

ALASKA LEGISLATURE SPECIAL COMMITTEE / SUBJECT FILE 8672

1307 SCOMM 59: HOUSE SPECIAL COMMITTEE ON STATE LOANS 1985-86

III. COST ESTIMATES (continued)

Royalty on fill is estimated at a rate of \$0.45 per cubic yard of fill extracted. This item also includes a provision for reclamation work at the borrow sites.

Indirect costs are estimated as 7.3% of direct costs. Indirect costs cover the costs of engineering design and project management.

The Contingency allowance is estimated at 5.7% of net total costs and is an allowance to cover a portion of the anticipated risk in carrying out the road construction element of the project.

All direct costs included in the estimate include an allowance for construction support, construction supervision, taxes and insurance.

Costs for the Kruz route option have been developed on two bases:

- ° Alternative 1 assumes that fill will be drawn from borrow sources dispersed throughout the route as defined (Figure 9).
- ° Alternative 2 assumes that fill will be drawn only from borrow sources located outside the Krusenstern National Monument. This alternative includes the cost of constructing an ice road from close to the port to borrow sources 7 and 8. This ice road will permit construction equipment access to these borrow sources which would provide fill for construction in the northern part of the monument. (Figure 9).

Another approach to constructing this alternative has also been estimated. This approach allows for flying construction equipment into the Red Dog airstrip and building the road from two fronts only. There was no significant difference between estimated costs for these two approaches. The estimate for the ice road approach is used in this report.

Costs for the Asikpak route option have been developed on the basis that fill will be drawn from borrow sources dispersed throughout the route.

III. COST ESTIMATES (continued)

A control has been applied to ensure a uniform approach to road fill costs for both route options. This involves making direct comparison of costs for Asikpak route segments with those for a route segment with similar terrain characteristics estimated for one of the Southern routes.

For instance, Asikpak route segment A5 is compared with Southern route segment M5. Both segments are on gently graded lower slopes on the fringe of wetland areas and have average borrow availability.

Operating costs consist of all items for which costs will vary dependent on road route mileage. These include concentrate haulage, personnel movement, haulage of inbound supplies and road maintenance.

Cominco, as part of their normal estimating procedure, frequently make use of a suitably experienced third party to carry out an audit of their estimates. If a reasonable correlation is achieved, confidence in the validity of the estimate is enhanced and estimate credibility improved.

The estimate for the Kruz route option has been audited by Morrison-Knudsen of Boise, Idaho. This company is a large and reputable civil engineering contractor with extensive experience of construction in remote areas. They have been involved in Alaskan construction for 40 years.

This audit was completed in May 1984 and the road element took the form of an independent estimate carried out in accordance with Morrison-Knudsen's usual in-house methods for preparing construction bids. Their estimate is based on a reduced nominal fill thickness of 5 feet compared with the 6-1/2 feet designed depth used in the Cominco estimate.

III. COST ESTIMATES (continued)

Morrison-Knudsen's estimate of total net cost is \$68.2 million to which they added a contingency allowance of \$4.4 million for an estimated total cost of \$72.6 million. This provides an unusually close correlation with Cominco's estimate of \$74.7 million. For construction work of this type at a remote site, it is very unusual for independent estimates to agree so closely.

ASIKPAK ROUTE QUANTITIES AND COSTS — FILL

SEGMENT	FILL QUANT- YD ³	FILL COST (\$)	HAUL QUANT (YD ³ Mi)	HAUL COST (\$)	NET TOTAL COST (\$)	TOTAL COST (\$ M)
A1	1121858	10321094	2352697	3058506	13379600	13.75
A2	1682710	15480932	1347462	1751701	17232633	17.78
A3	1044780	9611976	1361976	1770569	11382545	11.78
G5	1917731	17643125	2445331	3178930	20822055	21.55
M8	224580 *550800	2066136 *5060000	74044	96257	7222393	7.47
TOTAL		60183263		9855963	70039226	72.3

* EXCAVATION

ASIHPAK ROUTE CONSTRUCTION COST ESTIMATE - CULVERTS

23

SEG- MENT	24" DIA @ \$400	30" DIA. @ \$7200	48" DIA. @ \$15360	54" DIA. @ 17440	66" DIA. @ \$30960	78" DIA @ \$36000	96" DIA @ \$41200	108" DIA @ \$44080	120" DIA @ \$61200	NET TOTAL	TOTAL (\$M)
A1	30 192000	13 93600	16 245760		3 92880	2 72000		3 132240		67 828480	0.85
A2	38 243200	28 201600		9 156960	6 185760	4 144000	21 865200			106 1796720	1.86
A3	13 83200	40 288000	5 76800	2 34880		4 144000	16 659200		3 183600	83 1469680	1.51
G5	54 345600	5 36000	5 76800	5 87200	2 61920	1 36000	2 82400			74 725920	0.75
M8	2 12800		21 322560	5 87200						28 422560	0.44
	137 876800	86 619200	47 721920	21 366240	11 340560	11 396000	39 1606800	3 132240	3 183600	358 5243360	5.41

ASIHPAK ROUTE CONSTRUCTION COST ESTIMATE - BRIDGES

SEGMENT	WATERCOURSE CROSSED	LENGTH (FEET)	NET COST (\$)	TOTAL COST (\$ MILLION)
A1	TATIGIROK CREEK	30	360 000	3.66
	UMARACHEK CREEK	50	600 000	
	ASIHPAK RIVER	150	1 800 000	
	TRIBUTARY OF ASIHPAK RIVER	45	540 000	
	ASIHPAK RIVER	30	360 000	
			3 660 000	
A2	KIVALINA RIVER	700	8 400 000	11.46
	SOUTH FORK OF KIVALINA RIVER	220	2 640 000	
	TRIBUTARY OF KIVALINA RIVER	35	420 000	
			11 440 000	
G5	NORTH FORK OF WULIK RIVER	250	3 000 000	13.56
	TRIBUTARY OF WULIK RIVER	30	360 000	
	WULIK RIVER	380	4 560 000	
	TRIBUTARY OF IKALUKROK RIVER	70	840 000	
	IKALUKROK RIVER	400	4 800 000	
			13 560 000	
				28.7

ASIHPAK ROUTE

CONSTRUCTION COST SUMMARY

SEGMENT	LENGTH (MILES)	FILL (\$MILLION)	TURNOUTS (\$MILLION)	CULVERTS (\$MILLION)	BRIDGES (\$MILLION)	TOTAL (\$MILLION)
A1	14.0	13.75	0.08	0.85	3.66	18.34
A2	19.5	17.78	0.08	1.86	11.46	31.18
A3	12.5	11.78	0.08	1.51	0	13.35
G5	21.5	21.55	0.12	0.75	13.56	35.98
M8	7.5	7.47	0.02	0.42	0	7.91
TOTAL	75.0	72.3	0.4	5.4	28.7	106.8

ROYALTY ON FILL

4.0

TOTAL DIRECT COSTS

110.8

INDIRECT COSTS

8.1

NET TOTAL

118.9

CONTINGENCY

6.8

TOTAL COST

125.7

TOTAL ANNUAL OPERATING COST

5.93

KRUZ ROUTE

(USING BORROW SOURCES THROUGHOUT ROUTE)

CONSTRUCTION COST ESTIMATE - FILL

SEGMENT	FILL QUANTITY (CU. YD.)	FILL COST (\$)	HAUL QUANTITY (CU. YD. MILE)	HAUL COST (\$)	NET TOTAL COST (\$)	TOTAL COST (\$ M)
M1	576570	5304444	887420	1153646	6458090	6.70
M2	937770	8627484	1597985	2077380	10704864	11.29
O3	357380	3287896	2137830	2779179	6067075	6.25
O4	149190	1372548	605979	787773	2160321	2.22
H2	308620	2839304	490778	638011	3477315	3.60
M6	799170	7352364	3090460	4017598	11369962	11.76
M7	512100	4711320	226346	294250	5005570	5.18
M8	224580 *550800	2066136 *5060000	74044	96257	7222393	7.47
		40621496		11844094	52465590	54.47

* EXCAVATION

CONSTRUCTION COST ESTIMATE - CULVERT

SEGMENT	24" DIA. @ \$6400	30" DIA	48" DIA.	54" DIA.	66" DIA.	78" DIA.	96" DIA @ \$41200	NET TOTAL	TOTAL (\$MILLION)
M1	⁹ \$57600	² 14400	¹⁰ \$153600	⁵ \$87200	² \$61920	² \$72000	—	³⁰ 446720	0.47
M2	¹⁷ \$108800	—	¹⁷ \$261120	⁹ \$156960	² \$61920	² \$72000	² \$82400	⁴⁹ 743200	0.77
O3	¹ \$6400	⁵ 36000	¹² \$184320	⁵ \$87200	—	—	—	²³ 313920	0.32
O4	—	—	⁷ \$107520	⁴ \$69760	—	—	² \$82400	¹³ 259680	0.27
H2	² \$12800	² 30720	³ \$52320	¹ \$30960	—	—	—	⁸ 126800	0.13
M6	¹⁵ \$96000	—	¹² \$184320	⁵ \$87200	¹ \$30960	—	—	³³ 398480	0.42
M7	⁷ \$44800	—	⁵ \$76800	² \$34880	² \$61920	² \$72000	² \$82400	²⁰ 372800	0.38
M8	² \$12800	—	²¹ \$322560	⁵ \$87200	—	—	—	²⁸ 422560	0.44
	⁵³ \$339200	⁹ \$81120	⁸⁷ \$1342560	³⁶ \$641360	⁷ \$216720	⁶ \$216000	⁶ \$247200	²⁰⁴ \$3084160	3.20

KRUZ ROUTE

CONSTRUCTION COST ESTIMATE - BRIDGES

SEGMENT	WATERCOURSE CROSSED		LENGTH (FEET)	NET COST (\$)	TOTAL COST (\$M)
M2	TRIBUTARY OF OMIKVIOKOR RIVER	50	50	600000	3.18
		50	50	600000	
		160	160	1920000	
		3120000			
M6	TUTAK CREEK	100	40	1200000	1.72
		480000			
		1680000			
		4.90			

KRUZ ROUTE

(USING BORROW SOURCES THROUGHOUT ROUTE)
CONSTRUCTION COST SUMMARY

SEGMENT	LENGTH (MILES)	FILL (\$MILLION)	TURNOUTS (\$MILLION)	CULVERTS (\$MILLION)	BRIDGES (\$MILLION)	TOTAL (\$MILLION)
M1	8.60	6.70	0.04	0.47	—	7.21
M2	12.88	11.29	0.06	0.77	3.18	15.12
O3	5.10	6.25	0.04	0.32	—	6.66
O4	1.95	2.22	0.01	0.27	—	2.52
H2	3.69	3.60	0.02	0.13	—	3.76
M6	11.50	11.76	0.07	0.42	1.72	14.02
M7	5.49	5.18	0.02	0.38	—	5.60
M8	7.44	7.47	0.03	0.44	—	7.97
TOTAL	56.65	54.47	0.29	3.20	4.90	62.9
ROYALTY ON FILL						3.0
TOTAL DIRECT COSTS						65.9
INDIRECT COSTS						4.8
NET TOTAL						70.7
CONTINGENCY						4.0
ROAD TOTAL COST						74.7
TOTAL ANNUAL OPERATING COST						4.43

KRUZ ROUTE

(NOT USING BORROW SOURCES INSIDE KRUSENSTERN NATIONAL MONUMENT)

CONSTRUCTION COST ESTIMATE - FILL

SEGMENT	FILL QUANTITY (CU. YD)	FILL COST (\$)	HAUL QUANTITY (CU YD MILE)	HAUL COST (\$)	NET TOTAL COST (\$)	TOTAL COST (\$ MILLION)
M1	576570	5304444	13588633	17665223	22969667	23.13
M2	937770	8627484	14994942	19493425	28120909	28.68
O3	357380	3287396	2501630	3232153	6540054	6.67
O4	149190	1372548	605979	737773	2160321	2.22
H2	308620	2839304	180773	633011	3477315	3.60
M6	799170	7352364	3090430	4017593	11369952	11.76
M7	512100	4711320	226346	294250	5005570	5.13
M8	224580 *550800	2066136 *5060000	74041	96257	7222393	7.27
TOTAL		4062496		46244695	86866191	33.9

* EXCAVATION

KRUZ ROUTE

(NOT USING BORROW SOURCES INSIDE KRUSENSTERN NATIONAL MONUMENT)

CONSTRUCTION COST SUMMARY

SEGMENT	LENGTH (MILES)	FILL (\$MILLION)	TURNOUTS (\$MILLION)	CULVERTS (\$MILLION)	BRIDGES (\$MILLION)	TOTAL (\$MILLION)
M1	8.60	23.25	0.14	0.47	—	23.86
M2	12.88	28.68	0.15	0.77	3.13	32.73
03	5.10	6.67	0.08	0.32	—	7.07
04	1.95	2.22	0.01	0.27	—	2.50
H2	3.69	3.60	0.02	0.13	—	3.75
M6	11.50	11.76	0.07	0.42	1.72	13.97
M7	5.49	5.13	0.02	0.33	—	5.58
M8	7.44	7.47	0.03	0.44	—	7.94
TOTAL	56.65	83.9	0.5	3.20	4.90	97.5

KE ROAD CONSTRUCTION

1.2

ROYALTY ON FILL

3.0

TOTAL DIRECT COSTS

101.7

INDIRECT COSTS

7.4

NET TOTAL

109.1

CONTINGENCY

6.2

ROAD TOTAL COST

115.3

TOTAL ANNUAL OPERATING COST

4.48

4/1/85

Loren Lounsbury, Commissioner,
Department of Commerce and Economic Development
Pouch
Juneau, AK 99811

Dear Commissioner Lounsbury:

I appreciate your efforts in providing so much information on the Delong Mountains Regional Transportation Project for consideration by the House Special Committee on Loans. Before recommending legislative action on any appropriation or bond authorization measures, however, I would like to request your providing further backup on the proposal.

We have taken extensive testimony on the Red Dog project in three hearings and I would appreciate your help in coordinating the administration response to the few issues yet to be resolved.

The remaining issues fall into the following categories:

- Finance Plan

- State support in cash and appropriated loans

- Route

- Where we go from here

legislative consideration and as the actual
I know that many of the questions I have cannot be resolved
until the plan of finance is completed by SRI. However as
the SRI plan will apparently be drafted too late for
legislative consideration and as the actual financing will
be approved by the AIDA board, which you chair, I am hoping
you will attempt to be as specific as possible. I also
realize that some of these questions are still to be
resolved in negotiations between the state and
Cominco/Nana.

The first question is the quantification of the state
contribution to the project. What will be the state
contribution, including the general fund cash to be
appropriated, the earnings on the loan portfolio to be
appropriated and the interest earned on the funds in the
Economic Development fund of AIDA?

The second question is what will be the cash flow for the
entire state contribution - from the General Fund through
the Economic Development Fund and back to the General Fund.
The Committee has already requested information on the
reason for the need for appropriating \$18 million this
session.

I have understood that under consideration ~~is~~ for
financing the project is a combination of of tax-exempt
bonds and a letter of credit from a bank and that these may

come in stages. What is the proposed timing for bond and letter of credit authorizations?

Cominco Ltd. has assured us that a firm guarantee will be forthcoming for the user fees on the road in the form of a 'take-or-pay' contract. What will be the outline of this contract and have any letters of understanding been signed? How will toll fees be assessed and what will be provided for future road users?

(Dept. of Commerce + Economic Development)

SUGGESTED DRAFT OF LETTER OF INTENT ATTACHED TO THE APPROPRIATION BILL WHICH INCLUDES THE APPROPRIATION OF \$18.0 MILLION AND REVENUE'S LOANS TO AIDA:

It is the intent of the Legislature that, before the appropriation of \$18.0 million and loans to the Economic Development Fund may be expended, obligated, or encumbered, the Alaska Industrial Development Authority must enter into a binding contractual agreement(s) with Cominco, Ltd. and with Nana Regional Corporation to execute substantially the assurances and guarantees represented by the parties to the Legislature.

Specifically, those assurances and guarantees are as follows:

1. Cominco, Ltd. will guarantee to pay toll fees that will repay State expenditures.
2. Cominco, Ltd. will guarantee to pay the operation and maintenance costs of the road and port facilities.
3. Cominco, Ltd. will guarantee minimum toll payments and other payments necessary to repay the State's investment if the mine is delayed or if production is suspended after operation commences.

4. Cominco, Ltd. will agree that, to the extent that the price of zinc should rise above a level presently contemplated to yield a reasonable profit, the State's investment will be repaid at an accelerated rate.
5. Nana Regional Corporation will guarantee to provide necessary land to accomodate reasonable expansion requirements for future users at the port site.

DRAFT
Law

DeLong²
L152 3/28/85
#3

1 IN THE _____

BY THE _____ COMMITTEE
±

2 _____ BILL NO.

3 IN THE LEGISLATURE OF THE STATE OF ALASKA

4 FOURTEENTH LEGISLATURE - FIRST SESSION

5 A BILL

6 For an Act entitled: "An Act relating to the authorization of bonds or
7 notes for the DeLong Mountain transportation project;
8 and providing for an effective date."

9 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

10 * Section 1. The Alaska Industrial Development Authority is authorized
11 to issue bonds or notes in a principal amount not to exceed \$175 million to
12 provide financing for the development of the DeLong Mountain transportation
13 project.

14 * Sec. 2. The authority may pledge the moral obligation of the state in
15 support of the issuance of bonds or notes authorized under sec. 1. If the
16 moral obligation of the state is pledged, the authority shall establish
17 appropriate capital reserve funds, and the chairman of the authority shall,
18 no later than January 2 of each year, certify in writing to the governor
19 and the legislature the amount, if any, required to restore a capital
20 reserve fund to the capital reserve fund requirements. The legislature may
21 appropriate to the authority the amount certified by the chairman of the
22 authority. Nothing in this section creates a debt or liability of the
23 state.

24 * Sec. 3. The authority may not issue bonds or notes authorized under
25 this Act unless any limitations imposed by law with respect to the expendi-
26 ture of money appropriated for the fiscal year ending June 30, 1986 to the
27 authority as loans or grants for the purpose of the DeLong Mountain trans-
28 portation project have been satisfied.

29 * Sec. 4. This Act takes effect immediately in accordance with AS 01.-
10.070(c).

DRAFT
Law

Agry
LPJ #4
3/28/85

"PROPOSED SECTION TO BUDGET BILL"

* Sec. __. (a) All right, title, and interest in loans of the type described in (b) of this section, in an amount not to exceed \$142,000,000 in unpaid principal as of July 1, 1985, and all right, title, and interest in all mortgages, notes, and other instruments of security made in connection with those loans, purchased or acquired by the Department of Revenue and held in the general fund on July 1, 1985, are transferred and appropriated to the Alaska Industrial Development Authority for the purposes of its economic development fund (AS 44.88.172).

(b) This section transfers and appropriates

(1) veterans loans acquired or made under AS 26.15;

(2) commercial fishing loans acquired or made under AS 16.10.-300 -- 16.10.360;

(3) small business loans acquired or made under AS 45.95;

(4) tourism loans acquired or made under AS 45.90;

(5) fisheries enhancement loans acquired or made under AS 16.10;

(6) child care loans acquired or made under AS 44.33; and

(7) historical district loans acquired or made under AS 45.98.

(c) In an amount not to exceed \$30 million in unpaid principal as of July 1, 1985, all right, title, and interest in commercial fishing loans acquired or made under AS 16.10.300 -- 16.10.360 and secured by a limited entry permit, and all right, title, and interest in all mortgages, notes and other instruments of security made in connection with those loans, purchased or acquired by the Department of Revenue and held in the general fund on July 1, 1985, are transferred and appropriated from the general fund to the commercial fishing revolving loan fund (AS 16.10.340) for the purposes of AS 16.10.300 -- 16.10.370.

(d) In an amount equal to the principal balance of loans appropriated under (c) of this section, all right, title, and interest in commercial

1 fishing loans, and all right, title, and interest in all mortgages, notes
2 and other instruments of security made in connection with those loans, are
3 transferred from the commercial fishing revolving loan fund to the Alaska
4 Industrial Development Authority for the purposes of its economic develop-
5 ment fund (AS 44.88.172). However, only loans which are not secured by a
6 limited entry permit may be transferred or appropriated under this subsec-
7 tion.

Draft 2

4/8/85

It is the intention of the Legislature that, before the appropriation of \$18.0 million and the loans of the Department of Revenue to the Economic Development Fund may be expended, obligated, or encumbered, the Alaska Industrial Development Authority must enter into a binding contractual agreement with Cominco, Ltd. and with NANA Regional Corporation to execute substantially the following assurances and guarantees:

1. Cominco, Ltd. will guarantee to pay minimum toll and other payments necessary to repay the State's investment if the mine is delayed or if production is suspended after operation commences.
2. Cominco, Ltd. will guarantee the operation and maintenance costs of the road and port facilities, proportionate to its use of those facilities.
3. Cominco, Ltd. and AIDA will agree on a written plan for the use of the port facilities by regional shippers and which will include provision for access by those shippers to the backhaul capacity available on Cominco owned or chartered vessels.
4. NANA will make available at no cost to AIDA the land necessary to meet the expansion needs of the port to accommodate future regional and industrial users.
5. AIDA will establish a toll schedule for the use of the road and port facilities which maximizes the return to the state on its investment throughout the useful life of the facilities and which guarantees equitable access to the facilities by all users.

DRAFT
Law

DeLong²
L152 3/28/85
#3

1 IN THE _____

BY THE _____ COMMITTEE
±

2 _____ BILL NO.

3 IN THE LEGISLATURE OF THE STATE OF ALASKA
4 FOURTEENTH LEGISLATURE - FIRST SESSION

5 A BILL

6 For an Act entitled: "An Act relating to the authorization of bonds or
7 notes for the DeLong Mountain transportation project;
8 and providing for an effective date."

9 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

10 * Section 1. The Alaska Industrial Development Authority is authorized
11 to issue bonds or notes in a principal amount not to exceed \$175 million to
12 provide financing for the development of the DeLong Mountain transportation
13 project.

14 * Sec. 2. The authority may pledge the moral obligation of the state in
15 support of the issuance of bonds or notes authorized under sec. 1. If the
16 moral obligation of the state is pledged, the authority shall establish
17 appropriate capital reserve funds, and the chairman of the authority shall,
18 no later than January 2 of each year, certify in writing to the governor
19 and the legislature the amount, if any, required to restore a capital
20 reserve fund to the capital reserve fund requirements. The legislature may
21 appropriate to the authority the amount certified by the chairman of the
22 authority. Nothing in this section creates a debt or liability of the
23 state.

24 * Sec. 3. The authority may not issue bonds or notes authorized under
25 this Act unless any limitations imposed by law with respect to the expendi-
26 ture of money appropriated for the fiscal year ending June 30, 1986 to the
27 authority as loans or grants for the purpose of the DeLong Mountain trans-
28 portation project have been satisfied.

29 * Sec. 4. This Act takes effect immediately in accordance with AS 01.-
10.070(c).

1 IN THE SENATE

BY THE RESOURCES COMMITTEE

2 SENATE BILL NO.

3 IN THE LEGISLATURE OF THE STATE OF ALASKA

4 FOURTEENTH LEGISLATURE - FIRST SESSION

5 A BILL

6 For an Act entitled: "An Act making a special appropriation to the eco-
7 nomic development fund of the Alaska Industrial
8 Development Authority, transferring and appropriating
9 certain loans to the economic development fund and
10 the commercial fishing revolving loan fund; and
11 providing for an effective date."

12 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

13 * Section 1. The sum of \$18,000,000 is appropriated from the general
14 fund to the economic development fund (AS 44.88.172) of the Alaska Indus-
15 trial Development Authority for the DeLong Mountain transportation project.

16 * Sec. 2. (a) All right, title, and interest in loans of the type
17 described in (b) of this section, and all right, title, and interest in all
18 mortgages, notes, and other instruments of security made in connection with
19 those loans, purchased or acquired by the Department of Revenue and held in
20 the general fund on July 1, 1985, are transferred and appropriated to the
21 economic development fund (AS 44.88.172) of the Alaska Industrial Develop-
22 ment Authority for the DeLong Mountain transportation project. However, if
23 the amount in unpaid principal of the loans exceeds \$112,000,000 as of
24 July 1, 1985, only loans and instruments of security totaling \$112,000,000
25 in unpaid principal are transferred and appropriated under this section.

26 (b) This section transfers and appropriates

- 27 (1) veterans loans acquired or made under AS 26.15;
28 (2) small business loans acquired or made under AS 45.95;
29 (3) tourism loans acquired or made under AS 45.90;

- (4) fisheries enhancement loans acquired or made under AS 16.10;
- (5) child care loans acquired or made under AS 44.33; and
- (6) historical district loans acquired or made under AS 45.98.

* Sec. 3. All right, title, and interest in commercial fishing loans acquired or made under AS 16.10.300 - 16.10.370 that are secured by limited entry permits, and all right, title, and interest in all mortgages, notes and other instruments of security made in connection with those loans, purchased or acquired by the Department of Revenue and held in the general fund on July 1, 1985, are transferred and appropriated from the general fund to the commercial fishing revolving loan fund (AS 16.10.340) for the purposes of AS 16.10.300 - 16.10.370. However, if the amount in unpaid principal of the loans exceeds \$30,000,000 as of July 1, 1985, only loans and instruments of security totaling \$30,000,000 in unpaid principal are transferred and appropriated under this section.

* Sec. 4. All right, title, and interest in commercial fishing loans that are not secured by limited entry permits, in an amount equal to the principal balance of loans appropriated under sec. 3 of this Act, and all right, title, and interest in all mortgages, notes and other instruments of security made in connection with those loans, are transferred and appropriated from the commercial fishing revolving loan fund (AS 16.10.340) to the economic development fund (AS 44.88.172) of the Alaska Industrial Development Authority for the DeLong Mountain transportation project.

* Sec. 5. The appropriation made by sec. 3 of this Act is for capitalization of a loan fund and does not lapse in accordance with AS 37.25.010.

* Sec. 6. The appropriations made by secs. 1, 2 and 4 of this Act are for a capital project and are subject to AS 37.25.020.

* Sec. 7. This Act takes effect July 1, 1985.

1
2 IN THE SENATE

BY THE RESOURCES COMMITTEE

3 SENATE BILL NO.

4 IN THE LEGISLATURE OF THE STATE OF ALASKA

5 FOURTEENTH LEGISLATURE - FIRST SESSION

6 A BILL

7 For an Act entitled: "An Act relating to the authorization of bonds or
8 notes for the DeLong Mountain transportation project,
9 establishing conditions under which the bonds or
10 notes may be issued; and providing for an effective
11 date."

12 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

13 * Section 1. The Alaska Industrial Development Authority is authorized
14 to issue bonds or notes in a principal amount not to exceed \$175,000,000 to
15 provide financing for the DeLong Mountain transportation project. Bonds or
16 notes may not be issued under this section until

17 (1) Cominco, Ltd. agrees in writing to terms and conditions
18 under which

19 (A) adequate access to the road and port constructed as
20 part of the DeLong Mountain project is guaranteed to other users;

21 (B) Cominco, Ltd. will pay for all or a portion of the
22 operation and maintenance of facilities constructed as part of the
23 project based on the use Cominco, Ltd. makes of the facilities com-
24 pared to the use made by others;

25 (C) Cominco, Ltd. will repay all expenditures by the state
26 for the project through toll fees for the use of facilities construct-
27 ed as part of the project and other payments;

28 (D) payments by Cominco, Ltd. to the state will be accel-
29 erated if the price of zinc rises above a level determined by the
Alaska Industrial Development Authority to yield a reasonable profit;

1
2 (2) the United States Congress approves the Cape Krusenstern
3 National Monument land exchange between NANA Regional Corporation and the
4 United States Department of the Interior;

5 (3) NANA Regional Corporation agrees in writing to convey to the
6 Alaska Industrial Development Authority, at no more than fair market value,
7 land needed for the port and road constructed as part of the DeLong Moun-
8 tain transportation project and land needed for future expansion of the
9 road and port;

10 (4) NANA Regional Corporation agrees in writing to lease land
11 for the Red Dog Mine to Cominco, Ltd. and to provide easements and right-
12 of-ways needed to operate the mine to Cominco, Ltd.;

13 (5) the Alaska Industrial Development Authority obtains a ruling
14 from the Internal Revenue Service that bonds or notes issued under this
15 section will qualify for tax exempt status; and

16 (6) the Alaska Industrial Development Authority establishes a
17 toll schedule for use of facilities constructed as part of the DeLong
18 Mountain transportation project that ensures the greatest return on the
19 state's investment in the project and guarantees equitable access to the
20 facilities by all users; the toll schedule may be periodically adjusted.

21 * Sec. 2. Notwithstanding limitations on the establishment of a capital
22 reserve fund under AS 44.88.105, the authority may covenant and agree with
23 the trustee or holders of the bonds or notes authorized under sec. 1 of
24 this Act that the authority will establish a capital reserve fund for the
25 purpose of securing the bonds or notes, that the chairman of the authority
26 will, by January 2 of each year, certify in writing to the governor and the
27 legislature the amount required to restore the capital reserve fund to the
28 capital reserve fund requirement, and that the legislature may appropriate
29 to the authority the amount certified by the chairman. Nothing in this
section creates a debt or liability of the state.

1 * Sec. 3. This Act takes effect immediately in accordance with AS 01.-
2 10.070(c).
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ALASKA MINERS ASSOCIATION, INC.

509 W. Third Ave., Suite 17, Anchorage, Alaska 99501 (907) 276-0347

April 8, 1985

Alaska State Legislature
Pouch V (MS 3100)
Juneau, Alaska 99811

Dear Legislator:

During this time of drastic reductions in oil revenues it is essential that Alaska aggressively seek means of diversifying its economic base. At this point in time, Alaska's most immediate promise for economic diversity is development of its resources.

As you well know, Alaska is blessed with a wealth and diversity of resources that is unequalled by any other states or by many sovereign nations. Yet, resource rich as we are, we are almost totally dependent on a single resource for our state's economy. Even the most superficial knowledge of history and economics makes it obvious that to attempt to maintain such a dependence is sheer folly!

The Alaska minerals industry has long known that the mineral resources of Alaska have great potential for providing long term alternative economic development for our state. We are firmly convinced that Alaska's most immediate hope for economic diversity is the creation of new wealth by mining of our vast mineral deposits.

Alaska now has an opportunity, by developing the Noatak area deposits, to quickly achieve much needed economic diversification. Time, however, is of the essence. If we do not avail ourselves of this opportunity now, we will have foreclosed much of the economic future for this generation and for those to follow.

Red Dog in the Noatak area is one of the most well known and closely watched mineral activities in the world. As such, it is an almost absolute barometer to the world of whether it is possible to develop Alaska's minerals. If the largest and richest mineral deposit of its kind cannot be mined, it is the belief of many that none can.



ALASKA MINERS ASSOCIATION, INC.

DeLong Mountains

April 8, 1985

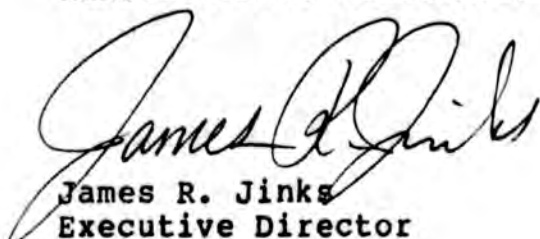
Page 2

The Alaska Miners Association and the mineral industry has long encouraged the State's participation in developing the transportation infrastructure needed for development of the Noatak deposits.

Enclosed is a resolution by the Alaska Miners Association which expresses our strong support of the State's participation in the DeLong Mountain Transportation System. We trust it will be of assistance to you in supporting the project.

Sincerely,

ALASKA MINERS ASSOCIATION



James R. Jinks
Executive Director

Enclosure



ALASKA MINERS ASSOCIATION, INC.

509 W. Third Ave., Suite 17, Anchorage, Alaska 99501 (907) 276-0347

RESOLUTION SUPPORTING THE DELONG MOUNTAINS TRANSPORTATION SYSTEM

WHEREAS, the people of Alaska support the diversification and expansion of the State of Alaska's economic base through the development of mineral resources; and

WHEREAS, the lack of transportation facilities, particularly in Northwest Alaska, has created economic barriers to development, including mineral development; and

WHEREAS, Cominco Alaska and the NANA Regional Corporation are considering the development of the Red Dog mineral deposit in the Delong Mountains area; and

WHEREAS, the development of the Red Dog deposit will provide the people and the State of Alaska with employment, income, tax revenues, and economic diversification; and

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

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

WHEREAS, Cominco Alaska has requested the State of Alaska to assist in financing the transportation infrastructure, also known as the DeLong Mountains Transportation System; and

WHEREAS, Cominco Alaska has guaranteed to repay the State of Alaska, through equitable user fees, in an amount to enable the State to repay amounts loaned; and

WHEREAS, Cominco Alaska has further guaranteed to bring the mine into production within a specified timeframe, to pay for the operation and maintenance of the transportation facilities, and, if there were to be significant delays, to still repay the State of Alaska the amount loaned to develop the transportation facilities, and

WHEREAS, the State of Alaska in its involvement in the DeLong Mountains Transportation System will provide a positive image to the resource development industry and international markets,

NOW, THEREFORE BE IT RESOLVED that the Alaska Miners Association supports the State of Alaska assisting in financing of the DeLong Mountains Transportation System; and

Alaska State Legislature



House of Representatives

Committee on Loans

POUCH V
JUNEAU, ALASKA 99811

PHONE:
(907) 465-4919
(907) 465-4920

TUESDAY, APRIL 16, 1985
3:30 p.m.
Capitol Room 124 (House Judiciary)

- * HB 105 "An Act relating to the international airports revenue bonds authorization; and providing for an effective date."

Loan Program Funding for FY 86.

For more information, contact JOHN HARTLE
CAPITOL ROOM 411
465-4919

* Indicates first public hearing.



ALASKA MINERS ASSOCIATION, INC.

509 W. Third Ave., Suite 17, Anchorage, Alaska 99501 (907) 276-0347

RESOLUTION SUPPORTING THE DELONG MOUNTAINS TRANSPORTATION SYSTEM

WHEREAS, the people of Alaska support the diversification and expansion of the State of Alaska's economic base through the development of mineral resources; and

WHEREAS, the lack of transportation facilities, particularly in Northwest Alaska, has created economic barriers to development, including mineral development; and

WHEREAS, Cominco Alaska and the NANA Regional Corporation are considering the development of the Red Dog mineral deposit in the DeLong Mountains area; and

WHEREAS, the development of the Red Dog deposit will provide the people and the State of Alaska with employment, income, tax revenues, and economic diversification; and

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

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

WHEREAS, Cominco Alaska has requested the State of Alaska to assist in financing the transportation infrastructure, also known as the DeLong Mountains Transportation System; and

WHEREAS, Cominco Alaska has guaranteed to repay the State of Alaska, through equitable user fees, in an amount to enable the State to repay amounts loaned; and

WHEREAS, Cominco Alaska has further guaranteed to bring the mine into production within a specified timeframe, to pay for the operation and maintenance of the transportation facilities, and, if there were to be significant delays, to still repay the State of Alaska the amount loaned to develop the transportation facilities, and

WHEREAS, the State of Alaska in its involvement in the DeLong Mountains Transportation System will provide a positive image to the resource development industry and international markets,

NOW, THEREFORE BE IT RESOLVED that the Alaska Miners Association supports the State of Alaska assisting in financing of the DeLong Mountains Transportation System; and



ALASKA MINERS ASSOCIATION, INC.

BE IT FURTHER RESOLVED that the Alaska Miners Association urges the 1985 Alaska State Legislature to appropriate such funds as are necessary to begin the construction of the DeLong Mountains Transportation System, and

BE IT FURTHER RESOLVED that this resolution be sent to:

The Governor of Alaska
The Commissioner of Commerce and Economic Development
The Commissioner of Revenue
The Commissioner of Natural Resources
The Commissioner of Transportation and Public Facilities
The Senate Resources Committee
The Senate Finance Committee
The House Resources Committee
The House Finance Committee
The House Special Committee on Loans
All Other Members of the Alaska Legislature

Adopted: March 29, 1985

Alaska State Legislature



House of Representatives

Committee on Loans

POUCH V
JUNEAU, ALASKA 99811

PHONE:
(907) 465-4919
(907) 465-4920

TUESDAY, APRIL 16, 1985

3:30 p.m.

Capitol Room 124 (House Judiciary)

- * HB 105 "An Act relating to the international airports revenue bonds authorization; and providing for an effective date."

Loan Program Funding for FY 86.

For more information, contact JOHN HARTLE
CAPITOL ROOM 411
465-4919

* Indicates first public hearing.



University of Alaska-Fairbanks

John Alfonsi-Chairman
S. A. A. D.
415-E MODS- UAF
Fairbanks, AK. 99701

Dear Rep. Sund

The Red Dog Mine project has had a negative cost/benefit analysis since 1981. However, the recent developments concerning Cominco's activity in South Africa deserve special consideration.

Economically speaking, big companies would not exist in South Africa without the present apartheid form of government. Regretably, the money made by Cominco is shared primarily with white South African supremacists and used to maintain minority rule.

It seems Cominco is tacitly supporting the present South African government by negotiating mining contracts with racists thus contributing to South Africa's very selective wealth re-distribution scheme. Obviously, the vast majority of South Africa's people are neither as financially secure or politically powerful as the racist minority. The product of apartheid is racial violence, with Cominco providing indirect monetary support for the immoral government that exists in South Africa today.

It is our belief that Alaskan dollars should not be appropriated by any elected official to tacitly support Cominco Ltd. while the company indirectly condones a racial, oppressive, supremacist government.

We hope Alaska's people will realize that the Red Dog Mine project only generates dollars, for NANA Inc. cash dependant shareholders. In addition, the project would generate money for Cominco consequently, for the white minority rulers in South Africa.

Sincerely,

John Alfonsi- Chairman
Students Against Alaska's Destruction (S.A.A.D.)

Original sponsor: Rules/Governor

KEY:

— additions to Loans C'

[] deletions from
Loans CS

IN THE HOUSE

BY THE FINANCE COMMITTEE

CS FOR HOUSE BILL NO. 105 (Finance)

IN THE LEGISLATURE OF THE STATE OF ALASKA

FOURTEENTH LEGISLATURE - FIRST SESSION

A BILL

For an Act entitled: "An Act relating to the authorization of bonds or notes, establishing conditions under which the bonds or notes for the DeLong Mountain transportation project may be issued; and providing for an effective date."

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

* Section 1. AS 37.15.410 is amended to read:

Sec. 37.15.410. BOND AUTHORIZATION. For the purpose of providing part or all of the money to be used, with or without any grants or other money that [WHICH] may become available, the issuance and sale of revenue bonds of the state in the total principal sum of not to exceed \$86,525,000 [\$62,825,000] is authorized to acquire, equip, construct, and install the additions, improvements, extensions, and facilities authorized in AS 37.15.510. The principal of and interest on these bonds shall be paid out of and secured by the gross revenues derived by the state from the ownership, lease, use, and operation of the airports, and of all the facilities of them and out of any other revenues or money that [WHICH] the state legislature may provide exclusive of any state tax or license.

* Sec. 2. The Alaska Industrial Development Authority is authorized to issue bonds or notes in a principal amount not to exceed \$175,000,000 to provide financing for the DeLong Mountain transportation project.

* Sec. 3. Before bonds or notes authorized under sec. 2 of this Act may be issued the Alaska Industrial Development Authority shall comply with

AS 44.88.173 and shall incorporate into the final finance plan for the DeLong Mountain transportation project the following terms and conditions:

(1) Cominco, Ltd. is required to agree in writing that

(A) Cominco, Ltd. will pay for all or a portion of the operation and maintenance of facilities constructed as part of the project based on the use Cominco Alaska makes of the facilities compared to the use made by others;

(B) if Cominco Alaska ceases to develop the Red Dog Mine after costs or debts have been incurred by the Alaska Industrial Development Authority for the project, Cominco, Ltd. will repay the authority for those costs and debts;

[Alaska Ind. Development] (C) toll fees paid by Cominco Alaska for the use of facilities constructed as part of the project to the Alaska Industrial Development Authority may be periodically adjusted if the price of zinc rises above a level that yields a return on investment commensurate with risk;

(2) the United States government makes available land in the Cape Krusenstern National Monument that is included in the proposed land [is conveyed to] exchange with NANA Regional Corporation to the corporation for construction of a transportation system; [by the U.S. Department of the Interior]

(3) NANA Regional Corporation is required to agree in writing to make available to the Alaska Industrial Development Authority, at no more than fair market value, land needed for the port and road constructed as part of the project and land needed for future expansion of the road and port;

(4) tax exempt financing for the project is used to the maximum extent possible;

(5) a toll schedule, that may be periodically adjusted, is established for use of facilities constructed as part of the project that

(A) ensures a reasonable return on the state's investment in the project; and

(B) guarantees equitable access to the facilities by all users;

(6) contracts for the construction, operation, and maintenance of the port and road are subject to AS 36;

(7) reasonable access to the port and road is guaranteed to all users. *and equitable*

* Sec. 4. Before bonds or notes authorized under sec. 2 of this Act may be issued the Alaska Industrial Development Authority shall

(1) report in writing to the legislative budget and audit committee that the conditions under sec. 3 of this Act have been met; and

(2) agree with the Department of Revenue in writing to deliver all money generated by the DeLong Mountain transportation project to the Department of Revenue for deposit in the general fund, other than money necessary for payment of the principal and interest on bonds or notes issued under sec. 2 of this Act and except as may otherwise be provided in the bond or note covenants. *[to the Dept. of Rev. for deposit in the general fund]*

* Sec. 5. This Act takes effect immediately in accordance with AS 01.-10.070(c).

Red Dog Project Analysis

**A report to Governor
Bill Sheffield**

February, 1984

Red Dog Project Analysis

February 1984

Lead Agency

**Office of Mineral Development
Department of Commerce and Economic Development**

Contributing Agencies

**Department of Commerce and Economic Development
Department of Community and Regional Affairs
Department of Transportation and Public Facilities
Department of Natural Resources
Office of the Governor**

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 - B. Appendix B: Red Dog Fact Sheet
 - C. Appendix C: Project Permitting Time-Line
 - D. Appendix D: Permit Flow Chart
 - E. Appendix E: Base Metal Markets (Cu, Pb, Zn): Alaskan Opportunities (Paper by Gordon H. Laurie, Cominco, Ltd.)

I. Introduction

II. Executive Summary

A. Summary of Findings

B. Recommendations

I. Introduction

The Red Dog zinc, lead and silver deposit was discovered in the mid 1970's. Located in the Noatak River drainage 55 miles from the Chukchi Sea, the deposit was included in a 1976 NANA land selection. In February 1982, the NANA Regional Corporation signed an agreement with Cominco American Ltd. to develop the deposit.

In late 1984, the Board of Directors of Cominco will decide whether or not to proceed with the project according to the present proposed schedule. If the decision is positive, construction would begin in mid 1985, with initial production starting at a rate of one million tons per year. The capacity of the mine would be expanded to 2 million tons of ore per year in 1993.

The development of the mine will require the construction of a port facility on the Chukchi Sea and a 55 mile road inland to the mine. Cominco estimates the cost of port construction to be \$57 million and the cost of the road to be \$75 million. Total development costs for the mine, including the port and the road are estimated to be \$390 million. NANA and Cominco have jointly indicated that they will seek State funding assistance for construction of the road and the port.

This report was commissioned by the Governor to provide his office with the information necessary to formulate the State's role in the development of Red Dog. The lead agency in the preparation of the report is the Office of Mineral Development, Department of Commerce and Economic Development. Other State agencies contributing to the report are the Division of Finance and Economics, Office of Management and Budget, Department of Community and Regional Affairs, Department of Transportation and Public Facilities, the Division of Land and Water Management, and the Department of Revenue. Guidance in the handling of confidential information was provided by the Department of Law.

The following section is an executive summary which includes a summary of findings and recommendations. Following the Executive Summary, the contributions of each agency are included in their entirety. Minor inconsistencies inevitably occur in a report of this type which incorporates contributions from originating agencies.

The information used in the writing of this report represents independent research by the agencies involved as well as confidential and non-confidential information provided by NANA and Cominco.

II. Executive Summary

- This section of the report was prepared by the Office of Mineral Development. The contributing agencies have reviewed the Executive Summary for consistency.

A. Summary of Findings

Project Feasibility

- The enormous tonnage and high combined grade of zinc, lead and silver make Red Dog the worlds largest, undeveloped zinc/lead deposit.
- Development costs will be high. However, the deposit can be mined as an open pit with a very low ratio of waste material to ore. Therefore, actual mining costs will be low compared with the majority of world zinc/lead mines. This will give the Red Dog mine competitive advantage and result in reducing the possibility of temporary mine shutdowns in times of world economic recession.
- For the foreseeable future, 70%-80% of mine revenues will be from the sale of zinc concentrates. Zinc is the fourth most widely used industrial metal, and compared with the other base metals (copper and lead), zinc has the greatest potential for growth in terms of world demand and the least potential for being over-produced.
- Without State investment, an average long term zinc price of 63¢ per pound is estimated to provide Cominco a 15% return on investment. A return on investment of 15% is cited for comparison purposes only and should not be interpreted as a decision threshold for Cominco. A 2.5% change in the return on investment is estimated for each 5¢ change in the long-term average zinc price.

- In the long term, much of Red Dog's concentrate production can be refined at Cominco's smelter and refiner in Trail, British Columbia, and will replace concentrates from other depleting Cominco zinc mines. In the near and long term, concentrates from Red Dog will be attractive to Japanese and European processors because of the reliability of the supplier, the longevity of the mine, and the political stability of the United States. The development of Red Dog and other base metal deposits may eventually make the construction of an in-State smelter and refiner feasible.

Permitting and Access

- Conditions at Red Dog will allow the operators to meet the most stringent environmental regulations and environmental permitting should not pose any problems.
- Gaining an access right-of-way from a Chukchi Sea port, across the Krusenstern National Monument to the mine site, poses the single greatest hurdle to mine development.

NANA

- The NANA Regional Corporation is solvent and is strongly oriented towards projects which offer long-term employment benefits to its shareholders, principally in the form of joint ventures within the region.

Cominco

- Cominco is a sound corporation, has good overall prospects, is backed by a large, reputable parent corporation, and appears able to provide a solid corporate base for support and development of the Red Dog mine project.
- Cominco is presently the free worlds largest producer of zinc and lead and has been successfully mining, processing and marketing zinc and lead for over 70 years.
- Cominco has developed and successfully operates four major mines in the North American arctic. Three of these are zinc/lead mines and have been developed within the last 20 years. The senior management for the Red Dog project will include many of the same personnel responsible for building and operating these arctic mines.

State Impacts

- The project will create between 350 and 400 direct, permanent jobs within the State with an annual gross payroll of between \$11.2 and \$12.9 million. Additionally, approximately 225 secondary and indirect jobs will be created. Construction employment will total 143 full time equivalent jobs between 1986 and 1988 with an annual gross payroll of \$8.8 million during those years.
- Revenues to the State from the mine will be derived from the mining license tax and the corporate income tax. As both taxes are based on net profits, annual State revenues range from \$9 to \$20 million in current dollars subject to how repayment of infrastructure costs are treated. The net present value of revenues to the State over 30 years, including estimated reductions in

transfer payments, is from \$200 million to \$300 million based on a zinc price range between 55¢ and 65¢ per pound. Additionally, earnings derived by NANA from the mine will provide revenue to the State. At present, there is no personal income tax so no revenues from employee income can be projected.

- No estimates have been made for the potential demands on State programs from the migration of out-of-state job seekers attracted by the project. Because of the NANA/Cominco agreement requiring preferential local hire, the remoteness of the project, and the lessening of national unemployment, the problem of out-of-state job seekers may not be significant.

- Recent dramatic decreases in the total of state transfer payments to the NANA region have been tentatively linked with permanent fund distributions. This indicates that income derived from mine wages may also have a positive effect on reducing regional transfer payments by the State.

- If State ownership and future control of the transportation corridor and infrastructure facilities are not considered and assuming a 60¢ lb. zinc price an examination of project finances estimates that a direct State subsidy of \$40.1 million towards project development costs would assure a 15% rate on investment. This would provide a six-fold net present return on the State's subsidy in the form of tax revenues and transfer payment reductions totaling \$270 million. If the State were to completely finance construction of the road and port for an estimated cost of \$135 million, the cost/benefit ratio would be reduced to 2:1.

- Industrial development bond financing of the project infrastructure would not adversely affect the State's bonding capacity.

Regional Impacts

- Red Dog will provide approximately 260 full-time jobs for regional residents at mine start-up in 1988, increasing to 400 in 1993. The total regional payroll will total approximately \$7.0 million initially and will increase constantly as local employees move into professional and technical positions. Additionally, some 75 secondary jobs will be created after start-up and would mostly be filled by regional residents. At present, 88% of the regional economy is supported by Federal and State revenues, and the existing 1200 full-time equivalent jobs in the region are heavily dependent upon Federal, State and local government employment.

- If the local hire objectives are met, the net effect of the mine on increasing the regional population will not be significant. Some increase in the population of Kotzebue is expected as regional residents relocate to be closer to their jobs. Kotzebue's population increase attributable to the mine represents about 6% of the total increase in Kotzebue's population over the next 20 years. With the possible exception of the water system, existing municipal facilities should not be significantly stressed by population growth attributable to development of the mine.

- Because Red Dog is an enclaved development, no substantial additional demands will be placed upon the region's service delivery. However, an increase in regional affluence is likely to require some increased social service delivery, at least temporarily. Service delivery in Kotzebue will be impacted to some degree if mine workers commute regularly through the city. That impact will depend on the frequency and duration of transient visits.

- The NANA/Cominco agreement requires Cominco, contingent upon the availability of skilled labor, to preferentially hire regional

residents, state residents and out-of-state residents in that order. While there is no guarantee of the percentage of local hire, NANA has stated it will assume the responsibility to train regional residents for these jobs.

- The region could benefit from the use of the project's port facilities and backhaul capabilities. Savings on freight costs are estimated by Cominco to be between \$1 million and \$3 million annually assuming port user fees are not assessed to incoming regional freight.

- NANA is presently seeking to detach Red Dog and other mineral deposits in the area from the North Slope Borough. Successful detachment is seen as a factor in the decision to proceed with the Red Dog project (due to uncertain future taxation policies of the North Slope Borough), and in the creation of a Northwest Alaska Borough.

Infrastructure Costs

- Cominco's route selection and road design are based on sound engineering criteria and the cost estimate of \$80 to \$90 million for the preferred road through the Krusenstern National Monument is realistic for this stage of the evaluation.

- Cominco's estimates for port costs of \$50 to \$60 million, based on the proposed, ballasted-tanker design, appear reasonable.

B. Recommendations

Red Dog will become one of the premier zinc/lead mines in the world. While the mine would eventually be developed without assistance, there are several reasons why the State may want to consider participating in the funding of all or part of the costs of building a road and regional port.

- There is little risk that the project will not generate sufficient revenues to amortize infrastructure costs at a modest interest rate.
- In addition to being able to repay any State funding, the project will generate over 400 year-round, permanent jobs; provide direct tax revenues to the State and local governments; and may significantly reduce the amount of regional transfer payments.
- The port facility, tidelands, uplands and right-of-way will service the region as well as the mine, and both the road and the port may stimulate future development of additional mineral deposits in the Noatak area. The road could eventually become part of an integrated transportation system that could link other more distant mineral developments such as the Northern Alaska Coal Field.
- The development of Red Dog will signal Alaska's firm intention to become a world supplier of mineral resources. This will have the effect of establishing Alaska's credibility with international consumers and attracting investment capital for other resource development projects.

If the State is to participate in the funding of the road and port facilities, the following recommendations are suggested.

- Any major State investment in the road and port facilities which will initially service the Red Dog mine should be conditional upon

firm agreements with NANA and Cominco which will provide for State interests in the facilities and right-of-way, as well as further guarantee the use of the road and the port to other potential users. This requires that State tidelands, privately owned uplands and the right-of-way be available for expanded development and use, in a reciprocal use agreement among affected landowners and users.

- The maintenance and operating costs of the road and the port should be borne by the users.

- If State funding were to take the form of a loan or appropriation, repayment of the funds should be required and should be spread over a period of 20 years or longer to begin with mine production. Whether repayment is to be made in the form of annual installments, tied to a tonnage user fee or some combination of both, the interest rate attached to the repayment should reflect the State's willingness to share in the project risk and should recognize the total benefits the project will provide, including State interests in the road and port.

- Any agreement between the State and NANA/Cominco should include an equitable mechanism to accommodate other future users into a fee schedule which would incorporate a pro rated share of debt amortization as well as operating and maintenance costs.

III. Report of the Office of Mineral Development Department of Commerce and Economic Development

- A. Technical Description of the Project and Permitting Requirements**
- B. Cominco Profile: History; Metal Mining and Processing Operations;
and Arctic Mining Experience**
- C. Commodity Profile of Mine Products, Marketing
Considerations and Price Forecasts**
- D. Zinc Resources of Alaska and Northwest Canada**
- E. Potential Alaskan Mineral Projects Requiring Public
Sector Infrastructure**
- F. Bibliography**

A. Technical Description of the Project and Permitting Requirements

1. Project Description

The Red Dog deposit has indicated reserves of 85 million tons of ore with an average grade of 17.1% zinc, 5.0% lead (22.1% combined) and 2.4 ounces per ton silver. Red Dog's reserves and grades compare extremely favorably on a worldwide basis with other primary zinc/lead mines. These would include the Brunswick Mining Company's (64% Noranda) No. 12 mine in Eastern Canada with reserves of 100 million tons of 13% combined zinc and lead; the Mount Isa Mine in Australia with 93 million tons of 14% combined zinc and lead; and the Tara Mine in Ireland with 59 million tons of 12.7% combined zinc and lead.

On a regional comparison, the open pit Cyprus Anvil zinc/lead mine in the neighboring Yukon Territory has reserves of about 37 million tons with a combined zinc/lead grade of only 7.8%. On a world basis, according to the U. S. Bureau of Mines, the average zinc grade of primary zinc mines is between 6% and 9%, spotlighting Red Dog's 17% zinc grade.

While the Red Dog grades and reserve tonnage compare favorably with major world producers, Red Dog will also enjoy the advantage of being an open pit mine, while most major zinc mines operate underground. U. S. Bureau of Mines statistics indicate less than 20% of the world's present primary zinc producers are surface mines. The cost of mining a ton of ore from an open pit is significantly less than the cost from an underground operation. This will enhance Red Dog's ability to operate during periods of market weakness and low prices. Cominco officials believe that Red Dog's actual cost to produce a ton of zinc, excluding development costs, will be lower than production costs of the majority of world zinc mines.

The mine site is located about 55 miles inland from the Chukchi seacoast and about 100 miles north of Kotzebue. A port site is proposed south of the village of Kivalina on the Chukchi Sea. The port will include either offshore or shore-connected docking facilities to accommodate 25,000-35,000 ton ore carriers which will ship mine concentrates to smelters and backhaul mine supplies during the ice-free shipping season from early July to mid October.

A 55 mile road will be constructed between the port and the mine site for the supply of the mine and for the transport of mine concentrates to port. At the proposed initial start-up production rate, 9 to 12 truckloads of concentrate will be hauled over the road daily. The road grade will be engineered for possible modification to a railbed when the production rate doubles and the economics of rail haulage become beneficial.

The mine site facilities will include an accommodation building for housing workers on a rotational basis, a mill complex for concentrating the mine ore, and other buildings for housing a vehicle maintenance shop, a primary ore crusher, an ore storage shed and other facilities. To the greatest extent possible, these buildings will be prefabricated in modules at Pacific port sites, shipped on barges to the port, and transported overland to Red Dog for siting on bedrock foundations.

The mine and mill will require 18 MW of power and the port facilities an additional 1.5 MW. The power will probably be supplied by diesel generators. While the cost of buying and transporting coal to the mine is significantly cheaper on a per Btu basis, Cominco has indicated the capital costs of a coal-fired power plant may not be competitive. A 50 MW power requirement is reported as being the minimum that would allow for the economies of scale necessary for coal fired generation to be considered cost effective.

The mine itself will be an open pit that may eventually reach a depth of 700 feet and cover 65 acres. Associated with the pit is the waste tailing pile area and the mill tailings pond. The tailings pond is located to allow treatment of all discharge water draining from the mine area including the pit, the waste tailings and the mill complex. Water naturally draining into the tailings pond basin will be diverted to an adjacent drainage to minimize the volume of water that must be treated. Once the tailings pond and drainage ditches are in place, the water quality in Red Dog Creek will be improved and the periodic fish kills in Ikalukrok Creek (caused by natural ground water leaching metals out of the orebody) will be eliminated.

The pit will require removal of only 1.3 million tons (less than 1 million yards) of material to prepare the mine site for production. Much of the waste material will be used in the construction of the tailings pond dam and access road. A portion of this preproduction material is mineralized and will be stockpiled in the tailings pond drainage area for possible future processing. The overall ratio of waste stripping to ore production is 0.8:1, which represents an extremely favorable situation compared with most open pit mines and will contribute significantly to the long term viability of the mine. Additionally, the first five years of ore to come from the pit will grade 21% zinc and 6% lead, 5% above the average mine ore grade, enhancing revenues from the initial production.

Initial ore production will be 1.1 million tons per year on a basis of 3000 tons per day. The ore will be crushed and concentrated using selective flotation. The final products shipped to smelters will be a lead sulfide concentrate with an approximate lead content of 62%, and a zinc sulfide concentrate with an approximate zinc content of 59%.

Forecast production at the initial mining rate is 350,000 tons of zinc concentrate and 79,000 tons of lead concentrate. The silver will be equally contained by weight in the lead and zinc concentrates,

resulting in a silver grade in the lead concentrate of 4-5 times than that of the silver grade in the zinc concentrate due to the smaller tonnage of the lead concentrate.

The chemicals and technology required to treat and concentrate the raw ore is well developed and the equipment and chemicals needed are readily available. The only departure from an "average" treatment scheme is the need for finer grinding of the ore to effectively liberate the ore minerals from the waste minerals.

Under the expanded scenario beginning in the sixth year of operation, production will nearly double increasing the daily mill throughput from 3000 tons to 5,600 tons. Annual ore tonnage will be 2.0 million tons with annual zinc concentrate shipments of 585,000 tons and lead concentrate shipments of 119,000 tons.

Two Appendices are attached to this report which provide further details on the design, construction and operation of the Red Dog project. Appendix A is from the Preliminary Draft Environmental Impact Statement. Appendix B is a "Red Dog Fact Sheet" generated and distributed by Cominco.

2. Permitting Requirements

Permitting activity to date for the Red Dog project has included the initiation of applications for those permits requiring long lead times. Cominco employs a full time environmental coordinator to manage this aspect of the project. This position is staffed by Mr. Harry Noah who formerly filled a similar position with the Noranda Mining Company during which the Federal EIS for the Greens Creek project was being prepared.

Environmental baseline data collection for the Red Dog project began in the winter of 1981 and continued through the summer of 1983.

The Environmental Impact Statement (EIS) process was begun in January of 1983 and the formal Draft EIS will be distributed to the public in March 1984. The final EIS could be issued by July of 1984. Other major permits applications which have been filed to date include a National Pollution Discharge Elimination System permit, a Section 10(404) Army Corps of Engineers wetlands permit, a State of Alaska right-of-way permit, and a Title 11 right-of-way permit with the U.S. Department of Interior.

The following is an itemization of major permits needed before the construction and operation of Red Dog can begin.

Federal Permits

U. S. Environmental Protection Agency

- National Pollutant Discharge Elimination System Permit
- Review of U. S. Army Corps of Engineers
Section 404 Permit for conformance with Section 404(b)(1) guidelines

U. S. Army Corps of Engineers

- Section 404 Permit (wetlands)
- Section 10 Permit (navigable waters dredge and fill)

U. S. National Park Service

- Right-of-way for transportation system

U. S. Fish and Wildlife

- Possible Section 7 Consultation (for endangered species)

National Marine Fisheries Service

- Possible Section 7 Consultation (for endangered marine mammals)

State Permits

Department of Environmental Conservation

- Air Quality Permit to Operate
- Certificate of Reasonable Assurance (Water Quality)
- Wastewater Disposal Permit
- Solid Waste Disposal Permit

Department of Fish and Game

- Title 16 Anadromous Fish Stream Permit

Department of Natural Resources

- Right-of-way Permit
- Water Rights Permit
- Tidelands Use Permit
- Tidelands Lease
- Materials Sale Contract

State Historic Preservation Office

- Archaeological Clearance

Office of Management and Budget

- Coastal Zone Management Consistency Determination

Local Permits

North Slope Borough

- Land Use Permit

Little problem is foreseen by Cominco in obtaining permits for the environmental aspects of the project. However, special interest litigation challenging procedural matters or other aspects of the issuance of federal permits may be possible as the project is large and represents the development of a remote area of Alaska.

In general the project should be able to meet the most stringent environmental standards. A water treatment plant will be installed to process the limited mine and mill discharge water. The naturally contaminated drainage from the mineral zone will also be treated. Ultimately the project will have permanently improved the quality of Red Dog Creek, even after the mine and water treatment facilities have been removed.

It is of interest to note that the present EPA regulations mandating zero-discharge of mill process water (which were developed on the basis of mill tailings ponds in the arid and evaporative climate of Southwest America) will be met at Red Dog by constructing a dam large enough to impound the cumulative volume of mill discharge water over the life of the mine. This regulation is attainable at Red Dog because the topography and the availability of stripped overburden material allow the construction of a mine tailings pond large enough to satisfy this requirement. The Quartz Hill mine, in the rainforest of Southeastern Alaska, will not have to comply with the regulation because a sole variance was granted to the project in the language of the regulations. However, this regulation has the potential to preclude the development of other Alaskan and U. S. mines which have neither a variance nor the favorable conditions found at Red Dog.

A possible major environmental permit that is not listed, but that may be in effect and needed for the permitting of Red Dog is a State Hazardous Waste permit which will be necessary if the proposed hazardous waste regulations are adopted. It is the contention of Cominco's staff that all the applicable provisions of these proposed regulations will have been addressed by the federal permitting process and that the State's permit requirements for Red Dog will be redundant. The State's proposed Hazardous Waste permitting process, however, would present an additional opportunity for project delay through litigation of permitting procedures.

At present, the most critical aspect of permitting for the project is the road access from the Chukchi coast to the mine site. Of two possible routes, a northern route across State lands and southern route through the Cape Krusenstern National Monument, the southern route has been identified in the Draft EIS as the preferred access option as it will have the least environmental impact and is the most cost-effective alternative for the project.

Use of the southern route requires either securing land from the Krusenstern National Monument or gaining a right-of-way across it. Both of these avenues are being pursued. The NANA Corporation is presently seeking a land exchange with the National Park Service for the four, corner townships in the monument through which the road would pass. Cominco has also begun a right-of-way application to the Park Service under the process outlined in Title 11 of ANILCA. The land swap is seen as the preferred method for gaining access as the alternative Title 11 right-of-way process is lengthy, complex, untried and would ultimately require approval of both the U. S. Congress and the President.

At present, government approval for access to the project is seen to be the only major permitting hurdle to the development of the mine. Appendix C contains a permit schedule time-line, and Appendix D is the basic flow chart for the Red Dog permitting process.

**B. Cominco Profile: History; Metal Mining and Processing Operations;
and Arctic Mining Experience**

1. History

The development and operation of Red Dog will be carried out by Cominco Alaska Incorporated, a wholly owned subsidiary of Cominco Ltd. of Canada. Cominco Ltd. was originally formed in 1906 as the Consolidated Mining and Smelting Company of Canada by the Canadian Pacific Railway (CPR), which remains the majority stockholder (53%) of Cominco Ltd.

The CPR entered the smelting business indirectly in 1898 when they purchased a government-granted railroad franchise from Augustus Heinze. Heinze's railroad franchise threatened the viability of the CPR's own rail expansion plans, but as a condition of the sale, Heinze required the CPR to purchase his smelter located at Trail, British Columbia. In 1906, to secure ore concentrates for the smelter, CPR merged its smelting interests with three mining companies and a local power company to form the Consolidated Mining and Smelting Company of Canada.

In 1913, the company purchased the Sullivan Mine in Kimberly, British Columbia (150 miles from Trail) at a sheriff's auction. The ore at the mine was extremely complex for the existing technology, but shortly after acquiring the mine, the company's research division discovered a new recovery technique called selective flotation which allowed the processing of the complex sulphide ore. The actual size of the Sullivan Mine turned out to be larger than anyone had imagined. Still operating in 1983 with an additional mine life of 20 years, the Sullivan Mine is the flagship of the company.

At present, Cominco is one of the largest mining, smelting and refining enterprises in the world. It is the leading producer of zinc

and lead, accounting for 10% and 11% of the world's supply, respectively. Additionally, the company operates fertilizer plants in the U.S. and Canada and operates a potash mine in Saskatchewan and a phosphate mine in Montana. Cominco supplies 22% of Canada's fertilizer demand and 12% of the U.S. demand.

2. Metal Mining and Processing Operations

Smelters and Refineries

Trail, British Columbia - The smelting and refining complex at Trail, British Columbia has an annual production capacity of 300,000 tons of refined zinc, 150,000 tons of refined lead and 12 million ounces of silver. Other products include gold, bismuth, cadmium, antimonial lead, sulphuric acid, ammonia, and fertilizers. The operation includes two hydro-electric plants which supply Cominco's power needs and sell the surplus locally. The Trail metallurgical operations represent Cominco's largest single source of revenue. Trail processes concentrates from the Sullivan Mine (100% Cominco) in British Columbia and from the Pine Point Mine (69% Cominco) in the Northwest Territories. Additional Trail capacity is met by purchasing concentrates from other sources including South America.

In 1977 Cominco began a modernization program at Trail which included \$210 million for a new zinc refinery. Of the 300,000 ton annual production capacity at the recently completed zinc facility, 70,000 tons is produced in a "state of the art" hydrometallurgical plant which uses a pressure leaching process to produce zinc. Elemental sulfur is a by-product of this process instead of sulfuric acid. An additional \$200 million investment is planned to rebuild the lead smelting segment of the complex.

Mitsubishi Cominco Smelting Company - Cominco holds a 45% interest in a lead smelter located on Naoshima Island, Japan. The

smelter has a 40,000 ton annual refined lead production annual capacity and purchases lead concentrates from the Pine Point mine.

Cominco Binani Zinc Ltd. - Cominco Ltd. and Metal Distributors Ltd. in joint venture operate an electrolytic zinc plant in India with a capacity of 32,000 tons refined zinc, and by-product cadmium and sulphuric acid.

Metal Mines

Sullivan Mine, Kimberly, B.C. - In its 74th year of production, the Sullivan Mine is wholly owned by Cominco and is the principal supplier of lead and zinc concentrates to the Trail smelter. In 1982 the Sullivan Mine milled 2.4 million tons of ore grading 3.2% zinc, 5.0% lead, and 1.9 ounces per ton silver and shipped 131,000 tons of zinc concentrate and 171,000 tons of lead concentrate to Trail. The Sullivan Mine has published ore reserves of 49 million tons grading 6.1% zinc 4.4% lead, and 1.0 ounces per ton silver, giving it an indicated mine life of an additional 20 years at the present production rate.

Pine Point Mine, Pine Point, Northwest Territory - Cominco is a 69% owner of the Pine Point Mine. In 1982 Pine Point milled 2.4 million tons of ore grading of 7.3% zinc and 3.0% lead. Almost all of the 287,000 tons of zinc concentrates were shipped to the Trail, British Columbia smelter while most of the 85,000 tons of lead concentrate were shipped to the Mitsubishi Cominco lead smelter in Japan. Published reserves are 25 million tons at 6.1% zinc and 2.4% lead. Full mine production capacity is four million tons of ore per year indicating an assured mine life of 7 years.

The Pine Point Mine began production in 1964 after a joint development effort with the Canadian government which provided infrastructure to the remote location consisting of a 400 mile railroad, and a hydroelectric power plant.

Polaris Mine, Little Cornwallis Island, Northwest Territory - The recently developed Polaris Mine commenced operation in 1982 at an annual production rate of 800,000 to 900,000 tons per year. Proven reserves are 11 million tons of 15.2% zinc and 4.4% lead while an additional 13 million tons of ore are inferred, indicating a mine life of 25-30 years. The concentrate production from Polaris is shipped to European smelters.

The Polaris Mine is located on Little Cornwallis Island only 75 miles from the magnetic North Pole. The shipping season from Polaris is restricted to a few months in the summer, as will be the shipping season at Red Dog, and a year's production of concentrate is shipped during the brief ice-free season. The mine's mill complex was constructed as a module at a Quebec port site and barged to Little Cornwallis Island for installation. This is the same method that will be used for construction of facilities at Red Dog.

Black Angel Mine, Maarmorilik, Greenland - Cominco is a 63% owner of the Black Angel Mine which milled 744,000 tons of ore in 1982, grading 12.6% zinc, 4.5% lead and 1.0 ounce per ton silver. Zinc and lead concentrates are shipped from Black Angel to European smelters during the summer shipping season. Black Angel reserves are 2.2 million tons grading 13.4% zinc, 4.0% lead and 1.0 ounces per ton silver. A mine life of 3 years is indicated unless additional reserves are discovered.

Magmont Mine, Bixby, Missouri - Cominco owns 50% of the Magmont Mine which milled 1.1 million tons of ore in 1982 at grades of 1.0% zinc and 6.5% lead. Concentrates from the mine are sold to U.S. smelters. The mine has 9.1 million tons of proven and inferred reserves indicating a mine life of 8-9 years.

Con Mine, Yellowknife, Northwest Territory - The Con Mine is located on the shores of Great Slave Lake and has been in production

since 1938. In 1982, 234,000 tons of ore were milled with an average grade of 0.36 ounces per ton gold. The ore is milled and the gold refined locally in Yellowknife. The mine has reserves of 2.1 million tons grading 0.47 ounces of gold per ton for an indicated mine life of 8-10 years.

Jersey Mine and Valley Mine, Logan, B.C. - These two open pit mines have reserves of over 500 million tons of copper ore. The Valley Mine is the largest known copper deposit of its type in Canada. The Valley Mine began production in January 1983 at a rate of 23,000 tons per day.

Warm Springs Mine, Garrison, Montana - Cominco owns and operates the Warm Springs Mine, a major underground producer of phosphate which employs 114 people.

Other Metal Mining and Exploration Interests - Cominco has interests in several other metal mines worldwide including a 47% interest in Aberfoyle Ltd. which operates two tin mines, a zinc/lead mine and other properties in Australia; a 17% interest in Tara Exploration which operates an underground zinc/lead mine in Ireland; and a 47% interest in Exploracion Minera Internacional Espana S.A. which operates a zinc/lead mine in Spain. Cominco also operates wholly owned subsidiaries for exploration in America, Australia, Belgium, France, Italy and the United Kingdom.

Research - Cominco operates a Product Research Center in Ontario which works towards developing uses for lead and zinc, including developing, marketing and licensing new products and processes.

3. Arctic Mining Experience

Cominco has major and minor interests in eight zinc/lead mines in the world of which five are in North America. Of these five, three are

located in the arctic and were developed and are being operated by Cominco. The Pine Point Mine in Northern Canada is located at latitude 62°, the Black Angel in Greenland at latitude 71° and the Polaris on Little Cornwallis at latitude 77°N. The Red Dog deposit is located at latitude 68°.

The development and operation of each of these mines has presented special challenges which have been successfully met.

The Pine Point Mine located in Northern Canada required the construction of the Great Slave Lake Railway between the closest existing rail link in Alberta, to the mine site on the south shore of Great Slave Lake, 423 miles to the north. Much of the railroad was built over permafrost. Construction was financed by the Canadian Government under the northern "Roads to Resources" program and construction and operating costs were recovered from the mine through a schedule of user fees based on a guaranteed volume of 215,000 tons of concentrate shipped annually and special fees based upon the value of the concentrate as determined by smelter returns. When the agreement was negotiated, infrastructure costs were to be recovered in 10 years as there were only 10 years of proven ore reserves known at that time. Due to higher than forecast shipping tonnages, the mine ultimately repaid the railroad capital costs in about seven years.

Cominco underwrote the costs of developing a hydro-electric generating plant for use by the Pine Point mine and the developing region. Also a complete townsite was constructed which is today a chartered village with a population of 2200 and presently enjoys the second highest per capita income in the Northwest Territories. 640 residents are employed by the mine. Pine Point is an open pit, as will be Red Dog, with production coming from several pits. The ore is concentrated at the mine site and shipped to smelters at Trail, B.C. and Naoshima, Japan.

The Black Angel Mine was developed in 1972 with production beginning in 1973. The mine's entrance is located in a cliff wall of Maarmorilik Fjord on the west coast of Greenland. The mill and concentrator are located on the opposite side of the fjord and ore is transported from the mine portal, by aerial tramway, across the fjord to the mill site. The mine ships its concentrates by ocean transport to various European smelters, and as will be true at Red Dog, is limited to a shipping season determined by the winter ice pack.

The decision to develop the Polaris Mine was made by Cominco in November of 1979 and the first ore was processed in the mill on November 4, 1981, just two years later and 10 weeks ahead of schedule. Located on Little Cornwallis Island only 1,000 miles from the North Pole, the severe climactic conditions and short ice-free season required innovative development. As at Black Angel, the mine was located virtually at tide water. The mill and administrative offices were constructed as a single barge-mounted module at a port in Quebec and towed to the mine site. This is the same scenario Cominco will use to develop the Red Dog facilities. For Red Dog the modules will be constructed and shipped from Pacific ports and will then be transported overland approximately 55 miles.

Polaris is an underground mine, and mining techniques take into account the underground permafrost conditions which extend to a depth of about 1200 feet. While Red Dog will be an open pit mine and will therefore not have the mining problems as at Polaris, similar arctic conditions will be experienced at Red Dog. During the ice free season at Polaris, eight shiploads of concentrate, representing 12 months of mine and mill production, are shipped to European smelters.

The Polaris Mine maintains a personnel program targeted at maximizing regional employment of the area's Inuit natives. A training program for Northern Canadians is utilized and work schedules have

been tailored to accommodate the subsistence lifestyle of the northern residents.

The Con Mine in Yellowknife, Northwest Territories is a gold mine and as such does not handle the same large quantities of ore that a basemetal producer must mine, mill, concentrate and transport. The mine has been in operation since 1938, was one of the first of Canada's northern mines, and has given Cominco 45 years of practical experience operating in the arctic.

Cominco's success has been attributed to its strong management. Locally, the President and General Manager of Cominco Alaska is Hank Giegerich, who is responsible for Cominco's statewide activities and for the development of Red Dog.

Mr. Giegerich is a 30 year Cominco employee and was formerly Vice President of Cominco's northern operations, headquartered in Yellowknife. In that position Mr. Giegerich was responsible for the operation of the Con and Pine Point mines and was responsible for the development of the Polaris Mine. Prior to that assignment he was Project Engineer for the development of the Black Angel Mine in Greenland. Mr. Giegerich recently received awards from the Canadian Institute of Mining and Metallurgy and the Alberta Chamber of Commerce for the success of the development of the Polaris Mine and is undoubtedly one of the most qualified individuals in North America (and quite probably in the world) to manage the development of the Red Dog Mine.

The project manager for the Red Dog development is James "Bud" Rae. Mr. Rae is a long time Cominco employee and participated in the construction of the Pine Point Mine and later served as the mine's production superintendent. Mr. Rae managed the rehabilitation and development of Cominco's Pinchi Lake mercury mine in Northern B.C. which operated until the mid 1970's, and has been involved in the

development of Cominco's Valley Copper Mine, the operation of the Trail smelter and the construction of hydroelectric dams in British Columbia.

More generally, as the world's largest miner, smelter, refiner and marketer of zinc and lead, Cominco's profitable history is the result of its success in assessing market demand and timing the development of carefully planned and efficiently operated mines. This record is more impressive when it is taken into consideration that four of Cominco's major mines operate in remote regions of the arctic. These mines are successful despite the high development costs of infrastructure creation, and high operating and labor costs.

C. Commodity Profile of Mine Products and Marketing Considerations

1. Introduction

The average grade of the Red Dog Mine is 17.1% zinc, 5.0% lead and 2.4 ounces per ton silver. The importance of zinc to the economics of the mine is understated as the actual zinc grades will be closer to 21% in the first five years and average 19% for the following 15 years. It is in this initial period of the mine's life when capital costs are amortized and therefore the higher ore grade is important to the ultimate return on investment.

Using an average grade of 19.0% zinc, 5.0% lead and 2.4 ounces per ton silver (conservatively representing the first 20 years of operation), an appreciation can be gained for the relative contribution each commodity will make to the total mine revenues by figuring the gross value of a ton of ore and the relative percentage each metal contributes.

Commodity prices published for November 4, 1983 were 49¢ per pound for zinc, 25¢ per pound for lead and \$9.00 per ounce for silver. Though the price a smelter pays for contained metals is discounted to reflect smelting charges and other considerations, applying these basic prices will give a relative comparison of the importance of each commodity.

At a grade of 19.0% zinc, one ton of ore will contain 380 pounds of zinc with a gross value of \$186.20 at 49¢ per pound. At a 5% grade, one ton of ore will contain 100 pounds of lead with a gross value of \$25.00 at 25¢ per pound. And at 2.4 ounces per ton silver, one ton of ore contains 2.4 ounces of silver with a gross value of \$21.60 at \$9.00 per ounce. The total gross value of a ton of ore at these prices is therefore \$232.80. Gross value, as used here, simply states the value

of the contained metals and does not account for the costs and losses that occur during mining, milling and refining. Zinc value represents 80% of this total while lead and silver contribute 11% and 9% respectively. It is obvious that zinc is the critical commodity in the economics of the Red Dog mine.

To further highlight the importance of zinc, the same calculations can be done holding the price of zinc at its present level of 49¢ while doubling both the price of lead (to 50¢ per pound) and silver (to \$18.00 per ounce.) The recalculated percentage contributions to revenues are 67% zinc, 18% lead and 15% silver. Thus Red Dog is primarily a zinc mine and unless there are extraordinary increases in lead and silver prices, the critical commodity is, and in the foreseeable future will remain, zinc.

2. Zinc

Uses and Substitutes

Zinc is the fourth most widely used industrial metal, surpassed only by iron, aluminum and copper. Its importance, however, often goes unnoticed as the metal loses its identity in most end product forms. There are four primary areas of zinc use.

- 1) Protective coatings. The greatest use of zinc is for coating (galvanizing) steel and iron products. This use accounted for about 44% of all zinc consumed in 1982. Zinc coating protects steel in two ways; by providing a long-lived barrier between the steel base and the corrosive environment; and by protecting the steel through galvanic action due to zinc's high electrochemical activity. Common applications for zinc coating are steel sheet, fencing, storage tanks, fasteners, wire rope, towers, industrial plants, culverts, bridges, ships and structural shapes. As a second method of protecting steel, sacrificial zinc anodes are used

to inhibit electrolytic corrosion of ship hulls, offshore drilling rigs, submerged or buried steel including tanks, pipes or other works.

2) Brass. Brass is an alloy of copper and zinc containing up to 40% zinc. Brass tubes, valves, radiators, and fittings are extensively used in vehicles, motors, refrigeration equipment, heat exchangers, communication and electronic devices. Brass accounts for about 20% of the world's zinc consumption.

3) Die casting. Zinc's low melting point allows problem-free gravity casting. Zinc used in die casting is often combined with small percentages of aluminum to impart strength and wear resistance, and copper to improve tensile strength, hardness and other properties. Zinc die cast parts, such as handles, grills, brackets, carburetors, gauges, pumps, and housings are extensively used in automobiles, machinery, business machines, appliances, scientific and electronic equipment. Die casting accounts for about 16% of the world's zinc consumption.

4) Rolled Zinc. Products manufactured from rolled zinc include engraving plate, coinage and zinc foil. These uses account for about 8% of consumption.

5) Zinc compounds. Zinc dust, zinc oxide, and other zinc compounds are used in a variety of industrial applications as corrosion inhibitors, activators in vulcanizing rubber, chemical catalysts, fluxing agents, fungicides, pharmaceuticals, TV screen phosphors, and additives in lubricants. Zinc ferrite is used in electrical motors, transformers, coils, amplifiers, timers, and in radios, television and computers.

It also should be noted that zinc is an essential element in the growth of human beings and animals. An animal with a zinc deficient

diet will require 50% more food to achieve the same weight-gain as an animal supplied with sufficient zinc. While inhalation of freshly formed zinc oxide can result in the temporary disorder known as "zinc chills" or "oxide shakes," zinc is not considered to be a toxic substance.

The primary substitutes for zinc, (and therefore its economic competition) are aluminum, plastic and magnesium.

In protective coatings there is no substitute for zinc galvanizing in large-tonnage applications and therefore, zinc's largest use has an assured base level demand. In steel sheet coating a recently marketed product, Galvalume, has made significant inroads on traditional zinc-coated steel sheet. Galvalume is comprised of 55% aluminum and 43% zinc. Because the coating is less dense and offers greater corrosive resistance, much less zinc is used than when steel sheet is hot-dipped in zinc to form conventional galvanized sheet. However, Galvalume is not easily molded, nor can it be welded, so there are presently limitations on its ability to substitute for zinc coated sheet. A competitive sheeting product, Galfan (95% zinc, 5% aluminum), has also been developed and may be competitive with Galvalume in some applications. Aluminum sheet also competes with galvanized steel sheet for such applications as roofing and siding.

Aluminum alloys, stainless steels and plastics have replaced many traditional uses of brass and will continue to compete for those applications.

In die casting, aluminum and magnesium are competitive materials where weight limitations, temperature tolerances, and surface finishes are important. Plastics have also made inroads in this field. However the recent development of thin-wall zinc die casting and improved zinc alloys and finishing techniques has allowed zinc die casting to retain many of its challenged applications. It is also possible that the recent

MAJOR WORLD ZINC MINES

Mine Name*	Location	Average Grade ⁽¹⁾			Annual ⁽²⁾ Capacity	Re- ⁽²⁾ serves	Life ⁽³⁾	Ownership
		Zn	Pb	Ag				
#Red Dog (S)	Alaska	17.1	5.0	2.4	2.0	85	40+	NANA (100%)
Sullivan (U)	Canada	6.1	4.4	1.0	2.4	49	20	Cominco (100%)
Pine Point (S)	Canada	6.1	2.4	-	4.0	25	7	Cominco (69%)
Polaris (U)	Canada	15.2	4.4	-	0.8	24	30	Cominco (100%)
Black Angel (U)	Greenland	13.4	4.0	1.0	0.8	2	3	Cominco (63%)
Magmont (U)	Missouri	1.3	6.8	0.1	1.1	9	8	Cominco (50%)
Que River (U)	Australia	8.8	4.8	3.2	0.3	5	17	Cominco (47%)
Rubiales (U)	Spain	6.9	1.2	0.4	1.2	14	12	Cominco (48%)
Tara (U)	Ireland	9.6	2.8	-	3.0	74	25	Noranda (36%)
Nanisivik (U)	Canada	10.4	0.8	-	0.7	4	5	Mineral Res. Int'l. (53%)
Brunswick (U)	Canada	9.1	3.7	3.0	3.5	100	29	Noranda (64%)
Cyprus Anvil (S)	Canada	4.5	3.0	1.5	3.5	60	17	Dome Petroleum (100%)
Kidd Creek (U)	Canada	5.0	0.2	2.0	5.0	100	20	Canada Devel. Corp. (100%)
Mount Isa (U)	Australia	6.3	6.5	4.8	3.5	54	15	Mount Isa Mines (100%)
#Hilton (U)	Australia	6.6	9.6	4.8	3.5	46	13	Mount Isa Mines (100%)
Zinc Corp. (U)	Australia	9.5	8.9	2.8	1.0	13	13	Rio Tinto Zinc (61%)
New Broken Hill (U)	Australia	12.2	6.6	1.9	1.5	13	13	Rio Tinto Zinc (61%)
North Broken Hill (U)	Australia	10.0	13.0	6.5	1.1	6	5	North Broken Hill (100%)
Elura (U)	Australia	8.6	5.6	4.4	1.5	30	20	Electrolytic Zinc (100%)
#Scuddles (U)	Australia	9.0	-	2.3	1.5	29	20	Electrolytic Zinc (100%)
Cerro de Pasco (U,S)	Peru	7.9	3.3	2.7	2.5	57	23	Centromin (100%)
Prieska (U)	South Africa	3.0	-	-	3.0	9	3	U. S. Steel (46%)
#Crandon (U)	Wisconsin	5.4	5.0	0.4	3.5	84	24	Exxon (100%)

* - (S) Surface or open pit mine, (U) Underground mine

(1) - Zinc and lead grades in percentages, silver in troy ounces per ton

(2) - Million short tons

(3) - Years

- Indicates property is in development stage

developments in thinwall zinc die casting may find new applications, further limiting any erosion of zinc demand.

In chemical uses, aluminum and magnesium replace zinc to some extent in chemical reactions, and titanium oxide can replace zinc oxide in paints.

In general, economic and other considerations favor the continued wide use of zinc and limit inroads of substitutes. Magnesium substitution is limited by the low capacity of magnesium production facilities, and while aluminum and plastics are widely available, the price of zinc is favorable. As aluminum production is energy intensive and as plastics are petrochemical products, both are sensitive to energy price increases.

The energy requirement for producing 1 ton of aluminum from ore is 244 million Btu's while the equivalent process for zinc requires only 65 million Btu's. Additionally, where durability is a factor, plastic will never be an acceptable substitute for metals. Cominco's Product Research Center has developed a super plastic zinc (SPZ) consisting of 78% zinc and 22% aluminum with a low forming temperature which would allow use of the same low cost thermoforming technology utilized by plastics and would possibly result in zinc becoming a substitute for plastic in certain applications.

World Supply and Demand

The U.S. consumes one sixth of the world's zinc supply, but presently produces only a third of its own demand. U.S. zinc smelter capacity has decreased from self-sufficiency in 1968, to 60% dependency on foreign sources at present. In the absence of a repeal of the Jones Act, which penalizes the shipment of commodities between U. S. ports, Red Dog Mine concentrates will be processed by foreign smelters as a matter of economic reality. U.S. consumers will enjoy no inherent

domestic supply advantage despite the nationality of the mine. Therefore discussions of supply and demand for zinc and other commodities will be examined from primarily a global perspective.

World mine production in 1982 from non-socialist countries was 4.8 million tons of contained zinc. Production of refined metal was 4.3 million tons while metal consumption was 4.1 million tons. Consumption was 6% below the 1981 level and primarily reflected a 17% decline in U.S. consumption due to the general economic recession, and a lesser decline in Europe for the same reasons. Japan showed no consumption change in 1982.

The decline in world demand reflected general worldwide economic recession. As zinc consumption is tied to automobile production, residential and commercial construction and general industrial output, zinc consumption will parallel general economic trends.

A demand increase in U.S. consumption is forecast as a nationwide program to restore or replace highway structures such as bridges, guardrails and culverts will increase the need for galvanized steel. Additionally the change from a 95% copper penny to a 98% zinc penny will increase the annual U.S. base demand by about 40,000 tons per year, which represents about 1% of the 1982 world demand. Similar changes in coinage elsewhere in the world could add significantly to zinc demand.

In world automotive production, zinc may increasingly be used to coat exterior sheet metal surfaces as well as interior surfaces due to improvements in the ability of zinc coatings to accept high quality paint finishes. A survey of the four major U.S. auto makers found that zinc consumption in sheet metal materials had increased 2% per vehicle for 1983 models. This new demand may begin to offset reductions in zinc die castings used in automobiles which declined in total weight from about 45 pounds per car to 23 pounds per car between 1975 and 1982.

In general, demand for zinc has grown faster in developing industrialized countries such as Brazil, Mexico and South East Asian countries than in the older industrial nations. In 1982 increased export of zinc concentrates and record export levels of refined metal to socialist countries were recorded. Much of this tonnage was shipped to China which may represent a growing zinc consumer.

The U.S. Bureau of Mines estimates a probable annual world growth rate in zinc consumption through the year 2000 of 2.5%. This compares with an annual growth rate of 4.8% between 1960-73. Using the 1981 free world zinc consumption of 4.3 million tons as a base level for demand (this assumes the recessionary 1982 consumption level is not representative of the present base level) a growth rate of 2.5% would indicate an increase in world consumption to 5.1 million tons in 1988. Using the three year mine production high of 4.8 million tons in 1982 as representing present annual capacity, a need for an additional 0.3 million tons of production will be required in 1988. The new production from Red Dog will produce 0.2 million tons of zinc metal in 1988. In 1993 when Red Dog's zinc metal production has increased to 0.3 million tons, the free world demand forecast would be 5.8 million tons or 1.0 million tons greater than 1982 mine production levels. Several sources also suggest the socialist bloc will become a significant importer of zinc, supporting the demand growth forecast.

An important factor in forecasting the need for new mine's is the possibility of new supply coming from recycling or secondary sources. Unlike lead, in which a significant component of supply comes from recycled batteries and other products, the largest uses of zinc are sacrificial. Zinc used for coatings is dissipated and therefore recycle will never become a major supply source.

Marketing Considerations

At the initial production levels, the Red Dog Mine will produce 350,000 tons of zinc concentrate. Assuming a concentrate grade of about 59%, this represents 207,000 tons of contained metal. Cominco has indicated its intention to sell concentrates to Japanese and European smelters and to its own smelter at Trail, B.C. In 1982 Trail produced 226,000 tons of zinc, representing the zinc concentrate output of both the Sullivan and Pine Point Mines. The total zinc capacity at Trail is 300,000 tons so that the smelter has an additional unused capacity of 75,000 tons, representing about a third of Red Dog's initial production.

The reserves at the Sullivan Mine indicate it will continue to produce for about 20 years if no additional reserves are discovered, while reserves at Pine Point indicate the mine may be exhausted in about 10 years. In 1993 Red Dog is scheduled to increase its zinc production to 585,000 tons of concentrate or about 345,000 tons of contained zinc which will exceed the total present capacity of Trail, B.C. However, the new zinc smelter at Trail was designed with space available for installing an additional zinc refining capacity of 150,000 tons. Cominco could exercise the option to expand the zinc smelter prior to Red Dog expansion (or earlier) and thereby have the capability to smelt all Sullivan and Pine Point concentrates (at their present production rate), as well as over 60% of Red Dog's expanded production. When the Pine Point Mine is exhausted the expanded Trail zinc refinery could handle 100% of Red Dog's maximum production, plus all production from the Sullivan Mine.

Japanese zinc refineries at present have a combined capacity of in excess of 800 thousand tons refined metal. In recent years Japanese refineries have had problems securing adequate supplies of zinc concentrates and may view Red Dog as a desirable long-term, stable source. European smelters, not counting communist countries, have a combined capacity of about 2.0 million tons. At present there is an over capacity

of zinc smelters in Europe. Red Dog will be attractive to both Japanese and European refineries as a long term zinc concentrate source (more than 40 years) and, with a competitive climate among smelters to secure adequate concentrate supplies, Red Dog should receive favorable rates and terms from smelters.

A final marketing consideration is the ownership of the zinc mining and processing industry. At present the zinc industry, compared with the copper industry, is being operated more in line with free enterprise concepts. Better balance of zinc metal stocks with demand will result in stronger and more predictable long term prices. This contrasts with metal industries in which gross overproduction for the sake of generating foreign exchange results in depressed or even below cost metal prices - very much a factor in the copper industry for example.

3. Lead

Uses and Substitutes

Lead ranks as the fifth most widely used metal behind iron, aluminum, copper and zinc. At present the two major uses of lead are for lead-acid batteries and as an anti-knock gasoline additive. Other uses include construction materials, ammunition, solders, protective coatings and paints, radiation shielding and electrical cable sheathing.

Over 50% of present lead consumption is used in lead-acid batteries, primarily vehicle starting-lighting-ignition (SLI) batteries. In transportation applications, weight is a primary consideration, and as average car size and "cranking" requirements have diminished, so has the average lead content from about 30 pounds per car in 1977 to 20 pounds per car in 1983. Severe winters shorten battery life and increase demand for replacement batteries.

Research to find alternate combinations of metals and non-metals for batteries has been extensive, and while most substitutes can match or exceed the performance of the lead-acid battery, problems include cost of components, economics of material recycling, toxicity, and operating limitations and difficulties. The U.S. Bureau of Mines indicates no large scale substitution for lead-acid batteries is forthcoming.

Domestically the use of lead additives in gasoline is gradually declining due to environmental restrictions on lead emissions. Consumption of lead in the U.S. for gasoline additives has dropped by 50% since the early 1970's. However, while the use of lead additives has declined in the U.S. and future use may be strictly limited to certain types of engines, consumption in developing countries may continue to increase.

Lead coatings are used on materials exposed to corrosive agents and lead lined containers and tanks are used for the storage of corrosive chemicals and hazardous wastes. Lead coatings are also used as shields against radiation. While demand for these applications may increase, the use of lead in paints and other chemical applications where lead is likely to enter the environment has declined in recent years.

The large scale use of massive, stationery, lead-acid storage batteries for leveling power loads in electrical generating plants may represent a significant future use.

Supply and Demand

With only a few exceptions, primary lead is produced as a by- or co-product of zinc, copper and silver mining. Recovery of lead from batteries and other sources results in a large component of recycled metal. In 1982 free-world mine production totaled 2.6 million tons.

Refined lead production, including recycled lead, totaled 3.9 million tons while lead consumption totaled 3.8 million tons.

The forecast demand for lead varies. The U.S. Bureau of Mines forecasts a probable average annual world growth rate of 2.8%, which is larger than the agency's forecast of 2.5% growth for zinc. Other sources indicate the lead growth rate will be significantly less, possibly approaching 1.0%.

At present, 75% of lead use is in transportation. If the use of lead in gasoline declines on a world wide basis, the importance of lead-acid batteries as a percentage of total lead consumption will increase. Battery demand for vehicles is a function of the total number of vehicles in use as replacement batteries constitute some 80% of sales. Any increased long term demand for lead-acid batteries will ultimately depend upon increasing automobile use in developing countries.

Marketing Considerations

Markets for lead concentrates from Red Dog would be found either at Cominco's Trail, B.C. smelter, at the Cominco Mitsubishi Lead Smelter in Japan or at other Japanese lead smelters. Lead concentrate production from Red Dog could replace Pine Point concentrates at the Cominco Mitsubishi smelter when the mine is exhausted. Present Trail lead capacity is 150,000 tons refined metal. Actual utilized capacity in 1982 was 126,000 tons. Plans to modernize and expand the lead smelter, as was done with the zinc refinery, could assure an in-house market for lead concentrates.

At present with Pine Point lead concentrates being shipped to Japan, concentrates from Cominco's Sullivan Mine represent about 100,000 tons of the Trail's refined capacity, leaving 50,000 tons available. At Red Dog's initial production rate, mine output in terms of refined lead would just match this capacity.

4. Silver

Uses and Substitutes

The largest use of silver is in the production of photographic materials. Despite intensive research, no substitutes have been found to replace light sensitive silver-halides used in photographic films. Other industrial uses of silver include electrical switches, silver solders and batteries. Medicinal uses include antiseptics for certain types of infections, and as an amalgam in dental fillings. Silver coinage, jewelry, tableware, and investment bars are also major uses.

No viable substitute has been found for silver in photographic uses. Gold or platinum-group metals may be substituted for silver in electrical applications but only where the more oxidation resistant qualities of these precious metals overcomes the cost disparity. Copper, nickel, zinc and aluminum in various combinations have replaced silver coinage in many countries.

Supply and Demand

About two-thirds of the world's future supply of silver is contained in copper, lead and zinc deposits. Therefore the supply of silver will be determined more by the production of these base metals than by actual silver demand. The long term growth of silver demand, as with zinc and lead, is seen to be tied to the prosperity of developing nations. Increasing industrial and photographic demands, attendant upon an increased standard of living in these countries, will contribute to a strong demand growth.

The U.S. Bureau of Mines forecasts a probable annual world growth rate of 2.5% through 2000. Complicating the supply, demand, and price structure are the large quantities of silver held by investors. Silver holdings of private investors are large compared with annual