage	1,280
Administration	2,300
Infirmary	960
Gymnasium	7,000
Changerooms & Sauna	2,850
Hobby Rooms	3,800
Commissary	800
Lounges	1,970
Library	400
Radio/Communications	400
Post Office	140
Janitors' Rooms	420
TOTAL AREA	145,460

13.0 LAND TRANSPORTATION

a) Route from mine to VABM 28 through Krusenstern

Distance 57 miles
Elevation @ Mine + 1030 ft.
Elevation @ Port + 10 ft.
Maximum grade 4%
Road Width 30 ft.
No. of bridges -- 5
Passing lanes @ 2 mile intervals

b) Concentrate Haulage Trucks

6 - 700 HP tractors each with 2 side-dump or rear-dump trailers each with a 36 cu.yd. capacity.

14.0 PORT

a) Shallow Water Dock:

Sheetpile dock face in 10' water depth
Earthfill causeway 400' long

b) Deepwater Dock:

(i) Ship ballasted to seabed in 35' water depth with storage capacity for: 71,000 tons of Zn concentrate
38,000 tons of Pb concentrate
10,000,000 USG of Fuel
Deck storage for 400 - 8'x8'x20' containers

(ii) 2 - 1,000 ton self-propelled lighter barges

c) Shore Facilities:

(i) Truck dump pad and barge loading facility.

(ii) Fuel transfer tank (50,000 USG) and truck loading facility.

(iii) Accommodations for 20 - left over camp from construction.

(iv) Small 250 kW power plant.

(v) Small storage building 40' x 40'.

(vi) Powder magazine.

d) Facilities at Mile 2.5:

(i) A-frame structure 180' x 1280' x 90' high to store 480,000 tons of concentrates.

(ii) Small 250 kW plant.

15.0 WATER SYSTEM

Fresh Water Consumption

° Process	-- Avg. =	449,280	USGPD
	-- Max. =	511,200	USGPD
° Domestic	-- Avg. =	17,280	USGPD
	-- Max. =	64,800	USGPD

15.0 WATER SYSTEM (continued)

Recycled Water Consumption (from pond + dewatering) 8,534,880 USGPD

Fresh Water Supply

- Bons Creek Reservoir
- Drainage area -- 3.7 sq.mi.
- Daily usage -- 501,120 USGPD
- Dam height -- 37 ft. (30' for minimum storage)
- Dam crest length -- 280 ft.
- Total storage -- 630 ac.-ft.
- Live storage -- 246 ac.-ft.
- Dam crest elev. -- 852 ft.
- Normal water surface elev. -- 845 ft.

Fresh Water Facility Specs.

- Floating raft -- 16 ft. x 9 ft.
- Pumps: Type -- Vertical turbine
  No. -- 2 operating and 1 standby
  HP -- 75 each pump
- Pipeline: Material -- high density polyethelene (SCLAIR)
  Length -- 18,000 ft.
  Diameter -- 10 in. to main storage tank
  Heat Tracing -- 110 volt
  Insulation -- 2 inch styrofoam

Fresh Water Tank

- Elevation -- 1,030 ft.
- Dimension: Diameter -- 45 ft.
  Height -- 30 ft.
- Volume -- 350,000 USG

16.0 TAILING SYSTEM

	% Solids	Volume
Tailing -- from process to pond	18	4,208,000 USGPD

Tailing Embankment:

- Height -- 150 ft.
- Length -- 2,200 ft.
- Fill Volume -- 255,000 cu.yd. starter dam (2 million cu.yd. to Elev. 950)

Tailing Impoundments @ 950 Elev.

- Area -- 25,472,000 ft^2
- Volume -- 29,860 ac.-ft.

Tailing Facility Specs.

- Tailing line:
  - Material -- H.D.P.E.
  - Length -- 3,500 ft.
  - Diameter -- 14 inches
  - Insulation -- 2 inches styrofoam

I. BACKGROUND

To help understand the Alaska Industrial Development Authority's (AIDA) potential role in the DeLong Mountains transportation project, some history is useful. Prior to 1984, AIDA could not have participated in projects such as that contemplated for the DeLong Mountains, in that State law did not permit AIDA to own projects, except in cases of default. Rather, what AIDA could do then, and still does now, is to issue tax exempt industrial development bonds to assist private investors in the financing of a variety of projects. AIDA has been very successful in this role, having issued over $700 million worth of tax exempt revenue bonds during the past few years. However, despite this success AIDA still could only play a passive role, in that AIDA could neither initiate or own projects.

During the 1984 legislative session, both the Governor and the Legislature decided that a more active State participant was needed for certain economic development projects. Many proposed developments are likely to be of a joint public-private nature, because of resource ownership, access, and so forth, hence an active state representative is needed. This is especially true if it appears that the State will become involved financially. For instance, in many situations, new infrastructure facilities have to be constructed before development can proceed. Although these facilities are, by and large, the responsibility of developers as a group, they are not necessarily the responsibility of any single developer. And, if the cost of providing the required infrastructure facilities has to be borne by one developer, it may be that these costs, in addition to the developer's other costs, are simply too much for the proposed project to bear, so the development does not proceed. In such cases, it may be appropriate for a governmental entity to construct the necessary infrastructure facilities, and then charge fees to all users to pay for the facilities. Furthermore, if the State decides to participate financially in providing these infrastructure facilities, it is much easier to do so via a governmental entity as opposed to directly with a private developer.

Of course, State government should not get involved in a development project simply because it is difficult for the developer to pay for some costs. Rather, State involvement should be based upon the benefits of the project to all Alaskans. In light of the State's almost singular dependence upon the petroleum industry, development of new, non-petroleum based or dependent industries is of critical importance. Further, when evaluating a proposed new development, it is important to keep in mind the total impact of that project or development. Generally the project is being evaluated during its start-up phase, where costs are significant and revenues are, at best, just starting. Since the State is concerned with the future economic situation, as well as the present, the benefits to the State over the long term must be given adequate weight, rather than focusing strictly on short term return.

II. WHY IS AIDA INVOLVED

The question remains, why did the Governor and the Legislature decide AIDA should have the ability to actively become involved in infrastructure projects such as discussed above. Although there may be other reasons, at least some of the major factors were:

(1) AIDA is a known, existing entity that has an independent legal existence from the State, but is still controlled by the State.

(2) AIDA can (and does) issue debt that is separate and distinct from the State.

(3) AIDA has experience with complex projects.

(4) AIDA has extensive experience with financing and bonding, particularly tax exempt bonding.

As a result, in 1984 the Legislature passed Chapter 162, which broadened AIDA's ability to participate in economic development projects. As well as expanding AIDA's powers, Chapter 162 also established a new fund in AIDA, the Economic Development fund, that is legally and financially separate from the Authority's existing fund. It is through this new fund that AIDA can exercise its new powers to:

(1) own and operate certain types of projects;

(2) charge user fees for these projects;

(3) issue debt for these projects; and

(4) accept state loans or grants for these projects

III. AIDA AND THE DELONG MOUNTAINS TRANSPORTATION PROJECT

Because of AIDA's newly acquired abilities, the decision was made to involve the Authority in the DeLong Mountains transportation project. The transportation project itself consists of a port and a 55 mile road in the western DeLong Mountains area, near Kivalina. The cost of the port is estimated at $65 million, and the cost of the road is estimated at $85 million, for a total estimated cost of $150 million for the project, with all figures in 1985 dollars. Although this region is a heavily mineralized area, only one mine site is presently close to going into production. This is the Red Dog deposit, a zinc, lead and silver deposit being jointly developed by Cominco Alaska and the NANA Regional Corporation. Other major deposits are known, such as GCO Mineral's Lik deposit, but development of these are thought to be five years or more behind Red Dog.

What is being considered at this time is to have AIDA construct the transportation project, and then charge fees (or tolls) to all users. At first, it is expected that Cominco Alaska would be the only significant user, but eventually other users are expected.

At this time, AIDA's continued involvement and eventual completion of the project looks favorable, however, no final "go-no go" decision has yet been made. Prior to making a final decision, the Authority has to prepare a Finance Plan, as prescribed by AS 44.88.173.

The Finance Plan has to identify the operational and capital costs of the project, and identify where all revenues will come from to pay these costs. The Finance Plan will offer a variety of financing options, with at least one of the options being that approach which minimizes any cost to the State. In preparing a Finance Plan, AIDA has identified the following guidelines:

(1) attempt to minimize the total costs of the project;

(2) minimize any State General Funds required;

(3) make maximum use of tax-exempt financing;

(4) design a plan that has the optimum chance of completing the project as expeditiously as possible; and

(5) never allow the State or AIDA to be in the position of having a completed project without a user, unless the State and AIDA are reimbursed for their investments.

IV. WHAT HAS OCCURRED TO DATE

Since AIDA became involved with the transportation project in the summer of 1984, a number of activities have occurred.

(1) A Resolution of Intent has been executed between the Department of Commerce and Economic Development and Cominco Alaska (Appendix A).

(2) An RFP for the Finance Plan (required by 44.88.173) has been prepared and distributed (Appendix B). A draft report is due this session of the Legislature. The statute requires that a Finance Plan be prepared and presented to the Legislature, the Governor and the State Bond Committee before issuing bonds or otherwise incurring debt for the project. It also mandates, among other things, that if a project requires financial assistance from the State, the state financial assistance must be available before bonds are issued for the project.

(3) An RFP for civil engineering services to verify cost figures for the road and port has been prepared and distributed.

(4) The Authority has assembled a team of legal and financial experts to assist with the project.

(5) Much attention has been focused on how to finance the project. For AIDA to build the project, it will need to have $150 million to pay for construction. These funds can come from a variety of sources, with the most likely ones being tax exempt revenue bonds, state loans to AIDA, and possibly state grants. A number of differing financial scenarios have been considered, all of which have indicated the need for some initial state financial involvement, for instance loans to AIDA.

(6) Last year the Legislature appropriated $3.4 million to AIDA for the project. To date, it has been used for the following items:

(1) Finance Plan costs of between $250,000 - $300,000
(2) Engineering services of $50,000 - $100,000
(3) Miscellaneous AIDA expenses of approximately $10,000

The remainder is available for various aspects of the DeLong Mountains transportation project consistent with the appropriation and finance plan.

(7) An additional $18 million request for a state loan to AIDA has been included in the Governor's FY86 Budget Request. As noted above, all analysis to date indicates the need for state loans, and this would constitute the initial capitalization.

V. WHAT IS PLANNED FOR THE FUTURE

The goal of this project is to allow development and production of the mineral resources of the western DeLong Mountains, along with the new employment and new economic activity that would result. Since this is a new (non-petroleum dependent) industry that will provide economic benefits to Alaskan citizens and State government over a long period, AIDA is eager to proceed with the project, assuming a suitable financial arrangement can be achieved. Although, of course, no results from the Finance Plan RFP are available yet, both the Department of Commerce and Economic Development and AIDA have made some initial calculations with respect to financing and costs and revenues associated with the transportation project. At this stage, under a range of different assumptions and alternatives, it is inevitably the case that State financial assistance is required, at least initially, if the transportation project and mineral development are to occur in the near future. The details of how much assistance would be required, and under what terms, will be provided in the Finance Plan. AIDA is continuing to meet with Cominco Alaska and NANA to devise an approach that minimizes any required financial assistance from the State, but still allows the project to proceed in an expeditious manner.

In closing, one seeming inconsistency needs to be discussed. The transportation project is being acclaimed as being part of a new self-supporting economic development project that will bring jobs, tax revenues, and increased economic activity to Alaska, yet a major part of this, and other discussions on the project center on the need for State financial assistance. While it is true that the project definitely appears to need State assistance, at least initially, to fairly appraise the true impact and value of the project, one must consider both the broad geographic and duration of the project. This infrastructure project will facilitate development of not just Red Dog, but also other mineral resources in the area. Further its benefits are by no means short term, but rather should go o for decades. So although there appears to be an initial financial need, when viewed in this broader perspective, available information suggests that the State may receive its initial investment back many times over. Indeed, the State's ultimate decision regarding financial involvement should consider all of these broadly based factors, and then proceed only if, in this broad perspective, it is a "good deal" for the people of Alaska.

APPENDIX A

STATE OF ALASKA

BILL SHEFFIELD, GOVERNOR

DEPARTMENT OF COMMERCE & ECONOMIC DEVELOPMENT

OFFICE OF THE COMMISSIONER

7TH FLOOR FRONTIER BLDG.
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ANCHORAGE, ALASKA 99503
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RESOLUTION OF INTENT

WHEREAS, the State of Alaska encourages the diversification of the Alaska economic base through the development of mineral resources; and

WHEREAS, the State of Alaska supports economic development in Alaska and the expansion of regional job opportunities; and

WHEREAS, the State of Alaska recognizes that the lack of transportation facilities in Northwest Alaska poses an economic barrier to the attainment of economic development; and

WHEREAS, the Alaska Department of Commerce and Economic Development is the principal state department responsible for facilitating economic development in all regions of the state; and

WHEREAS, Cominco, Alaska, a division of Cominco, American is considering the development of the Red Dog mineral deposit in the DeLong Mountains area; and

WHEREAS, other mineral resources have been identified in the area near the Red Dog mineral deposits; and

WHEREAS, the Alaska Department of Commerce and Economic Development, in a report entitled Red Dog Project Analysis, identified substantial regional benefits in the event that the DeLong Mountains transportation project is developed; and

WHEREAS, the projected cost of the development of the Red Dog mineral site, excluding the cost of developing transportation facilities, is estimated to be $290 million (in 1985 dollars); and

WHEREAS, the projected cost of the transportation facilities is estimated to be $152 million (in 1985 dollars); and

WHEREAS, the lack of available transportation facilities near the mineral deposit may substantially delay private development of the Red Dog mineral deposit; and

WHEREAS, it is contrary to the best interests of the state for there to be a substantial delay in the development of the DeLong Mountains mineral resources and, in particular, in the development of the Red Dog mineral deposit; and

WHEREAS, the transportation facilities which, among other public purposes, would be used in conjunction with the development of the Red Dog mineral deposit are collectively referred to as the Delong Mountains transportation project; and

WHEREAS, the Alaska Industrial Development Authority (AIDA), a public corporation of the State of Alaska has authority under Alaska Statutes Title 44, Chapter 88, to participate, either independently or in conjunction with a private developer, in the financing and development of public transportation facilities such as the DeLong Mountains transportation project;

NOW THEREFORE BE IT RESOLVED that Cominco, Alaska and the Alaska Department of Commerce and Economic Development, on behalf of the State of Alaska, agree to the following STATEMENTS OF INTENT:

1. The State of Alaska supports ongoing efforts by the Alaska Industrial Development Authority to examine the feasibility of AIDA financing of the DeLong Mountains regional transportation project.

2. The parties recognize and support AIDA's intent to promptly execute all necessary professional services contracts, including a contract with a firm nationally recognized in the field of financial planning, to assist in the preparation of the financial plan required pursuant to AS 44.88.173.

3. If AIDA participates in the financing of the DeLong Mountain transportation project, the parties agree that AIDA and Cominco, Alaska will enter into an agreement which will provide, inter alia, for the establishment of equitable user fees payable to AIDA in an amount sufficient to enable AIDA to repay amounts loaned by the state to AIDA; and for the refunding of certain state expenditures in the event that Cominco, Alaska decides not to proceed with the development of the Red Dog mineral deposit.

4. The State of Alaska states its intent to submit appropriate funding requests to the Alaska legislature in support of the DeLong Mountain transportation project.

5. The State of Alaska and Cominco, Alaska recognize that this Resolution of Intent does not limit or otherwise affect AIDA's Board of Directors' independent judgment with respect to AIDA's participation in the DeLong Mountain transportation project, nor does this Resolution of Intent limit or otherwise affect the independent judgment of the Alaska legislature upon its consideration of funding requests.

Date: Dec 18/1984

H. M. Giegerich, President
Cominco, Alaska

Date: Dec 17, 1984

Richard A. Lyon, Commissioner
Department of Commerce and
Economic Development

APPENDIX B

REQUEST FOR PROPOSAL FOR FINANCE PLAN

The Alaska Industrial Development Authority is inviting proposals to assist in preparation of a finance plan for a proposed transportation project in the DeLong Mountains area.

This RFP does not in any way obligate the Authority to reimburse recipients of this RFP for any costs incurred in the preparation of a proposal. The Authority reserves the right to reject all proposals. The Authority may request some or all respondents to clarify or supplement their proposals through additional written submission. All respondents will be notified in writing of the acceptance or rejection of their proposal.

I. Introduction and Explanation of Project

A. Alaska Industrial Development Authority:

The Authority was created by the Alaska Legislature in 1967. The purpose of the Authority, as stated in the Act, is to promote, develop and advance the general prosperity and economic welfare of the people of the State of Alaska, and to relieve problems of unemployment. In 1982, the Authority's enabling legislation was amended to add to its purpose the promotion, development and maintenance of an adequate supply of multi-family housing projects. Under legislation enacted in 1984, the Authority may acquire, manage and operate certain types of projects which the Authority considers necessary or appropriate to serve a public purpose. Under the newly enacted statutory authority, the Authority is presently reviewing the possibility of financing and constructing a transportation project in the DeLong Mountains area.

B. The Proposed Transportation Project

The proposed transportation project (sometimes also referred to herein as "the project") consists of two components; (1) a 55 mile segment of road, commencing near the Red Dog mine site and going to tidewater, and (2) a port, including shore facilities. The intent of the transportation project is to provide the necessary infrastructure to encourage mining development and regional port in the western DeLong Mountains area, in northwest Alaska.

The entire western DeLong Mountains is believed to be heavily mineralized. One mine site in particular has been extensively explored, and it is understood that this particular mine would be the initial user of the proposed transportation project. This mine would be based upon the Red Dog zinc, lead, and silver deposit. The Red Dog deposit is one of the richest in the world, having indicated reserves of 85 million tons of ore with an average grade of 17.1% zinc, 5.0% lead, and 2.4 ounces per ton silver. The mine would be developed as a joint project involving Cominco Alaska and the NANA Regional Corporation. The mine site itself would be developed by Cominco Alaska without any state involvement.

The transportation project would be owned and operated by AIDA. Users, such as Cominco Alaska would be charged a fee for use of this transportation system.

C. The Finance Plan

Before AIDA can proceed with a project which it intends to own and operate, it must first prepare a finance plan. The requirements of the finance plan are listed in AS 44.88.173, which is reproduced below. The purpose of this RFP is to fulfill the requirements of AS 44.88.173.

Sec. 44.88.173. Finance plan.

(a) Before approving a project financed under AS 44.88.172, the authority shall prepare a finance plan. The finance plan must include an estimate of the total cost of the project, and a description of the sources of money that will be used to finance the total cost of the project. The finance plan must also include an estimate of the operational costs of the completed project, as well as a description of the source of the money that is to be used to pay the operational costs.

(b) The authority shall give preference to a project that does not require financial assistance from the state. If the authority determines that a project requires state financial assistance, and if the authority further determines that it is desirable to finance the project, the authority shall recommend a method of financing that minimizes cost to the state. A finance plan required under (a) of this section must identify the method of financing that minimizes the cost to the state.

(c) The authority shall submit a finance plan prepared under this section to the state bond committee, the governor, and the legislature before issuing bonds or otherwise incurring debt for the project. If a project requires financial assistance from the state, the state financial assistance must be available before bonds are issued for the project. (¶ 8 ch 162 SLA 1984)

II. Terms & Conditions of Performance

A. Your proposal should be submitted with the understanding that it may form a material part of any subsequent contract. Your proposal should be complete as to all terms and conditions. After the contractor is selected the Authority may negotiate a contract with conditions considered in the best interest of the Authority. All terms and conditions must remain a firm offer for a period of not less than 60 days.

The proposal is due by February 15, 1985 (see Submission of Proposal section for details). The Authority expects to select a successful contractor by February 22, 1985. A complete first draft that is available and suitable for public distribution and comment must be completed by April 15, 1985.

Please note that the contract will not take effect until approved by the Commissioner of the Department of Administration pursuant to Alaska Statutes 36.98.040 (c).

B. Preparation of the finance plan requires the use of certain cost figures. In general estimates of these cost figures should be available from Cominco Alaska via the Authority. Some of these estimates will have been verified by the State Department of Transportation and Public Facilities, and/or by an independent contractor. It is not the intention of the Authority that a contractor employed as a result of this RFP prepare totally independent estimates of germane cost figures. Rather, a contractor should verify that cost estimates provided are reasonable, or make any modifications which the contractor believes are appropriate.

III. Scope of Services

A. Costs of the Project

1. Capital Costs: The contractor should provide an estimate of the capital costs of the project, broken down by major component.

2. Operational & Maintenance Costs: The contractor should provide an estimate of the Operational & Maintenance costs of the project, including an estimate of cost sensitivity to different use factors.

3. All estimates should be provided in 1985 dollars, and relevant cost escalators should be provided so that cost figures can also be estimated in future years dollars.

B. Revenues of the Project

1. The revenues of the project will be provided by fees charged to users of the project. All user fees should be in dollars per ton of ore shipped through the project, unless otherwise stated. Since no final user fee structure has been adopted by the Authority, alternative possibilities need to be examined. These alternatives must consider, at a minimum, the cases listed below.

   Some of the alternatives will require information specific to the proposed Red Dog mine. The contractor should assume that Cominco Alaska will, through the Authority, provide estimates of the capital costs and operational costs, including transportation costs, of the proposed mine, as well as estimates of ore production and the resultant concentrate tonnage that would be transported through the proposed road and port. A contractor may use these figures, or provide alternative figures.

2. The first set of alternatives assumes that the State will provide no financial assistance for the project. Since Cominco Alaska will be the initial user, baseline revenue projections should be based on Red Dog mine ore shipments. The contractor should provide estimates of different user fees, based upon: a range of price assumptions for zinc; a range of rates of return on investment to Cominco Alaska; a range of cost of capital to AIDA; other options deemed pertinent by the contractor.

3. The second set of assumptions assumes that the State is willing to make an unspecified amount of subsidy to the project, both to encourage its early completion and to account for its regional benefits. In this case, the contractor should select what it believes to be the "minimum rate of return on investment" required to induce a mining firm such as Cominco Alaska to make a major mining investment such as the Red Dog mine. More than one value may be selected for the "minimum rate of return", if the contractor believes a range of estimates would present a more accurate picture. Given this "minimum rate of return", the contractor is to estimate the amount of subsidy (if any) on the transportation project needed to cause the investment to be made. This should be estimated under a range of alternatives based upon differing assumptions for the: price of zinc; cost of capital for AIDA; other options deemed pertinent by the contractor. For all of the various alternatives estimated above, the contractor should indicate the cash flow to the project and the implied user fee structure of this cash flow. For any given level of subsidy, the contractor should indicate how the rate of return to the mine investor is affected depending upon whether this subsidy is used to offset the construction cost of the transportation project, or is reflected in deferred imposition of user fees on the project, or some combination thereof.

4. A proposal has been made to charge a certain user fee schedule to Cominco Alaska for its use of the proposed transportation project. This proposal will be made available to the successful contractor.

   Using the proposal and using the assumptions of the earlier alternatives with respect to costs and production, the contractor is to estimate: the implied rate of return to Cominco Alaska on its mine investment, and the amount of subsidy, if any, implied in the proposal. The contractor should state specifically what assumptions are being used for key variables (e.g. price of zinc) in this analysis, and further should discuss how sensitive the results are to changes in these key variables.

5. There are potential users of the transportation project other than Cominco Alaska for the Red Dog mine. The contractor should demonstrate how the above results would change if other users were to utilize the transportation system. Estimates of the production volume attributable to other users will be available from AIDA, however an independent estimate should also be made by the contractor.

C. Financing Options

1. The intent of the Finance Plan is to develop a financial plan that will provide adequate resources to enable a project to be undertaken and completed, while at the same time minimizing the costs both to the State and to the proposed project. As such, any proposed plan that will not realistically provide for enough resources to complete the proposed project is, by definition, not a Finance Plan.

2. The contractor should examine the question of debt financing for the project. At a minimum, the following questions should be answered:

- What forms of debt financing are available, and under what conditions?

- From a financial perspective, how much of the proposed project can be debt financed, and under what conditions?

- What types of security will be required for debt financing, and what are the possible interest rates for various types of financing?

3. If State financial assistance is required, it could come in a variety of forms. The contractor should consider different types of State assistance, such as a cash grant, low or deferred interest loans, appropriation of capital reserve funds, and so forth. The attributes of different types of assistance should be discussed, included specific advantages and disadvantages to the State, or to the financial feasibility of the project.

4. The contractor should consider these various financing options for both the construction phase, and the term financing. That is, one type of financing may be more appropriate during construction, whereas a different option may be better for term financing.

D. Presentation of Alternative Finance Plans

1. The contractor is to provide a series of alternative total Finance Plans. The term total Finance Plan refers to including financing during construction as well as term financing. At a minimum, the contractor must include as alternatives: (1) The Finance Plan involving the minimum cost to the State; (2) the option proposed by Cominco Alaska; and (3) an option that utilizes the maximum possible tax exempt bonding. Other options having particularly favorable attributes should also be included, up to a maximum of eight alternative Finance Plans.

2. The advantages and disadvantages of each plan should be discussed. At a minimum, each plan should include the total costs of the project; the costs, if any, to the State; the estimated rate of return to Cominco Alaska; the proposed cash flow and user fee structure; and explicit listing of key assumptions.

3. The models used to develop these alternatives must be available at no additional costs to the Authority. If requested by the Authority, the contractor will make these available in a computer ready manner that can be loaded on the Authority's equipment (see Appendix A).

E. Presentation of Results

An integral part of this study is satisfactory presentation of findings. These presentations would include at a minimum interim reports as requested by the Authority, an initial completed draft report, and a final report. In addition, the contractor must be available to make presentations to the Governor, other members of the administration and to various legislative committees during, and after, the course of the study.

F. Fees

A contractor should provide a fixed price bid for the entire contract. Also, an hourly charge should be provided for any work done at the request of the Authority after the completion of the project described in this R.F.P. The Authority has budgeted approximately $250,000 to $300,000 for this study.

IV. Method of Evaluation

An evaluation system will be utilized to review the proposals. The factors to be considered will consist of:

(i) a work plan which addresses the scope of services set forth in Section III of this RFP

(ii) proposed staff;

(iii) experience of respondent in performing an analysis of the feasibility of comparable capital facilities; and

(iv) availability of respondent to confer with staff of the Authority and to complete the feasibility study within the contemplated time frame.

In addition, the Authority may elect to conduct oral interviews with some or all of the respondents, and if oral interviews are conducted, the interviews will be considered in the award of the contract.

V. Submission of Proposals

Proposals may be submitted by providing 6 copies of your proposal to:

Bertram L. Wagnon, Executive Director
Alaska Industrial Development Authority
1577 "C" Street, Suite 304
Anchorage, Alaska 99501

Proposals must be received at the offices of the Alaska Industrial Development Authority, 1577 "C" Street, Suite 304, Anchorage, Alaska, 99501, no later than 3:00 p.m. on February 15, 1985. The proposer is solely responsible for the delivery of their proposal and proposals received after the above date and time will be rejected.

Each proposal should be clearly marked "Proposal to the Alaska Industrial Development Authority" on its outside cover. All proposals will remain sealed and unopened until after 3:00 p.m. on February 15, 1985.

APPENDIX A

TECHNICAL SPECIFICATIONS

COMPUTERS:	WANG VS 80	with a 308K-Byte Diskette Drive (S.S.,S.D.) and a Phoenix Disk Drive (75M Fixed Disk & 15M removable pack).
	WANG PC	5 1/4 inch, 360KB Diskett Drive, 256 KB or RAM and Asynchronous Serial Communications Port.
MODEMS:	RACAL VACIC	Full Duplex, 0 to 300 BPS, Asynchronous Full Duplex, 1200 BPS, Asynchronous or Synchronous Half Duplex, 2400 BPS, Synchronous
TELECOPIER:	XEROX 295	Group three digital facsimile, 9600 BPS with automatic fall-back to 7200/4800/2400 BPS based on line quality; transmission speed of 25 seconds average.

Geoffrey G. Snow, President

Noranda Exploration, Inc.

Joint Resources and Special Committee on Loans

Briefing

Friday, February 8, 1985

Mr. Chairmen, members of the committee - Thank you for the opportunity to brief you today. Noranda Exploration, Inc. is the wholly-owned subsidary of Noranda Inc. Noranda Inc. is a major Canadian mining company and a major zinc producer. Noranda mines produce (in 1982) about 625,000 tons of zinc per year, or close to 15% of world consumption. Zinc is important to Noranda's earnings. A 10% change in the price of zinc (4¢ today) affects Noranda's earnings 30%.

I am employed because Noranda's mines are being depleted. In order to survive, a mining company must replace material mined-out. Noranda can look any were in the world, but our organization has focused on the western Brooks Range. We have just concluded an agreement with GCO Minerals that permits us to examine a large claim block in the DeLong Mountains.

Why did we select the DeLong Mountains? Figure 1 shows where zinc has been mined. Most was from the Mississippi Valley. We are not looking there because, at today's prices and costs, the 6% average grade is not attractive.

Further we think the environment labled volcanic-exhalitive has greater potential. Figure 2 shows where reserves are.

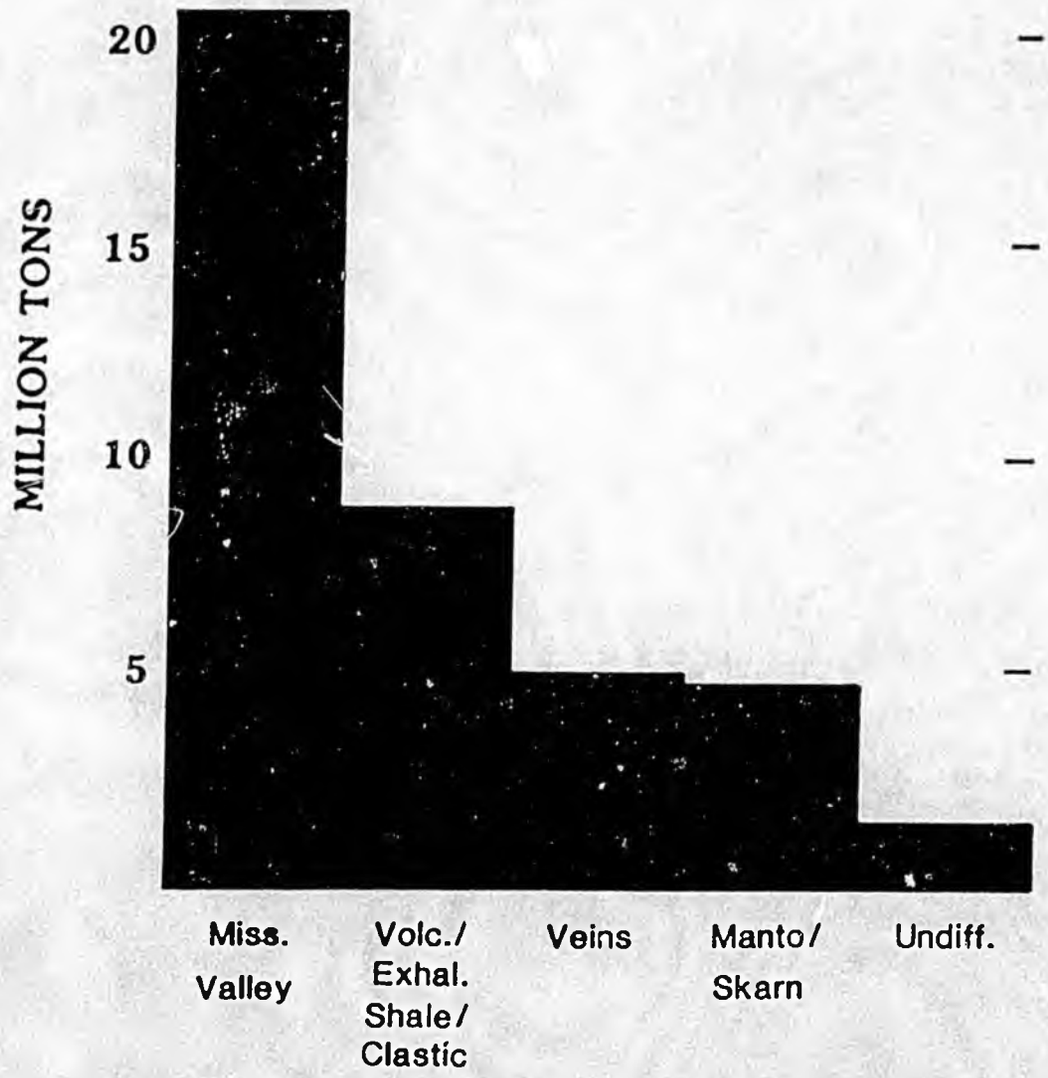
The Red Dog geologic environment is analogous to others in the world, for example the Selwyn Basin of the Yukon. There 10 deposits, ranging in size from 20 to 100 million tons, are in similar rocks over a length of 200 miles.

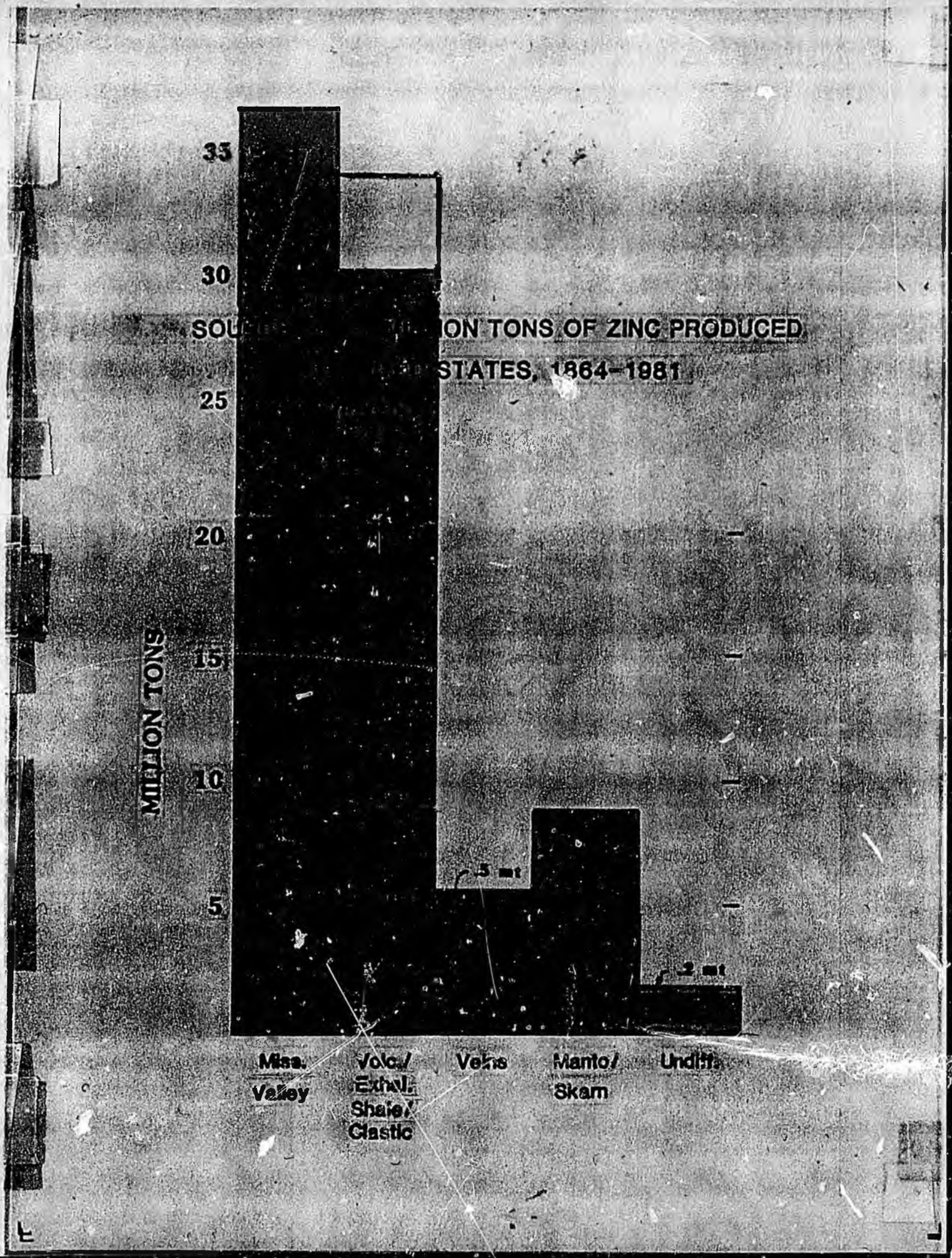
The point for me as an exploration geologist and for you as legislators is that deposits of this type occur in clusters. Noranda hopes to discover others in the Red Dog-Lik cluster.

We are not looking in the Yukon because that is too far from tide water. We are attracted to the DeLong Mountains because tide water is close. We are attracted because there is the possibility of a road to that water. We are attracted because Alaska's tax structure does not penalize those who produce.

The viability of mining operations is directly related to the capital required. A road into the DeLong Mountains will encourage exploration. Because of the clustering nature of deposits of this type, discoveries will hopefully result. Once started the DeLong Mountain zinc belt can provide long term employment, social benefit and new wealth to Alaska.

SOURCE OF 42 MILLION TONS OF ZINC PRODUCED
IN THE UNITED STATES, 1864-1981





SOU ION TONS OF ZINC PRODUCED,
STATES, 1864–1981

David S. Kennedy
Senior Geologist
GCO Mineral Company

Joint House Resources Commmittee and
House Special Committee on State Loans
Committee Hearing

Friday, February 8, 1985

Mister chairman, members of the committee:
On behalf of GCO Minerals Company, I appreciate this opportunity to testify before you in support of an important mine development in Alaska. My name is David Kennedy, and I am a Senior Geologist for GCO. First of all, let me provide a brief background of GCO Minerals Company. GCO is a wholly-owned subsidiary of International Paper Company. International Paper Company, one of the largest wood products companies in the country, provides the wood products component of the Dow Jones Index. Annual sales in 1984 were in excess of four billion dollars. Until the Native Claims Settlement Act in Alaska, IP was the largest private land owner in the country. IP is still one of the largest private owners of real estate in the world, owning approximately seven million acres of timberland in the U.S.

To help illustrate the magnitude of probable mine development in northwestern Alaska, in addition to Red Dog, I would like to

give a very brief review of GCO's DLM project and then provide some order-of-magnitude operational and financial data for the Lik deposit.

GCO has carried out exploration in Alaska since 1969 and has conducted a continuous exploration program in the DeLong Mountains region since announcement of significant lead-zinc mineralization at Red Dog on D-2 lands in 1976. To date, GCO has expended approximately twenty million dollars on this project, delineated significant zinc-lead ore reserves in the Lik deposit which is located approximately twelve miles northwest of Red Dog and maintains over 6,000 federal and state mining claims. These mining claims contain other good mineral showings which occur within ten to fifteen miles of the proposed right-of-way. An agreement between GCO and Noranda Exploration for further aggressive exploration on these mineral claims has been recently consumated.

Prior to 1984, over 100 holes totalling more than 60,000 feet were drilled on the Lik deposit. Ore reserves indicated by this drilling were approximately 25,000,000 tons containing 12% combined zinc and lead with approximately 2 oz/ton silver. Exploration drilling this past summer resulted in the discovery of an extension to the known deposit which we feel confident will double the present reserves.

Conceptual engineering design and order-of-magnitude feasibility studies have been carried out for the Lik deposit.

These studies indicate a mine operation with the following parameters:

1) A mine operating at approximately 5,000 tons per day. Initial production will come from a small open pit with an underground mining system being introduced in later years.

2) Capital costs exclusive of a road and port would be in the order of 300 million dollars.

3) Concentrate production would be in the range of 275,000 to 350,000 tons per year with higher production occurring in early years due to selective mining of higher grade reserves near the surface.

4) The Lik operation would be connected to the DeLong Mountains Transportation system by a spur road 14 to 25 miles in length.

5) Direct full-time employment generated by the Lik operation will be in the order of 300 jobs at start-up with an additional 20% added at the point of phasing-in the underground operations.

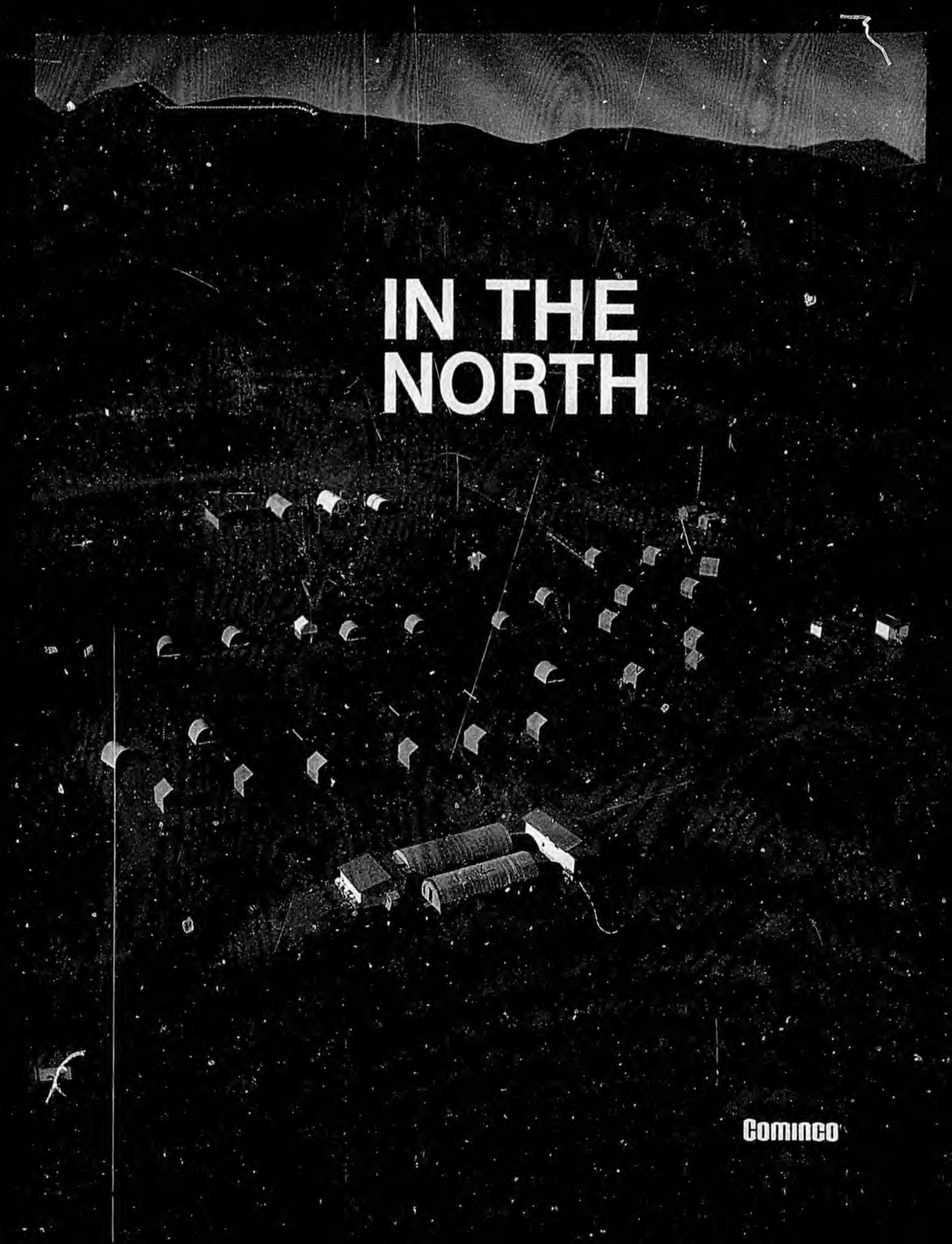
6) The importance of the 1984 exploration results is a potential increase in mine life to at least 30 years.

We have not at this point calculated a dollar value for the benefits that will accrue to the state from this additional mine development. However, implications from the Lik conceptual mine plan in addition to those previously stated for the Red Dog mine clearly show long term economic benefits for Alaska.

There is no question that state aid in financing of the road and port will speed the development of Red Dog and make possible additional mine developments such as Lik in the region. We are confident that the road and port will make the Lik deposit economically viable. The importance of the road and port project and the Red Dog mine to mine development in Alaska can be illustrated by an analogy with north slope oil development. Red Dog would be analogous to Prudhoe Bay development in the mid 1970s, and subsequent development of the Lik deposit and others would be analogous to development of the Kuparik, Milne Point and Endicott reservoirs.

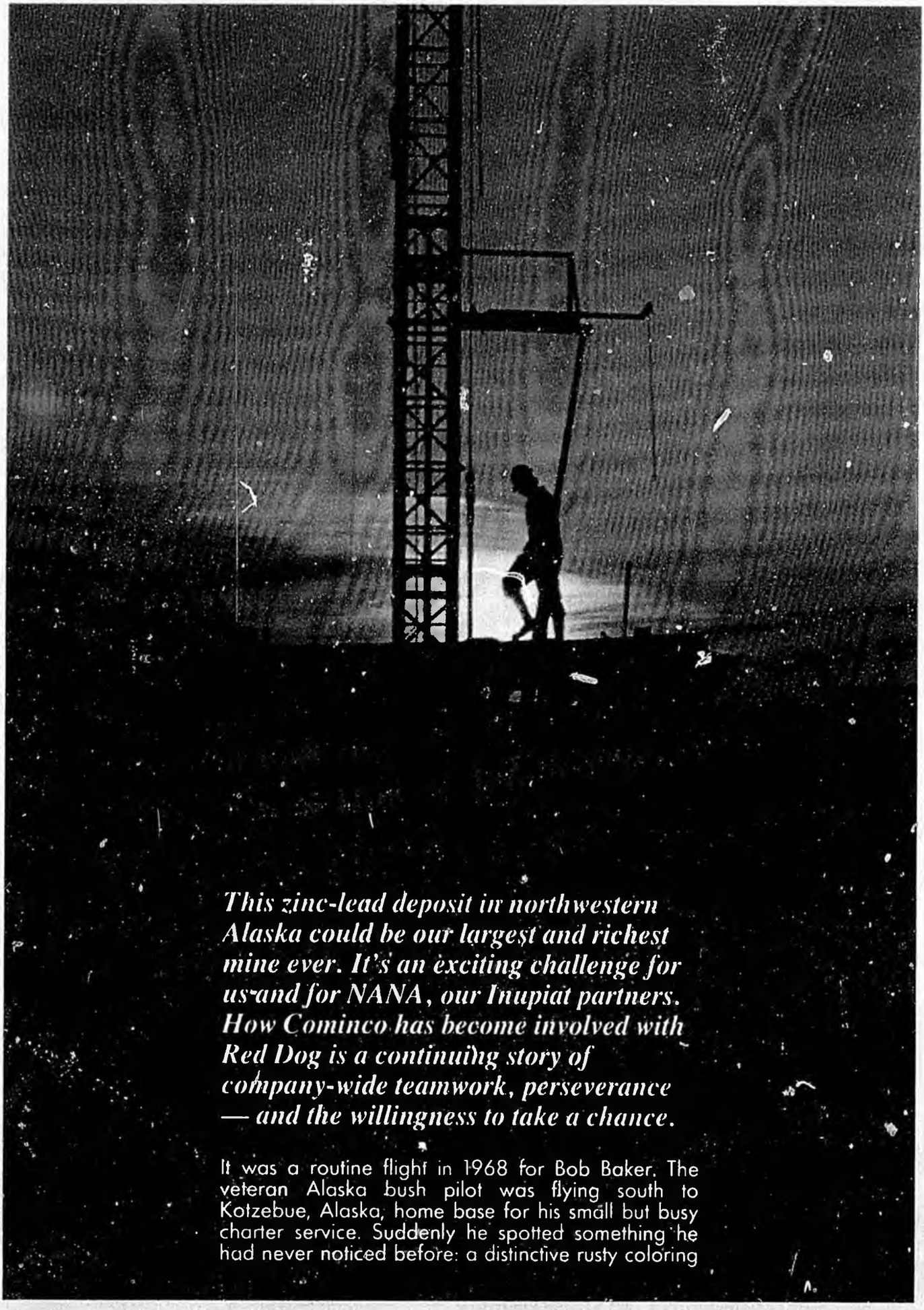
In conclusion, GCO strongly endorses the Red Dog Project, as it will be the first major mine development in Alaska in over 50 years. In view of Cominco's unparalleled experience in mine development in arctic environments, the Red Dog project should set a very positive precedent for mine development in Alaska and is thus deserving of broad support from the state and the public. GCO believes that the state involvement in the development of the DeLong Mountains Transportation system will

not only enhance the opportunity for development of mineral deposits in addition to Red Dog, but will be the first step in the creation of a viable mining industry in the state of Alaska.


IN THE
NORTH
Cominco

Cominco's commitment to the North spans 50 years. Our Arctic operations range from Alaska in the west to Greenland in the east.

We are proud of our northern ventures and our achievements. As Northerners, we look forward to expanding our horizons with exciting new developments here in Alaska.



This zinc-lead deposit in northwestern Alaska could be our largest and richest mine ever. It's an exciting challenge for us and for NANA, our Inupiat partners. How Cominco has become involved with Red Dog is a continuing story of company-wide teamwork, perseverance — and the willingness to take a chance.

It was a routine flight in 1968 for Bob Baker. The veteran Alaska bush pilot was flying south to Kotzebue, Alaska, home base for his small but busy charter service. Suddenly he spotted something he had never noticed before: a distinctive rusty coloring

in a creek and the surrounding hills. Bob Baker had done some prospecting in his spare time and was curious about what these colors might indicate. He mentioned his sighting to Dr. Irving Tailleur of the United States Geological Survey. Dr. Tailleur followed up, and ultimately made the first report of the mineralization that is now called Red Dog.

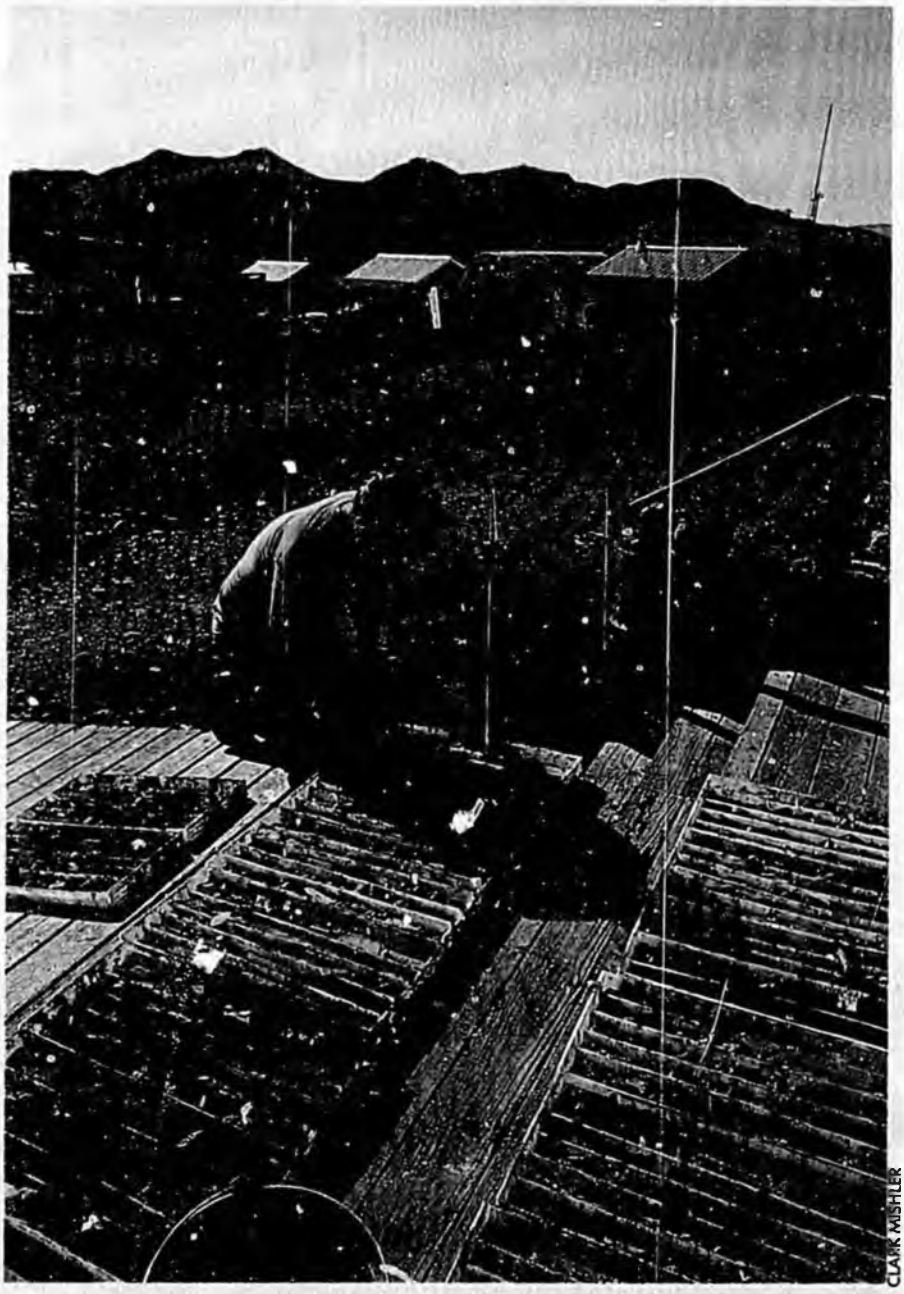
From this chance beginning may develop the largest and richest open-pit zinc and lead mine ever. The prospective mine, now in the early planning stage, has a potential life of 50 years with the probability of extension if new ore is discovered. Diamond drilling now indicates 77 million tonnes of ore, with grades of 17% zinc, 5% lead and 2.6 ounces per tonne of silver.

"The magnitude of Red Dog and our nearby properties will influence the world zinc and lead mining industry for decades," says Norman Anderson, Cominco's Chairman and Chief Executive Officer. "Red Dog is likely to be as important to Cominco in the next century as the Sullivan mine has been in this century."

Magnificent discovery

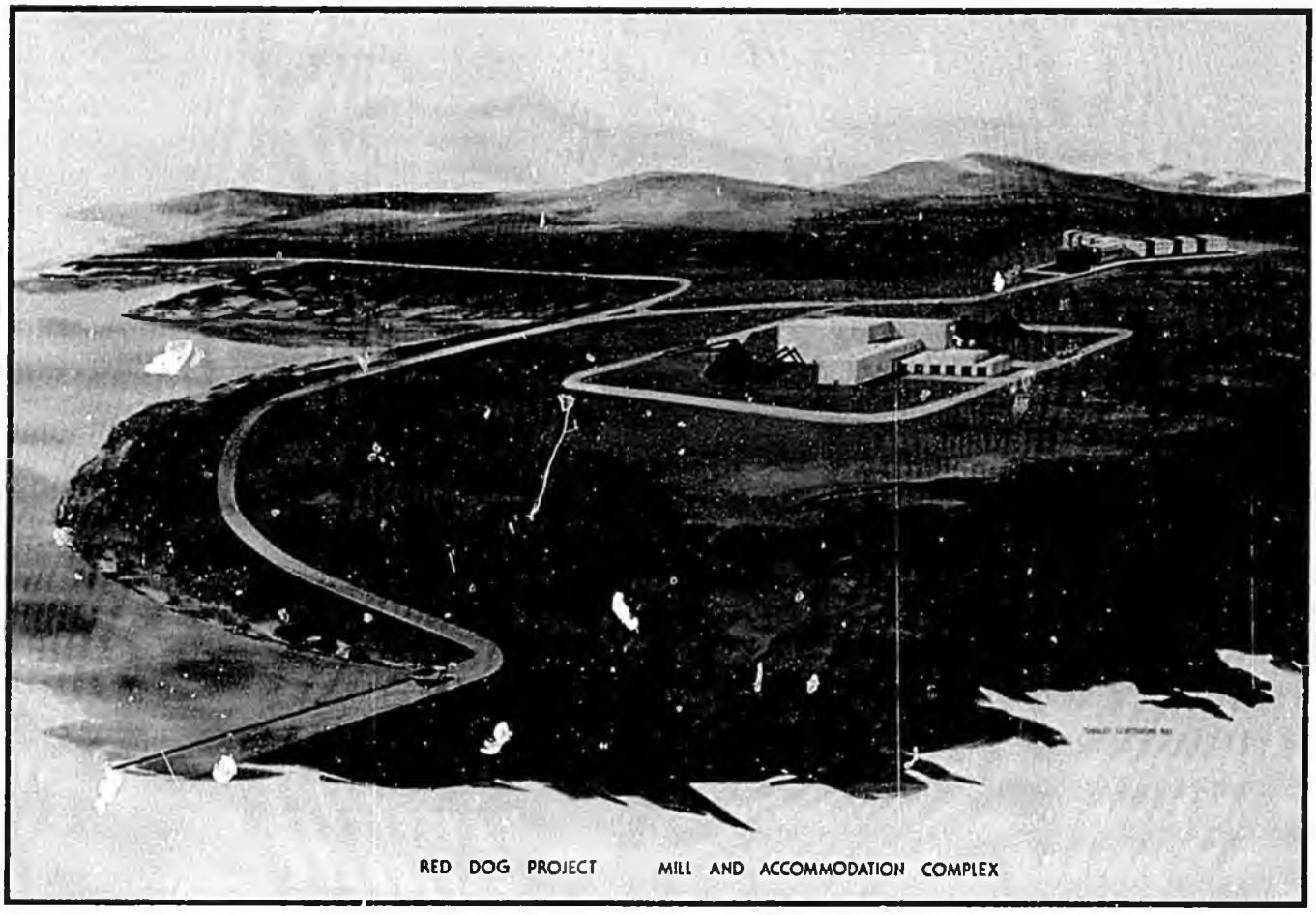
The deposit is 145 km north of Kotzebue and 115 km east of Kivalina on the Chukchi Sea (see map). Its isolation, environmental aspects, the

CLARK MISHLER

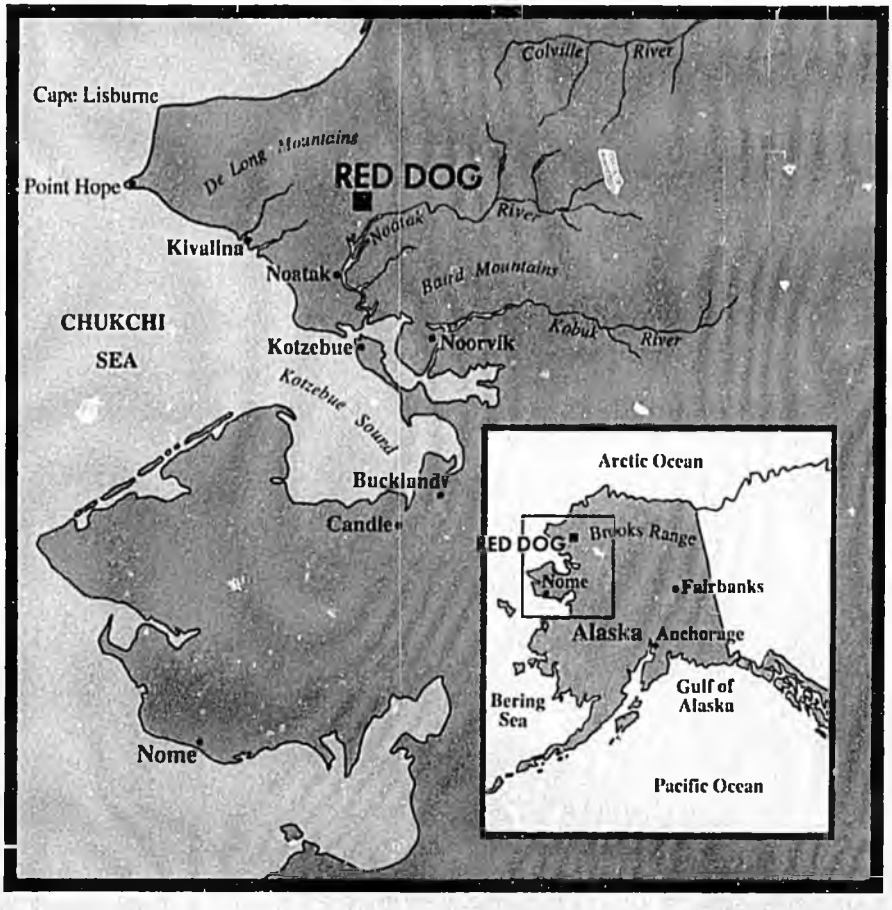


CLARK MISHLER

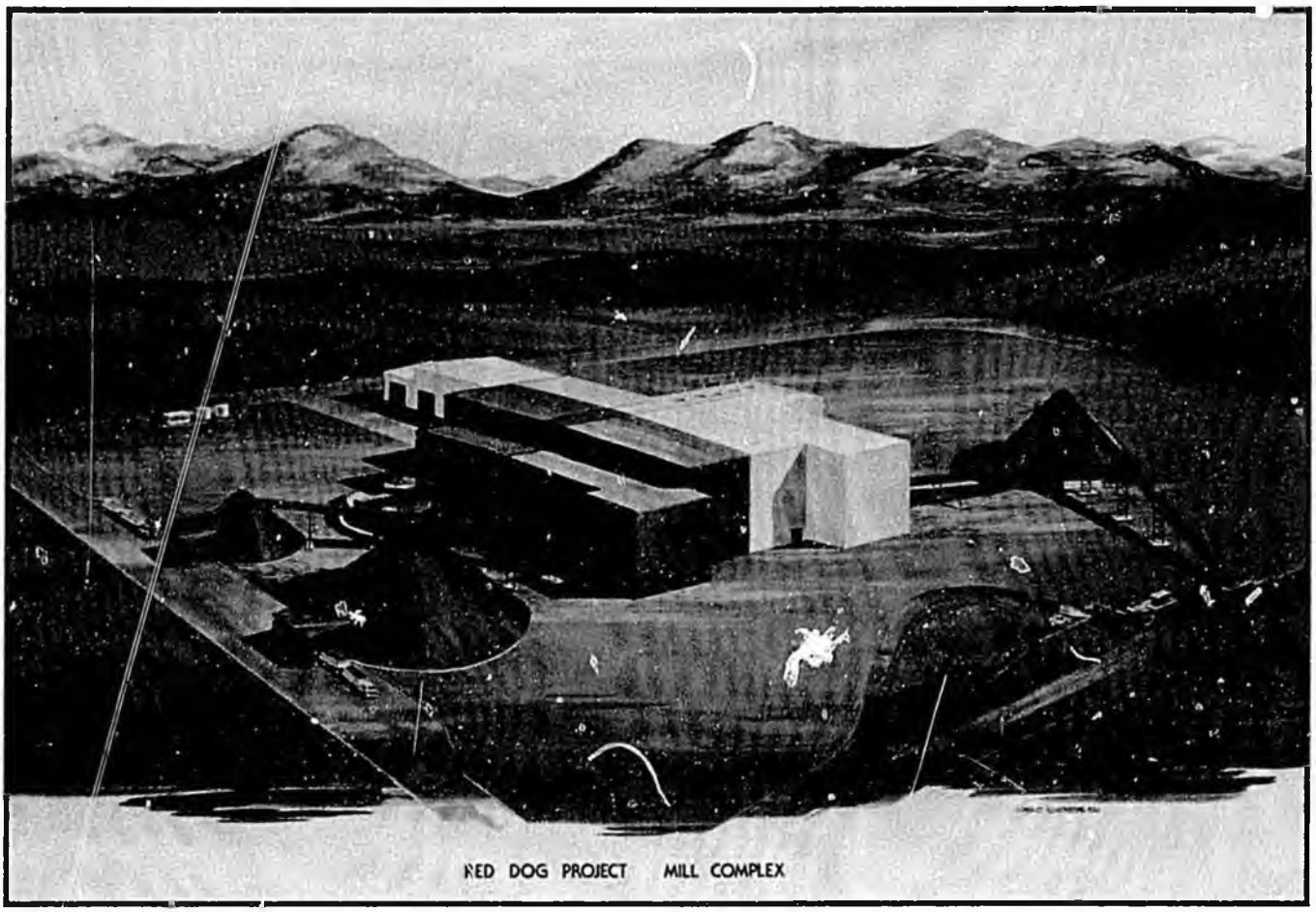
***Top right:** Diamond-drilling at Red Dog is a summer-long activity.* ***Right:** Core samples indicate very high grades of zinc and lead.* ***Above:** Rock samples arrived at Trail, B.C. for metallurgical assessment. The ore belongs to the same class of deposit as the Sullivan Mine at Kimberley, B.C.*
◀ *Drill crews work 24 hours a day during the long daylight hours of the Arctic summer.*



RED DOG PROJECT MILL AND ACCOMMODATION COMPLEX



Top: Artist's impression of the mine site. The mill is in the foreground, concentrate storage building to the right and accommodation complex in the background. Tailings from the mill will form the pond at left. Engineering studies have identified the optimum locations for surface facilities.
Above: Surveying for drill locations and engineering studies is carried out with laser equipment.



Top: Design of the mill complex is nearly complete. The larger dome structure is for zinc concentrate, the smaller is for lead.
Above: A 1,500-metre air-strip at top right, providing the only current access to the site, was constructed at Red Dog in the summer of 1982.

large capital expenditure required to build the mine and the concentrator and the current depressed prices for zinc and lead are all factors that must be considered before Red Dog gets the go-ahead. Still, this "magnificent discovery", as the *Northern Miner* recently described it, could be a producing mine as early as 1987.

The official beginning of the Red Dog story for Cominco was February 5, 1982, when Cominco American Incorporated and the NANA Regional Corporation reached agreement to proceed with the exploration and potential development of the deposit.

But there was a lot of spadework before that event. In 1970, Dr. Tailleur of the U.S. Geological Survey filed an "open report" on the occurrence of zinc, lead and barite in the area. (An open report is a preliminary report to which the public has access.)

About this time it became unclear whether the area would ever be opened for mining. The passage of the Alaska Native Claims Settlement Act of 1971 resulted in a program of evaluation of the resource potential of lands being considered for inclusion in parks and wilderness areas. In 1973, the land containing the Red Dog deposit was withdrawn from staking.

Like the Sullivan

In September 1975, the U.S. Bureau of Mines issued a press release on its exploration program in the Red Dog area. Cominco American had exploration crews on the Seward Peninsula, 300 km to the south, and the government announcement prompted Cominco American to take a close look at Red Dog. Cominco recognized it as an occurrence with great potential. It was a sedimentary deposit just like the Sullivan, a producer for Cominco for nearly 80 years.

Although the Red Dog prospect could not be staked because it was located on withdrawn land, land close by could be staked and explored. Intensive exploration of the area began in 1976, and has continued every year since.

In 1976, the NANA Regional Corporation filed a Regional Corporation Selection Application with the Bureau of Land Management, covering the Red Dog deposit. However, it was the opinion of Cominco's lawyers that NANA's selections might be invalid.

In 1978, the 1973 withdrawal expired, and on December 18, Cominco American staked the Red Dog deposit. It was deep in the Arctic winter, with its limited daylight, severe cold and high winds.

In 1980, Cominco American moved a drill onto the claims. Eight holes were drilled, of which five showed spectacular results. However, action by the Bureau of Land Management caused Cominco to cease drilling. Cominco's claim to the deposit conflicted with that of the NANA Regional Corporation.

It was not until the passage of the Alaska National Interest Land Conservation Act, in December, 1980 during the last days of the Carter administration, that NANA's right to select was reaffirmed.

Mining beneficial

The people of the NANA region had, by 1979, come to the viewpoint that mining could be beneficial. It could provide jobs while traditional values were still protected. Cominco knew that the sensible long-term solution was to show NANA that an agreement with the company would be mutually advantageous.

To convince NANA, Cominco invited six of its leaders to observe the company's operations in the north. They went to Pine Point; to the Con gold mine in Yellowknife; to Polaris on Little Cornwallis Island, Northwest Territories; and to the Black Angel Mine in Greenland. They were able to meet privately with local Indian, Inuit and Greenlandic Inuuk leaders at these locations, to hear whatever these local people wanted to tell them about Cominco.

Cominco also shared with NANA the results of the drilling, preliminary metallurgical testing and early-stage feasibility studies. After the trip, Cominco did further drilling at Red Dog, and with these results in hand, settled down to serious negotiation, culminating with the agreement signed in Kotzebue, on February 5, 1982.

Although any go-ahead decision on Red Dog is still at least a year away, the project demonstrates once again the value of some old virtues, particularly perseverence and making the fullest use of one's resources. The project has benefited by contributions from the diverse talents of scores of Cominco people in different countries. It was and remains a great team effort.

— George Tikkanen

This distinctive red and orange coloring led to the Red Dog discovery

What does it mean?
Red Dog

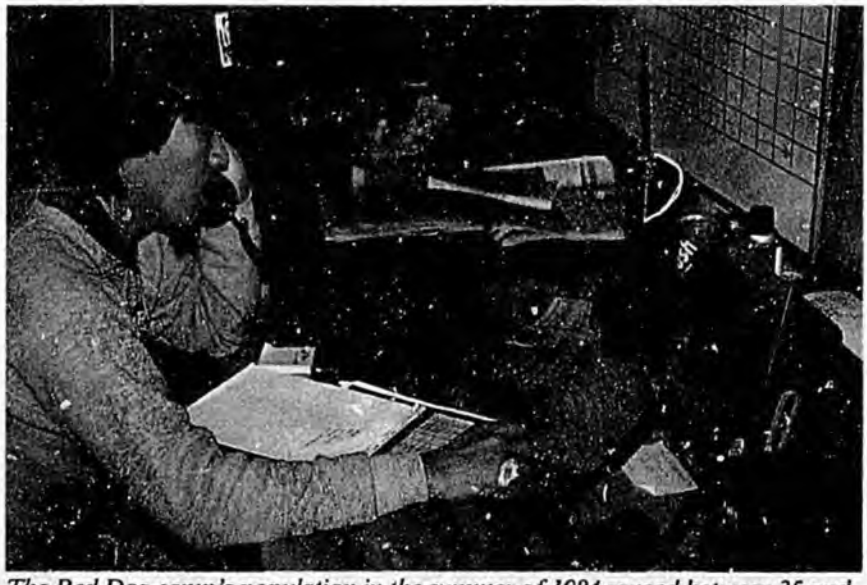
Red Dog is Cominco Alaska's rich prospect in northwestern Alaska, and we will be hearing a lot about Red Dog in the future. But isn't that a strange name for a mine?

In the late 1950s, bush pilot Bob Baker operated a charter service out of Kotzebue and in his spare time did some prospecting in the region. Baker's small prospecting company, The Red Dog Mining Co., was named in honor of Baker's pet dog O'Malley, a reddish-colored dog with a Heinz pedigree.

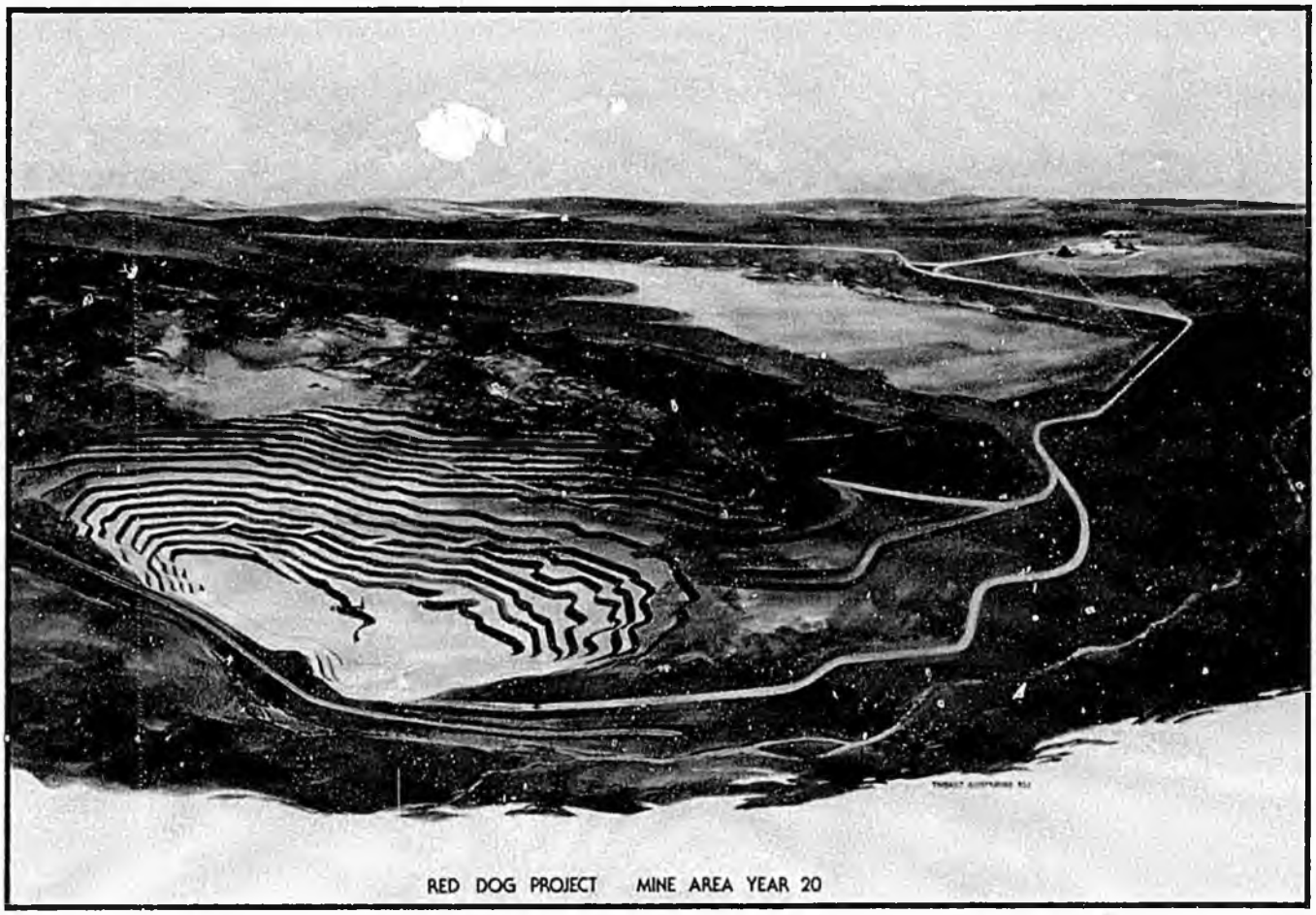
While flying over northwest Alaska, Mr. Baker noted conspicuously red and orange stained hillsides in the DeLong mountains and surmised that they indicated mineralization. Irving Tailleur of the U.S. Geological Survey, who often flew with Baker, was advised by Baker to take a closer look at the hillsides. When he did, Dr. Tailleur named the place Red Dog on his maps.

Tragically, Baker was killed flying a 1968 mercy mission and never heard the initial results of his eagle-eyed observation: he had spotted one of the biggest and richest zinc-lead deposits on earth.

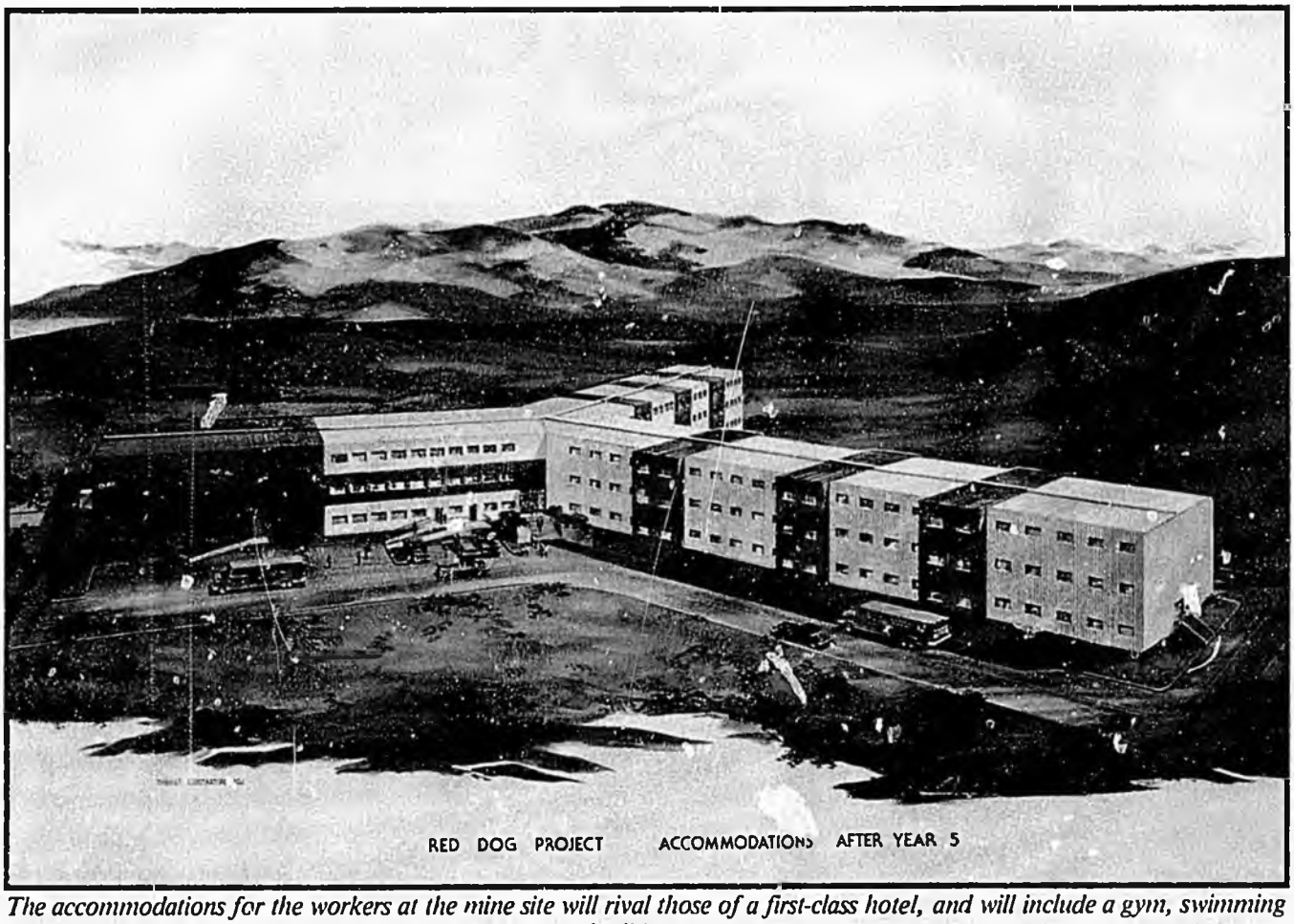
Cominco American's involvement came about through quick response to a bulletin issued by the U.S. Bureau of Mines about Red Dog in 1975.



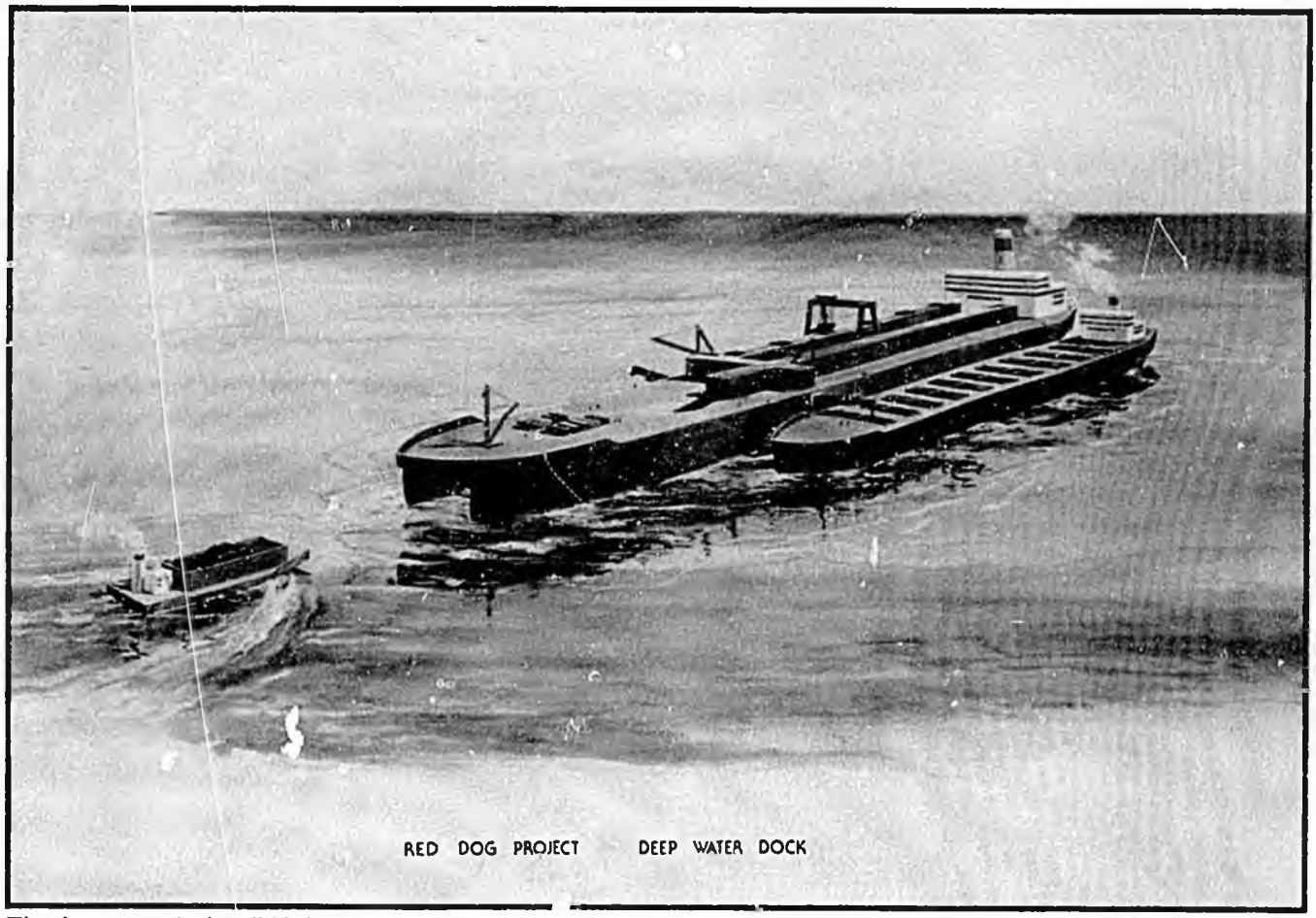
The Red Dog camp's population in the summer of 1984 ranged between 35 and 40 and many of the workers were NANA shareholders. All communication is by radio and is maintained on a round-the-clock basis.



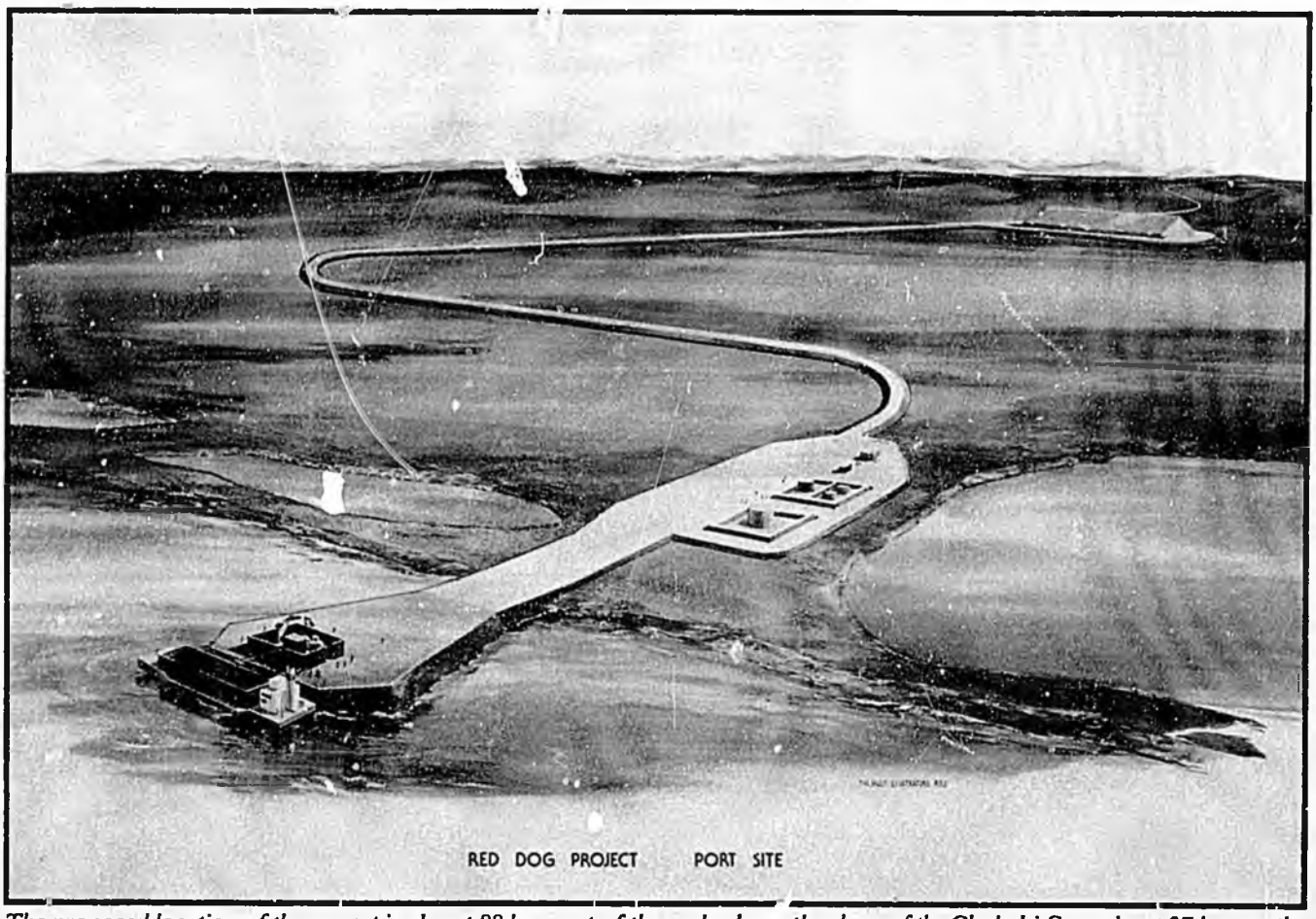
The actual open-pit mine area is quite small; the main deposit is 1,360 metres long and varying from 60 metres to 430 metres in thickness. Current reserves and mining plans give a mine life of 50 years; the sketch shows the operation at year 20.



The accommodations for the workers at the mine site will rival those of a first-class hotel, and will include a gym, swimming pool and a library as well as the mine's administration facilities.



The deepwater dock will likely be a former oil tanker ballasted 11 metres down to the seabed. Serviced by lighters, the ship could hold 65,000 tonnes of zinc concentrate, 35,000 tonnes of lead concentrate and 38 million litres of fuel oil.



The proposed location of the seaport is about 88 km west of the orebody at the shore of the Chukchi Sea, about 27 km north-east of Kivalina.

0 7 3 8 2

NANA

Our Alaskan partner

ROB STAPLETON/NANA

In Alaska, Cominco enjoys a unique partnership with 4,700 Inupiat Americans in the potential development of the Red Dog zinc-lead-silver deposit. NANA is the corporate name for one of 12 Alaskan regional corporations formed as a result of the Alaska Native Claims Settlement Act of 1971. Red Dog, and the prospective overland routes to the sea, lie within the NANA region.

The formal agreement between Cominco American Inc. and NANA Regional Corporation, Inc., whose shareholders are all Natives, calls for minimum payments by Cominco to NANA of $1 million a year.

But it's much more than a business arrangement. For the people of NANA it's another step in strengthening their economic base while continuing to

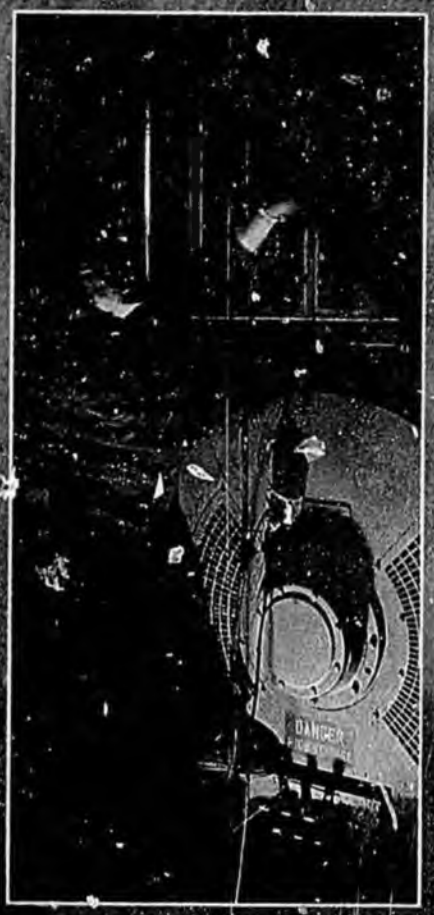
preserve their important traditions.

And for Cominco, it's also an engineering challenge and the opportunity to make further progress in our remarkable and pioneering record in working harmoniously with Native northerners, including Inuit in Canada, and Inuuk in Greenland.

NANA Regional Corporation, Inc. was created to improve and expand the assets acquired by the Inupiat in northwestern arctic Alaska under the U.S. Alaska Native Claims Settlement Act. This Act provides for the Corporation's share of US$962 million given to them from the Alaska Native Fund and a 16-million-hectare land settlement made with them and the other similarly organized Native corporations in Alaska.

NANA's symbol is an Eskimo

Opposite page: The traditional and the contemporary are important in NANA's programs. Here, children learn how to weave a wind shelter under the direction of elder Silla Sheldon. This page, right: In addition to electrical power generation (seen here), NANA is involved in oil activities in the Beaufort Sea. NANA's symbol is a stylized Eskimo hunter.



FRANK P. FLAVIN

FRANK P. FLAVIN

hunter moving aggressively toward a successful future in a vast, beautiful, and sometimes harsh world," says its 1982 Annual Report. "NANA is all of us together as one hunter successful if we are of one mind and purpose, hungry if we are split by doubts and mistrust of each other. As one hunter is small and insignificant when compared to our environment so is NANA when compared to the corporate and governmental environment in which it must hunt successfully to survive."

NANA Class A shares are held by Natives enrolled as residents of villages in the region, and Class B shares are held by Natives enrolled in the region but not registered as residents. Each shareholder is issued 100 shares of stock, and these cannot be sold or transferred until 1991.

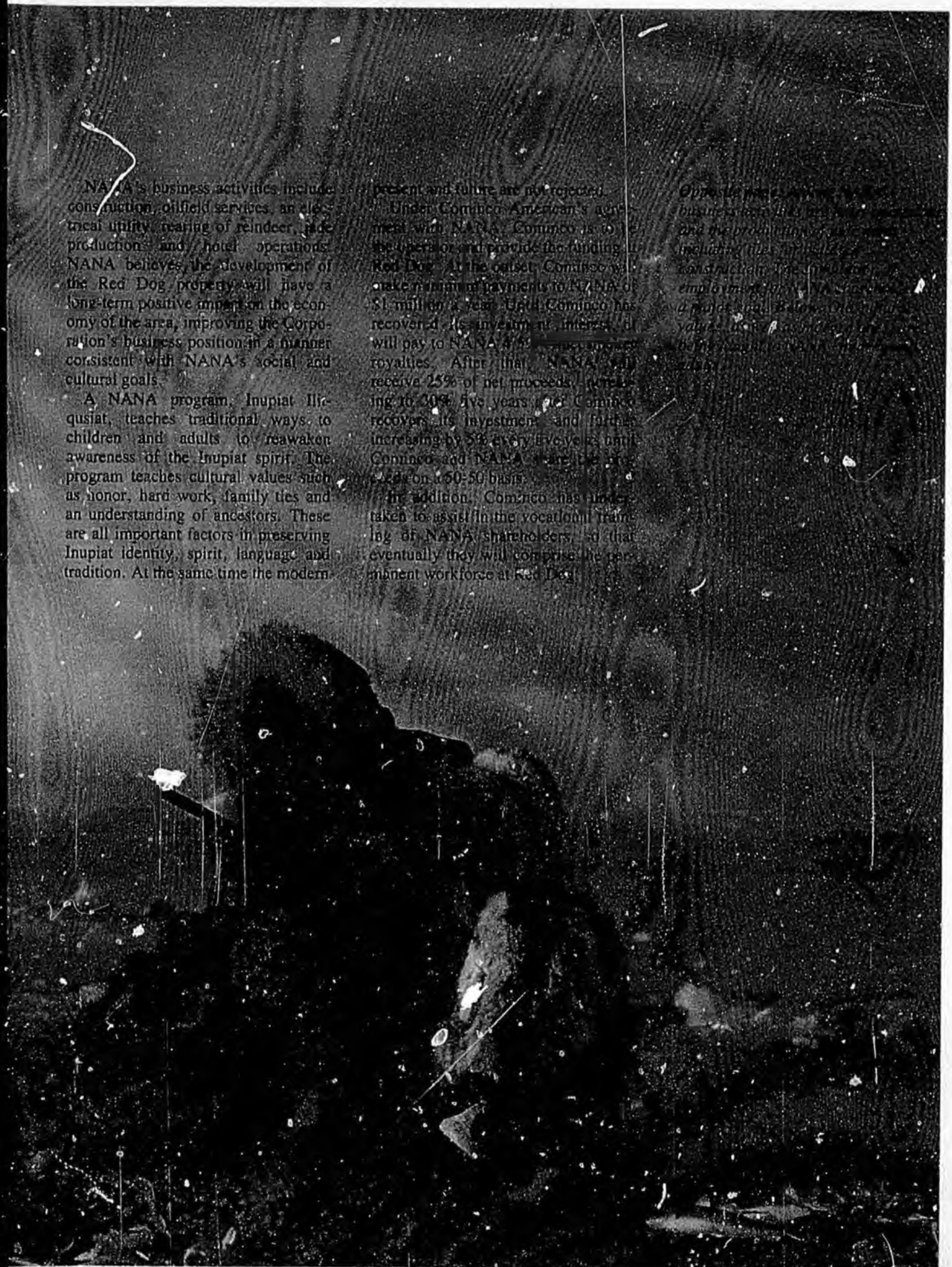
NANA's business activities include construction, oilfield services, an electrical utility, rearing of reindeer, jade production and hotel operations. NANA believes the development of the Red Dog property will have a long-term positive impact on the economy of the area, improving the Corporation's business position in a manner consistent with NANA's social and cultural goals.

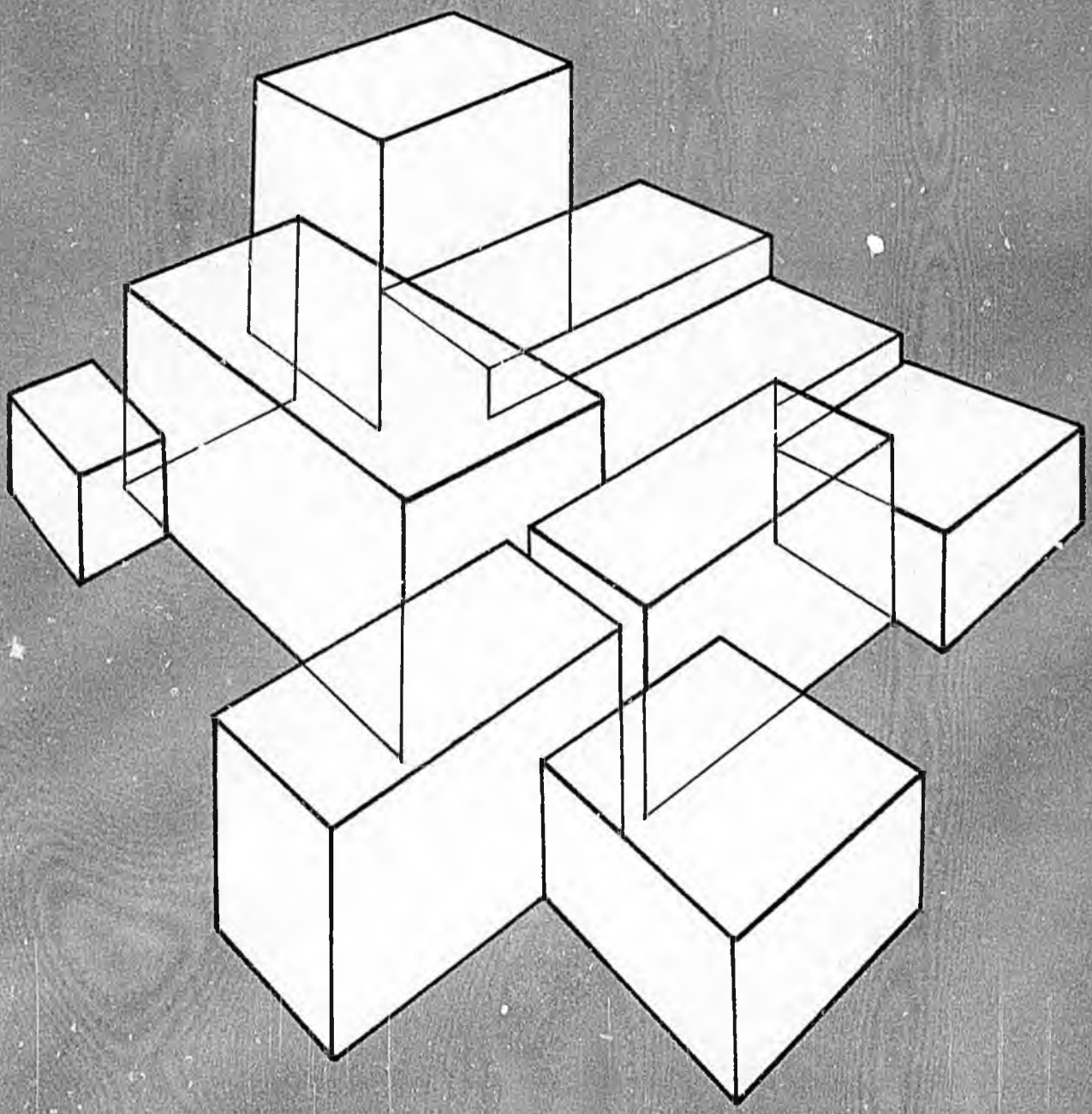
A NANA program, Inupiat Ilicqusiat, teaches traditional ways to children and adults to reawaken awareness of the Inupiat spirit. The program teaches cultural values such as honor, hard work, family ties and an understanding of ancestors. These are all important factors in preserving Inupiat identity, spirit, language and tradition. At the same time the modern

present and future are not rejected.

Under Cominco American's agreement with NANA, Cominco is to be the operator and provide the funding for Red Dog. At the outset, Cominco will make minimum payments to NANA of $1 million a year. Until Cominco has recovered its investment, interest, it will pay to NANA a 5% [illegible] royalties. After that, NANA will receive 25% of net proceeds, increasing to 30% five years after Cominco recovers its investment and further increasing by 5% every five years until Cominco and NANA share the proceeds on a 50-50 basis.

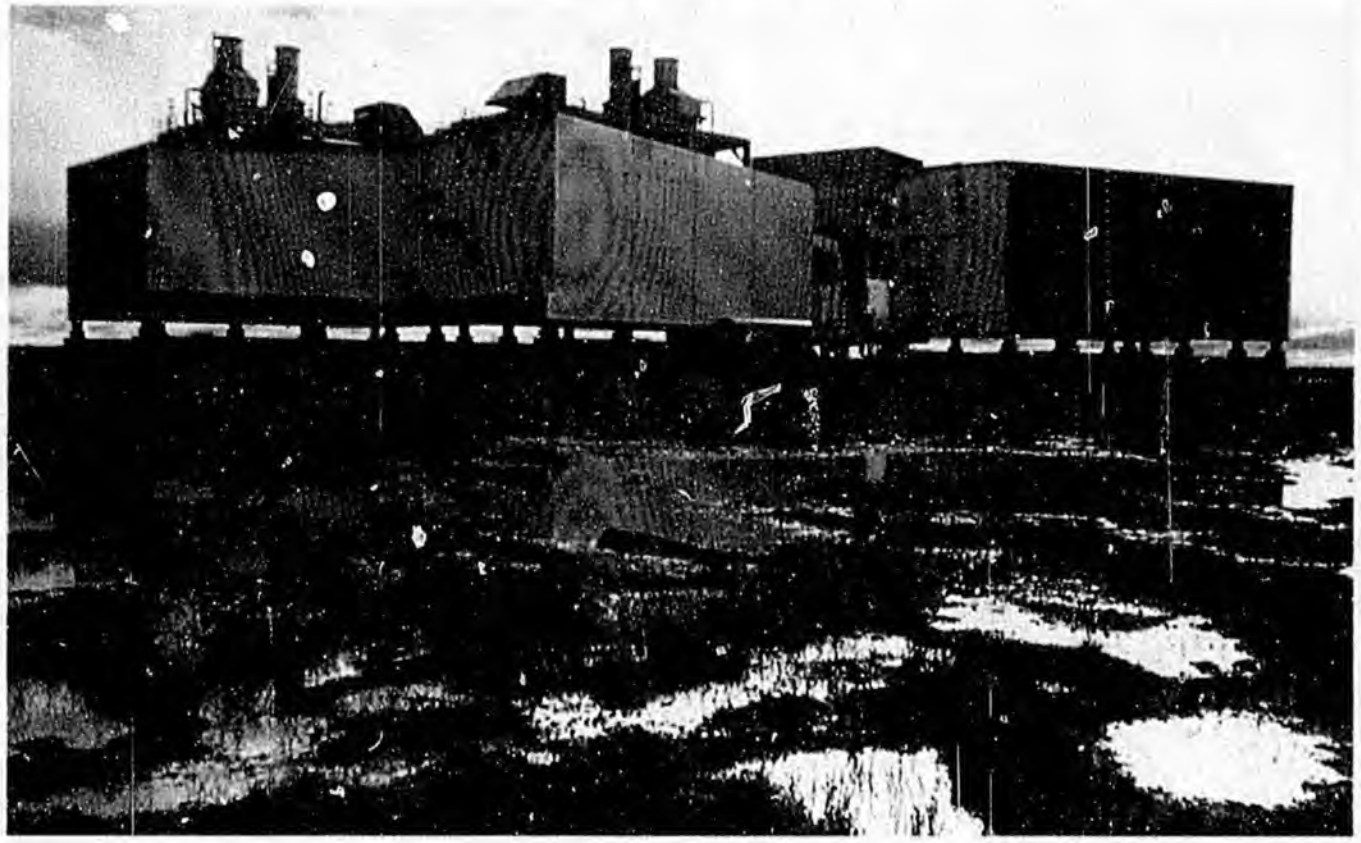
In addition, Cominco has undertaken to assist in the vocational training of NANA shareholders, so that eventually they will comprise the permanent workforce at Red Dog.





The Red Dog Concept

The following article is reproduced from the September, 1983 issue of ORBIT, the Cominco quarterly magazine.



Modules for processing crude oil are seen at a module staging area at Prudhoe Bay on the North Slope of Alaska. They were built in Seattle.

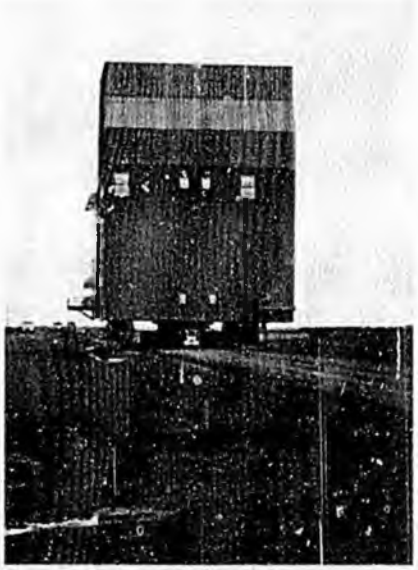
Modules: building blocks for an Arctic mine

Anchorage, Alaska — A complete mine processing plant, divided into seven separate units for transportation thousands of kilometres by sea and over land to a remote location in Alaska: That's the modular concept Cominco engineers in Trail, B.C. envision for the potential Red Dog Mine. Plants to process North Slope oil in Alaska have been transported in sections aboard barges from Seattle, but the Red Dog concept would be the first application of this modular building system for a mine concentrator.

Modular construction saves time and money. It saves project time because different stages can be developed simultaneously, and it saves money because construction manpower and supplies are found in an established industrial location.

For these same reasons, Cominco specified the world's first wholly prefabricated mine plant for the Polaris Mine on Little Cornwallis Island in the Canadian High Arctic. The entire mill complex was built on a barge the size of a city block, towed north and beached to become a shorebound facility.

Red Dog's plant will be much bigger in size, and will be located far from the ocean, so the mill built on a barge method isn't practical. However, the Polaris project did demonstrate the advantages of prefabrication in the south and points toward bigger and better applications — like modules.



Module transportation at Prudhoe Bay

Cominco Engineering Services engineers in Trail are planning seven modules for the process concentrator: one each for the grinding mill, the regrind mill, flotation cells, dewatering, dryers, power plant and a primary crusher. Each would be built in the south, lashed to the deck of a barge and towed to a staging area on the northwest coast of Alaska.

Giant crawlers would transport the modules 91 km to the mine site where they would be placed on prepared foundations and connected to each other inside and out to form a ready-made industrial plant. Most of the on-site work would be indoors and it would take about four months.

The largest and heaviest unit would be the flotation equipment, weighing in at 1,500 tonnes and measuring 45 m by 20 m and eight stories high. The lightest module would be the concentrate dryers at a hefty 450 tonnes, and the smallest the primary crusher at 19 m by 15 m and five stories high. Arvik, the Polaris plant, weighs 12,000 tonnes and measures 126 m by 30 m and is six stories high.

Six more modules for the accommodation complex would be built off-site and transported to the site. These

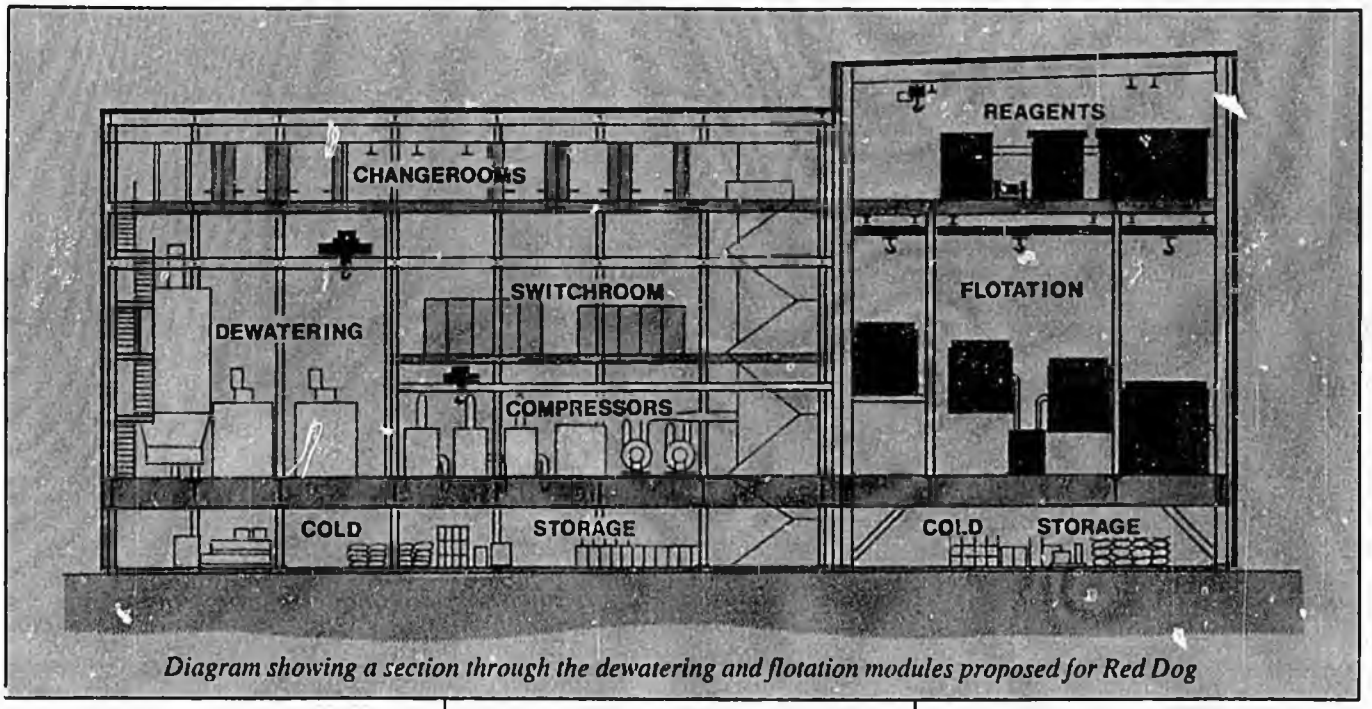


Diagram showing a section through the dewatering and flotation modules proposed for Red Dog

would arrive first and be put in place to provide living quarters for the construction crews working on the plant modules.

Because of winter sea ice and the short shipping season, scheduling is critical for success of the Red Dog project. Modules would be advantageous, because conventional on-site construction methods would require that a road be built from the ocean before any work could start. Using the modular method, plant construction in the south can go on apace while the road is being built in readiness for the arrival of the modules.

To house the workforce employed in preparing the road and port for arrival of the modules, another barge concept is being considered. A barge could be outfitted in the south as a construction camp, towed into a lagoon at the port site near Kivalina and ballasted in. Once the accommodation modules were on-site, workers would move there and the barge would be removed.

The workforce doing preparatory work for the modules at the mine site would be housed in the existing exploration camp, expanded for the purpose, until the accommodation modules are in place.

The use of a barge recalls Polaris, and the construction camp aboard the ship *C.D. Howe* at the Black Angel Mine in Greenland. There are a number of lessons learned at Polaris and Black Angel that are benefiting the Red Dog planners. For example, Polaris showed that mounting foundations on frozen rock is feasible at Red Dog, contrary to the popular wisdom in Alaska that permafrost requires piled foundations to appreciable depths.

Heavy structural demands

The Polaris barge taught lessons about the structural demands of a mine plant that puts to sea. To make the modules seaworthy and to allow them to be picked up and moved, they must be built more rigidly than a plant built on land, heavier steel must be used and designers must take into account load factors and distribution for land and sea transportation.

But not all construction at Red Dog is expected to be modular. Engineers talk of a "guts to fresh air ratio": the less there is inside a module the less cost-effective it is to modularize it. Modules that are like a box of fresh air are not economic. Structures such as those used for vehicle maintenance, concentrate storage and water treatment will be built on-site. However, once again, they will be built from units prefabricated elsewhere, just like a do-it-yourself kit.

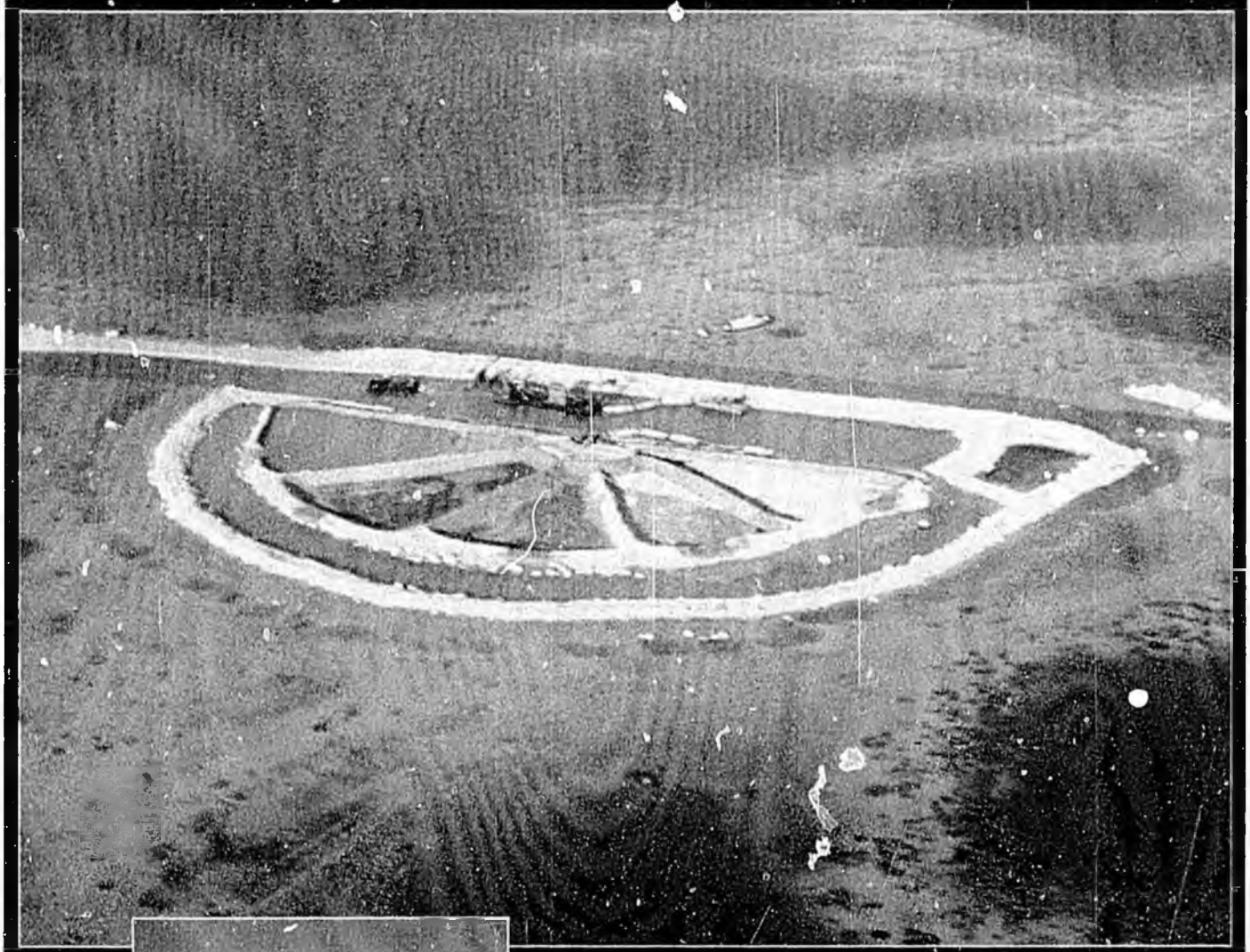
— Terry Manning, Ian Hanks, Tony Cowell with Hugh Leggatt

These modules, bound for Alaska, were constructed by National Shipbuilding Co[illegible] in San Francisco.

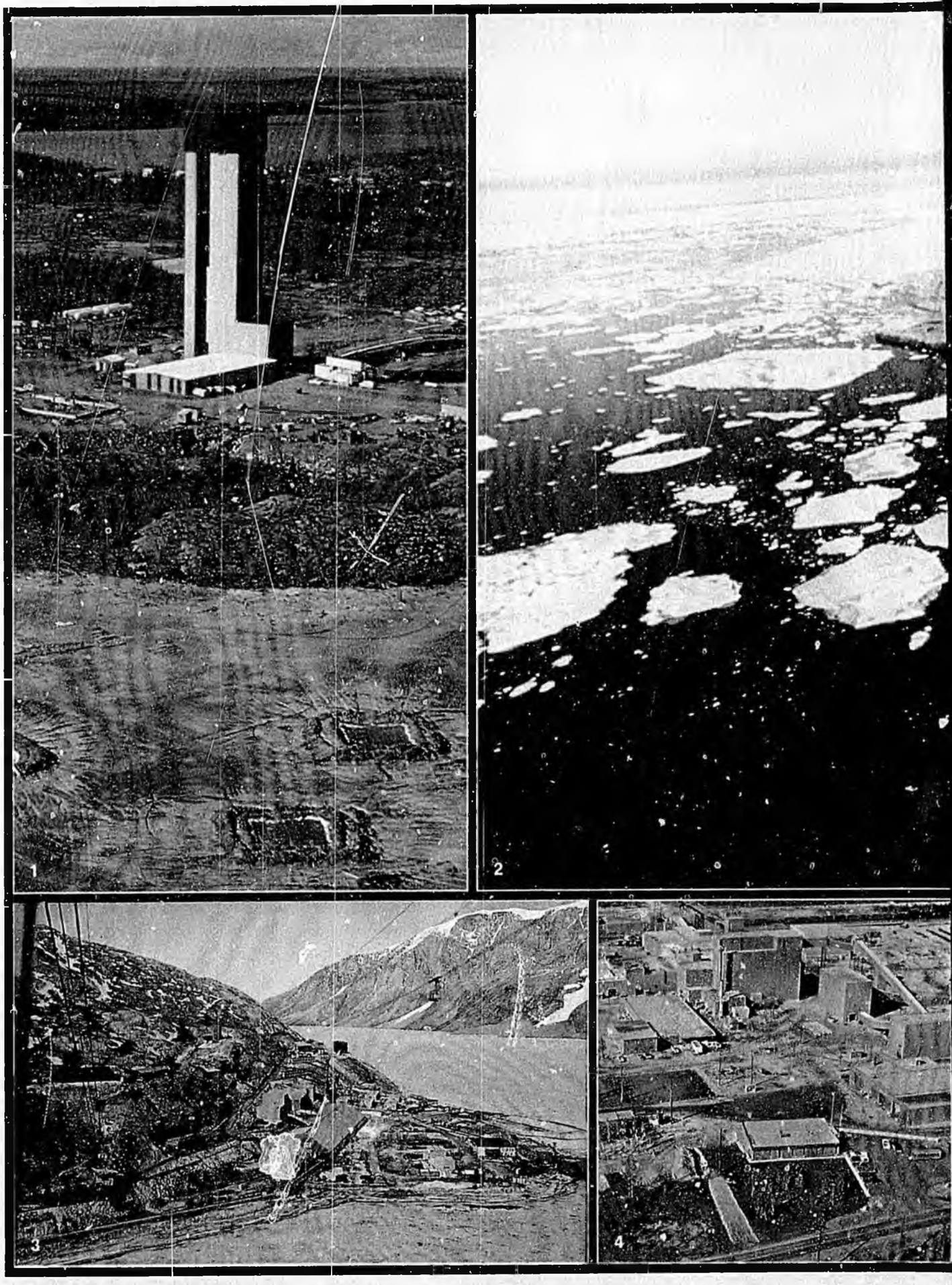
Cominco

from the air

A company portrait by aerial photography, revealing the great individuality of our operations around the world

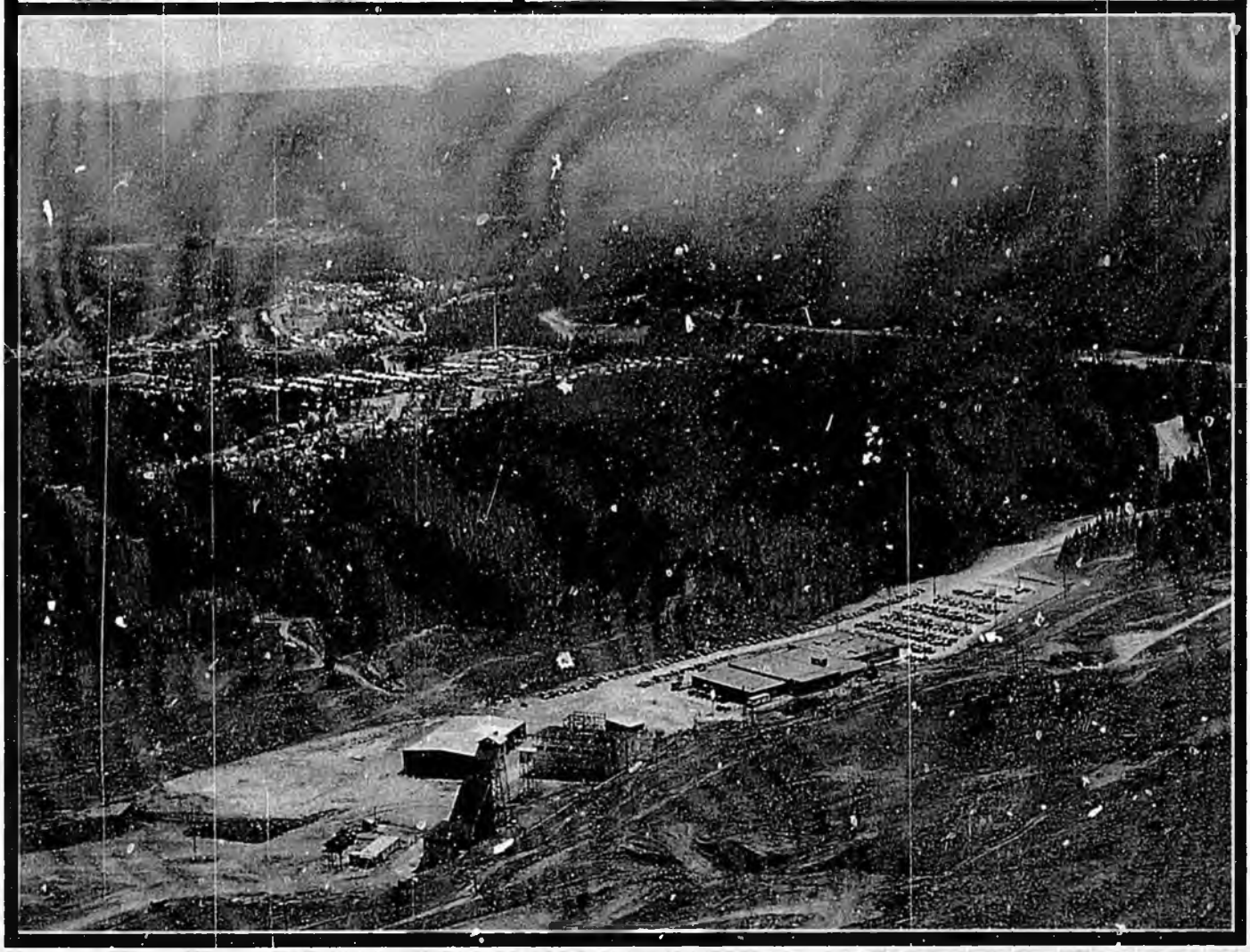


Mataiva: Like the spokes of a wheel, dykes radiate out in this lagoon in French Polynesia, South Pacific. Papeete is the closest town to this joint-venture project, still in the feasibility-study stage. The dredge, left, pumps phosphate mineral samples into the basins formed by the dykes, part of stringent environmental measures.

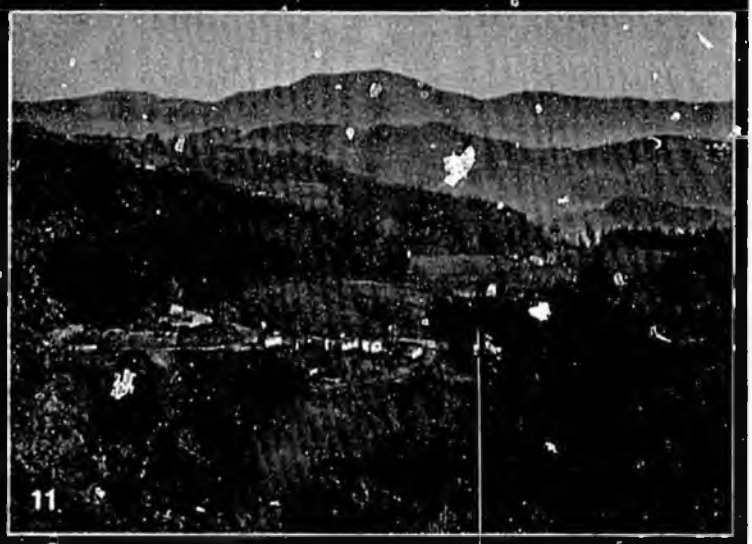


1. Con: If the Eiffel Tower is the symbol of Paris; then the 76-metre high Con headframe is the symbol of Yellowknife. Built in 1977, it is the tallest structure in the N.W.T. Con has been producing gold since 1938. 2. Polaris: The largest Maple Leaf in Canada, 40 metres high by 76 metres wide, proudly identifies the most northerly zinc-lead mine in the world, 1,440 km from the North Pole. 3. Black Angel: At Maarmorilik on Greenland's west coast, Greenex A/S operates a zinc-lead mine inside Black Angel mountain. The mine is connected to the mill by aerial tramway. 4. Pine Point: On the southern shore of Great Slave Lake, N.W.T., the zinc-lead mining and milling operations produce concentrates for Canadian and Japanese smelters. 5. Red Dog: Diamond drilling will continue this summer at Cominco Alaska's zinc-lead mine property, 145 km north of Kotzebue.

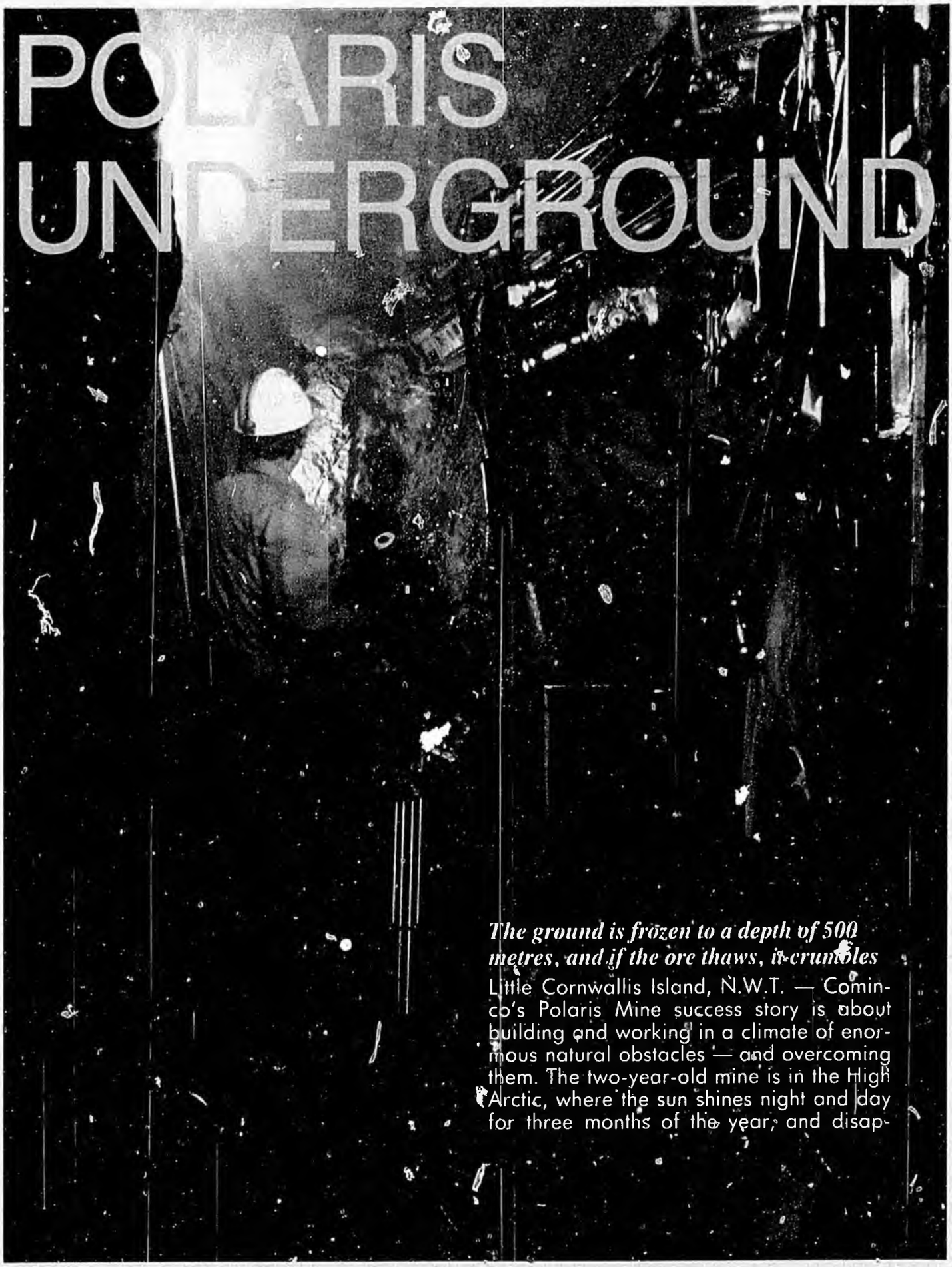
6. The Product Research Centre. At an R & D park in Mississauga, just west of Toronto, P.R.C.'s program is devoted to developing commercial uses of zinc and lead. 7. Rubiales: The Exminesa lead-zinc mine is located 450 km northwest of Madrid in the Province of Lugo, Spain. 8. Vade: Southwest of Saskatoon, Saskatchewan, potash for fertilizer is mined 1,000 metres below the surrounding wheatfields. 9. Sullivan: In southeastern British Columbia the Sullivan Mine at Kimberley has been a major zinc-lead-silver producer for Cominco for more than 75 years.



10. Owens Lake, California: A unique dyking system in the desert 360 km north of Los Angeles recovers trona, which is refined to soda ash and used in glass manufacturing. **11. Troya:** Exploration work is in progress at Troya, a potential zinc-lead mine, in the beautiful Basque countryside of northern Spain. **12. Trail:** In the foreground, the new zinc electrolytic and melting plant, the world's largest, looking southeast. A wide range of non-ferrous and precious metals, chemicals, fertilizers, electricity and electronic materials are also produced at Trail.

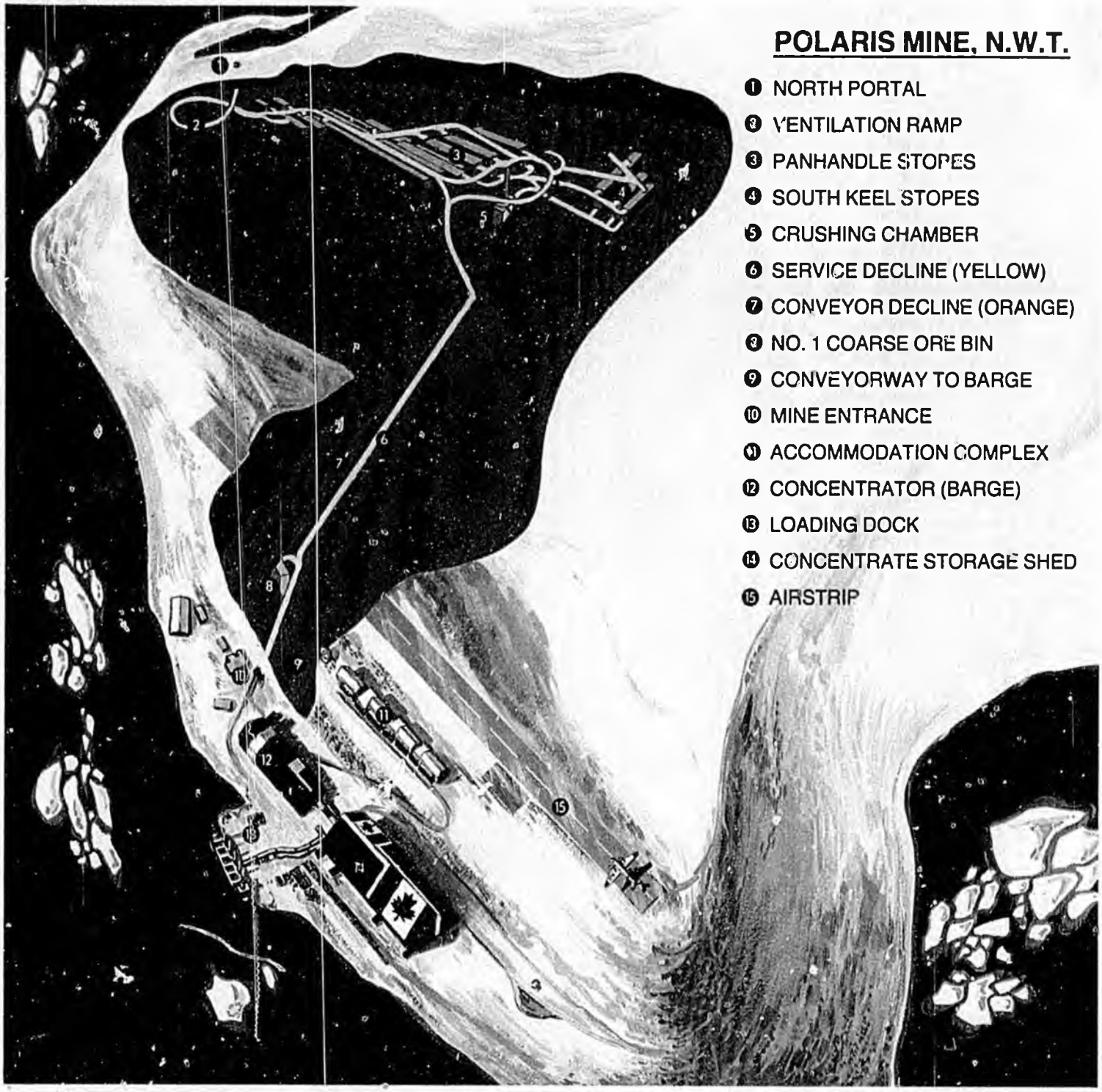


POLARIS UNDERGROUND



The ground is frozen to a depth of 500 metres, and if the ore thaws, it crumbles

Little Cornwallis Island, N.W.T. — Cominco's Polaris Mine success story is about building and working in a climate of enormous natural obstacles — and overcoming them. The two-year-old mine is in the High Arctic, where the sun shines night and day for three months of the year, and disap-



PREVIOUS PAGE: *Underground in the Polaris Mine.* ***Above:*** *A three-dimensional schematic view of the underground and surface facilities at Polaris. The orebody is not shown, but is located primarily in the Panhandle and South Keel areas.*

BILL MAYRS ILLUSTRATIONS AND DIAGRAMS

pears entirely for another three in winter. It is only 100 km from the magnetic North Pole, and only 1,600 km from the geographic North Pole. It is nearly as dry as the Sahara Desert, and the ground is frozen to a depth of 500 metres. When mineralization was first discovered there in 1960, the obstacles to recovering it seemed almost insurmountable.

All the same, Cominco began detailed investigations in 1964 and a drill program in 1971 outlined a substantial body of lead and zinc sulphides. Underground development began in 1972, and the decision to bring the Polaris Mine into production was made in October 1979.

The remote and harsh environment created a number of problems that had to be overcome in constructing facilities at Polaris. The shipping season at Polaris is only six weeks — the ice-free period. Careful planning was required because all supplies for a full construction year had to arrive at that time. Anything forgotten would have to be flown in as there are no roads or railways within 1,500 kilometres. Wages were necessarily high to attract workers to the north, and there was the additional cost of maintaining room and board on-site.

Unique concept saves money

Cominco adopted a scheme where as many as possible of the permanent

facilities would be built in southern Canada on a barge that would be towed to the mine site during the ice-free period. The barge was built in Lauzon, Quebec and outfitted in Trois-Rivières. It contains the concentrator, powerhouse, warehouse, dry, shop and offices. The galvanized steel structure, 31 m wide, 18 m high, and 122 m long, was towed 4,800 km through the St. Lawrence River, along the coast of Greenland and through Lancaster Sound to the mine site, arriving safely in August of 1981.

This unique concept of building a large portion of the project on a barge in southern Canada and simultaneously doing the necessary site work, saved about a year of time and millions of dollars.

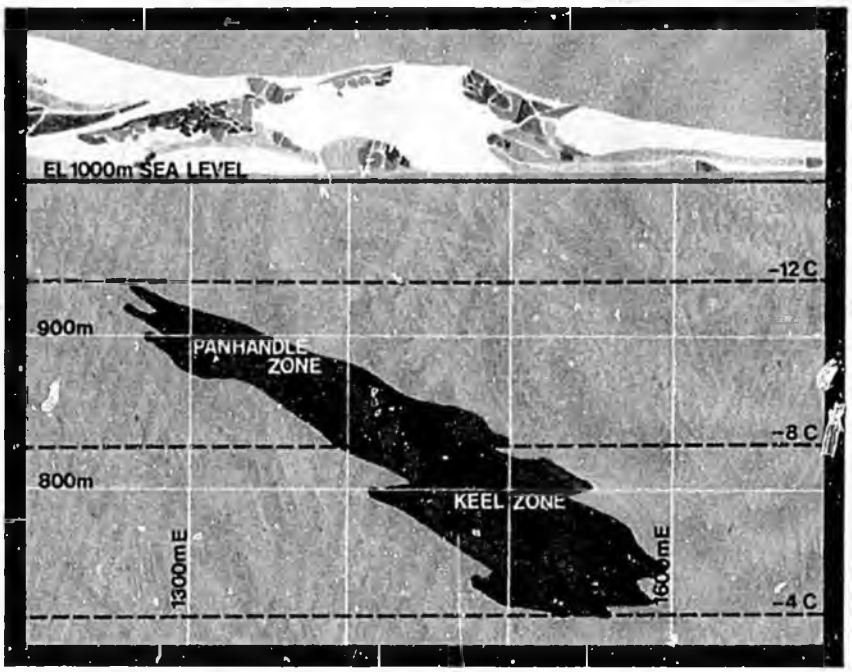
Construction on the island included a galvanized steel concentrate storage shed (with the familiar Polaris maple leaf), accommodations, an airport, fresh water and tailings disposal systems and a dock. Rather than using concrete to reinforce the dock structure, waste rock fill was frozen in place resulting in significant savings.

High grade orebody

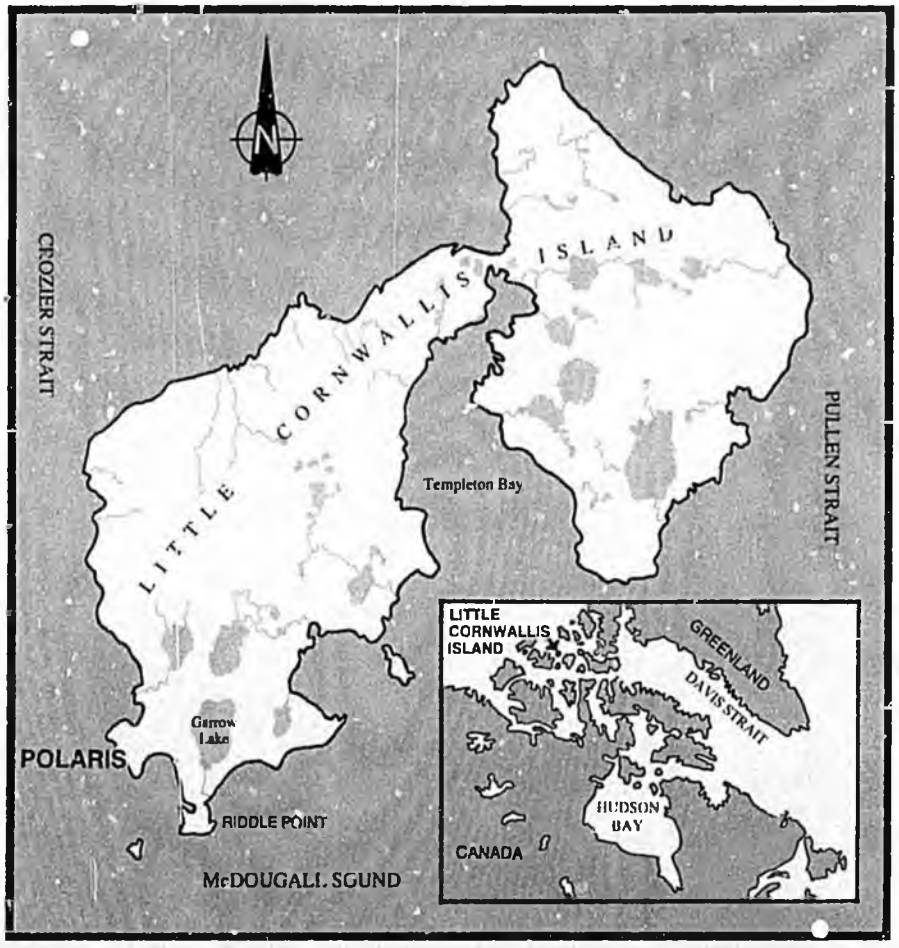
The Polaris orebody lies near the top of the Thumb Mountain Formation. Ore minerals are sphalerite and galena with the waste being predominantly dolomite with calcite and marcasite. Reserves in 1982 consisted of 11 million tonnes of indicated ore grading 4.4% lead and 15.2% zinc with a further twelve million tonnes of inferred ore at slightly lower grades.

The orebody is divided into two sections: the Panhandle Zone and the Keel Zone. The Panhandle Zone, about 25% of the reserves, is the upper portion of the orebody some 120 metres below surface. The ore thickness in this area ranges from 10 to 40 metres. The rest of the orebody, the Keel Zone, is attached to the east side of the Panhandle. This is the deeper zone with ore thickness of up to 110 metres.

The ore is porous and the voids are generally filled with ice, as the mineralized zone lies entirely within permafrost. The cross-section of the orebody shows typical rock temperatures as a function of depth. The influence of permafrost on the physical characteristics of the ore cannot be overemphasized. If allowed to thaw, much of the ore deteriorates to the extent that it crumbles. The stability of openings in the ore zone is entirely dependent on the permafrost.

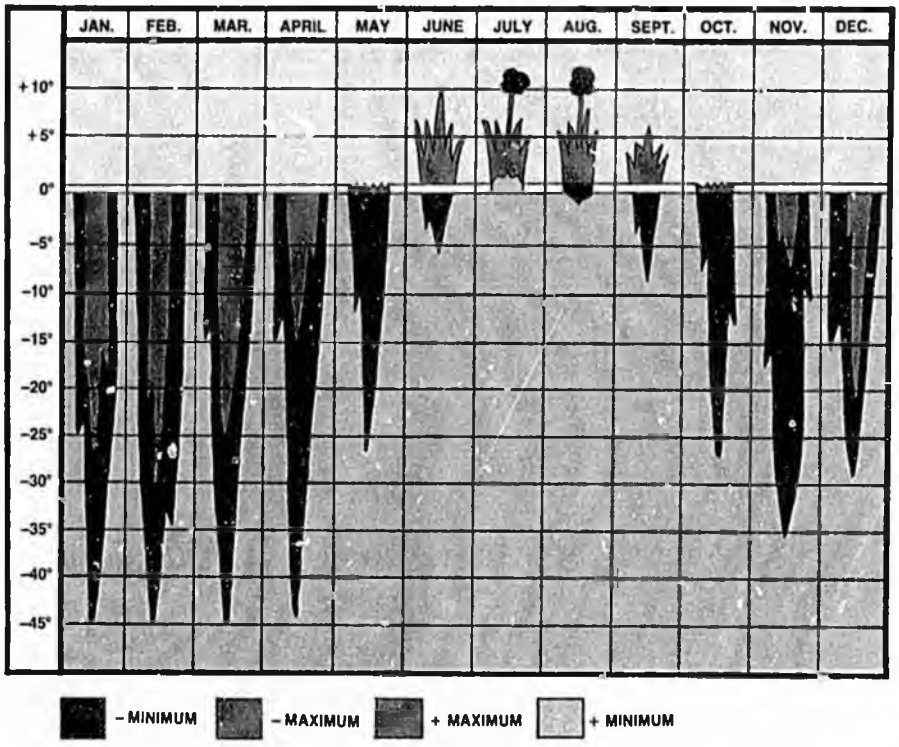


Above: The deeper you go, the warmer it gets: a cross-section of the orebody.
***Below:** Little Cornwallis Island is just off the northeast coast of Cornwallis Island in the High Arctic.*



CP PHOTO

Above: Aerial view of Polaris showing Garrow Lake in the background. Below: Only four months have above-freezing temperatures.



Underground mining methods were chosen at Polaris because the large amount of waste overburden made an open-pit method impractical. Primary stopes are mined in a series of parallel panels 10 metres wide. The cavity is then backfilled to allow recovery of the intervening pillars. Where ore thicknesses are less than 20 metres, panels are benched in five-metre vertical lifts from the top to the bottom of the ore zone. Higher ore thicknesses are extracted by blasthole mining.

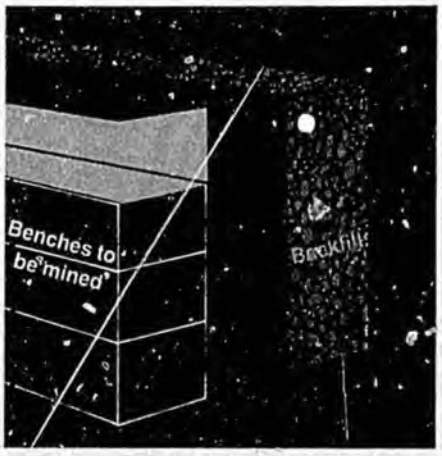
A backfill material was required that would not introduce heat to the mine and melt the permafrost. Shale rock, which is also in permafrost, is quarried on surface and delivered to the stope voids via boreholes between the surface and the mine workings. The shale is packed into the mined-out areas and a limited amount of water or snow is mixed in to form a consolidated frozen mass.

A lake in layers

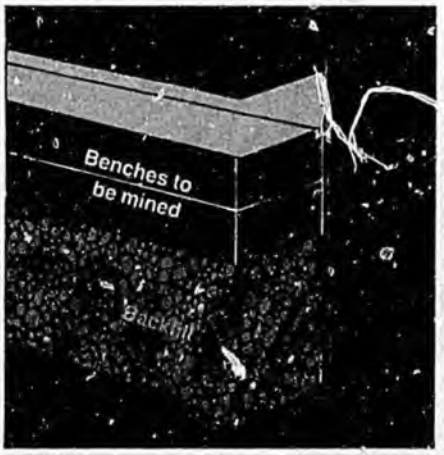
The Polaris tailings disposal concept incorporates a water recycle feature to conserve water and to recover heat in the process water. The mill tailings are pumped to a thickener overlooking Garrow Lake, 2½ km from the process barge. The thickened tailings are pumped to a depth below 20 metres in Garrow Lake and the overflow water from the thickener is returned to the concentrator.

Garrow Lake is a meromictic lake — a lake that has no vertical circulation of its water. The upper 13 metres of the lake is essentially fresh to brackish water supporting limited aquatic life forms. The transition zone (halocline) that extends from 13 to 20 metres is characterized by decreasing

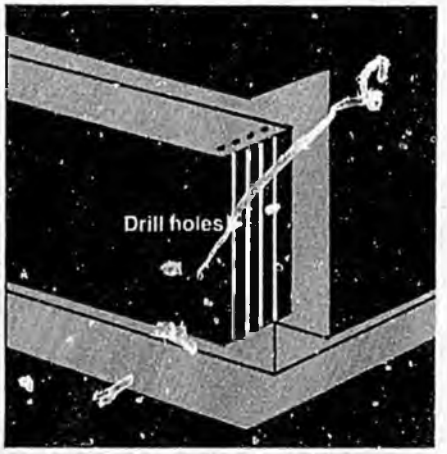
Benching (under 20 metres)



Two Stage Benching (over 20 metres)



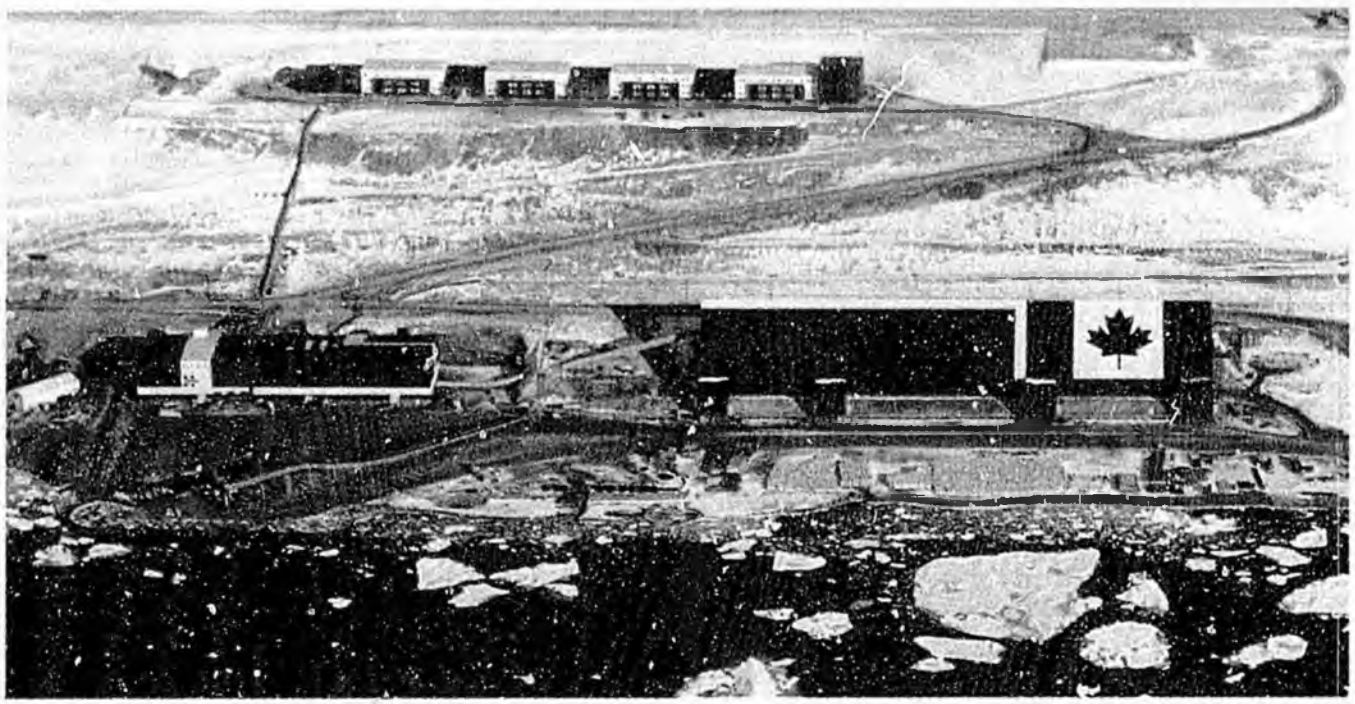
Blasthole Stoping (over 20 metres)



Mining methods used at Polaris include benching, two-stage benching and blasthole stoping. Blastholes of 82 mm are drilled from the top; the ore is blasted out and is then removed through an access tunnel at the bottom.

CP PHOTO

Above left: *The swimming pool at Polaris is the most northerly in the world.* ***Above right:*** *The accommodation complex is raised off the ground so that heat transfer from the buildings does not melt the permafrost.* ***Below:*** *Aerial view showing the accommodation complex at the top, the concentrator (barge) at lower left and the storage shed (with maple leaf) at lower right.*



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oxygen content and increased salinity. It supports no aquatic life.

The bottom zone, below 20 metres, has abundant soluble hydrogen sulphide (H_2S) to 120 mg/L, and salinity three times that of sea water, resulting in a hostile environment to conventional aquatic life. It is a habitat for anaerobic, decay-causing bacteria that generate hydrogen sulphide.

Deposition of the mill tailings in this bottom zone, where there are no sensitive life forms, is uniquely environmentally acceptable. The presence of hydrogen sulphide prevents the release of soluble heavy metals. The thickening of the tailings prior to discharge in the lake precludes the vertical transportation of solids in the lake and reduces the volume of material deposited.

Living in the cold

The facilities and personnel policies at Polaris must take into consideration the extreme climate and isolation of the operation. The air temperature in the mine remains about 0°C in summer, and from -15° to -20°C in winter. In winter, miners wear thermal underwear, work clothes, company-provided quilted coveralls, parkas and gloves. There is an underground lunch room where miners can take a coffee break and get a hot lunch.

Air conditioning for the Arctic: ventilation fan at the mine entrance.