

Kitsault Mine has estimated life of 26 years

By C. A. Born and W. D. Lenton*
The Kitsault Mine of Climax Molybdenum Corp. of British Columbia, is located at the head of Alice Arm, approximately 800 km north of Vancouver and 140 km northeast of Prince Rupert. The orebody, which has been developed by open pit mining methods, is about 7.25 km from the existing townsite at an elevation of 610 m.

British Columbia Molybdenum, a subsidiary of Kennecott Copper,

*Excerpts of a paper presented at the 81st annual meeting of the Canadian Institute of Mining and Metallurgy by Mr. Born, president, and Mr. Lenton, general manager of Climax Molybdenum Corp. of British Columbia.

developed the open pit mine, constructed a 5,440 tonne per day concentrator and built a townsite composed of 56 single family homes and 250 single men's quarters to house employees. Operations started in late 1967 and continued into mid-1972. During the period that British Columbia Molybdenum operated the property, approximately 10.5 million kg of molybdenum were produced from 9 million tonnes of ore at an average mill recovery of 90%. The average ore grade was 0.20% molybdenite (MoS_2). A stripping ratio of approximately 1.50:1.0 resulted in 13.6 million tonnes of waste being mined.

In late 1972 Amax, parent com-

pany of Climax Molybdenum, purchased the Kitsault property from Kennecott.

The Kitsault orebody occurs in metamorphosed and altered Hazelton and Bowser Lake formations east of the coast range crystalline complex. Molybdenite mineralization is related to complex stocks of early tertiary age. The coast range crystalline complex in the Alice Arm area consists of numerous diorite, granodiorite and quartz diorite intrusives, which are believed to be 45 to 55 million years old.

Intrusion of the Alaskite phase produced the first molybdenite mineralization as minor disseminated rosettes.

A second period of mineralization followed the Alaskite. Initially quartz-feldspar veins cut by quartz-molybdenite veins, and, lastly, quartz-pyrite veins.

After the second period of mineralization, intramineral porphyries were emplaced. This event was followed by the third period of mineralization, which is identical to the second period, except that veins of this age are not cut by intramineral dikes.

The fourth period of mineralization, similar to periods two and three, is characterized by wide, banded quartz molybdenite veins.

In quartz veins

Most of the molybdenite occurs in quartz veins, with minor amounts disseminated in Alaskite and as molybdenite paint on fracture surfaces. Generally, the highest grade material is in the central portions of the ore lobes. Mineralization occurs along the contact between the lime creek stock and hornfels in the west, north and east, but cuts across the centre of the stock in the southern part of the orebody.

Galena, sphalerite, chalcopryrite and copper-lead-bismuth sulfosalts occur primarily in late polymetallic veins. Galena is probably present as either attachments on, or encapsulated within the molybdenite grains.

Alteration of the orebody has decided effects on the rock competency and milling characteristics of the ore. Generally, silicified and feldspathized rock is more competent and slightly harder than the unaltered rock. Argillization and sericitization reduces competency and softens the rock.

A minable ore reserve of 105 million tonnes having an average grade of 0.192% MoS_2 has been indicated. Insufficient drilling below the 365 m depth prevents estimation of grades with any degree of confidence at lower levels.

structural steelwork on the concentrator, access roads, tailing disposal, mine office and shop, primary crushing, coarse ore storage and secondary and tertiary crushing and screening.

This year's work

In 1980, all areas worked on in 1979 plus the water supply, fine ore storage, tailings line and outfall will be completed. Approximately 3.5 million tonnes of preproduction stripping will start at mid-year 1980 and continue through the first quarter of 1981. Additional open pit mining equipment needed to meet a 10,887 tonne per day mill production rate will be delivered late in 1980 and early 1981.

The second quarter of 1981 will be devoted to commissioning the mill and crusher, continued stripping and completion of the townsite development. Start-up of production is scheduled for mid-1981.

The production capacity of the open pit is restricted by the nearly vertical cylindrical shape of the orebody and it is unlikely that tonnages exceeding 10,887 tonnes per day could be sustained over long periods of time. Selected as the primary pit equipment were 7.6 m shovels and 77-tonne trucks. The required ore and waste tonnage can be produced by operating two shovels and eight trucks for three shifts per day, seven days a week, 350 days per year.

Three shovels

The pit mining operations will utilize three shovels and 12 trucks, 24-hour operation will require four crews of 12 men each. Drilling will require two drills around the clock utilizing four crews of two men each. The four small trucks and a loader will operate only on day shift along with some of the grader and dozer operations. Drilling and blasting operation and maintenance will

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he has estimated life of 26 years

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A minable ore reserve of 105 million tonnes having an average grade of 0.192% MoS₂ has been indicated. Insufficient drilling below the 365 m depth prevents estimation of grades with any degree of confidence at lower levels.

The mineral inventory was developed from diamond drill holes with assays from each 3.05 m sample interval. These assays, when composited into 12.2 m intervals to correspond to the bench height, gave an average grade of 0.192% MoS₂ with a stripping ratio of 1.82:1.0. A three dimensional mineral model, comprised of 15.2 x 15.1 x 12.2 m blocks, was developed from the assay data using a spherical interpolation distance of 122 x 122 x 30.5 m in the X Y and Z directions respectively. Variogram studies supported the selection of these interpolation distances. With a mill throughput of 10,887 tonnes per day, a mine life of 26 years is predicted.

The capital cost of the project is estimated at \$143 million largely committed in the 1979/1980 period.

The 1979 program entailed placement of orders for equipment and delivery of equipment needed for development, initial work on the dock, townsite expansion, concrete,

structural steelwork on the concentrator, access roads, tailing disposal, mine office and shop, primary crushing, coarse ore storage and secondary and tertiary crushing and screening.

This year's work

In 1980, all areas worked on in 1979 plus the water supply, fine ore storage, tailings line and outfall will be completed. Approximately 3.5 million tonnes of preproduction stripping will start at mid-year 1980 and continue through the first quarter of 1981. Additional open pit mining equipment needed to meet a 10,887 tonne per day mill production rate will be delivered late in 1980 and early 1981.

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The crusher and concentrator were operated for approximately five years by B.C. Moly at a nominal rate of 5,433 tonnes per day. Considerably higher rates were achieved when the "softer" diorite-granodiorite ore was milled. The mill expansion has been designed to handle an average 10,887 tonnes per day of combined hard and soft ore. Based on the analyses of the B.C. Moly operating data and the research done by the Amax metallurgical laboratory, grind and recovery relationships were developed. These studies and tests indicated that, depending on head grade, average recoveries of 85-95% MoS₂ could be achieved at an average grind of 40-50% plus 100 mesh in the rougher circuit.

The final concentrate would contain over 90% MoS₂. Since the concentrate would otherwise be high in lead, nokes reagent will be added to grinding and flotation stages and the final concentrate will be subjected to a hot hydrochloric acid leach. The nokes addition and subsequent hot hydrochloric acid leaching will produce a molybdenite concentrate containing less than 0.02% lead.

Sulphide sniffers

From Page C1

day is approximately four hours with numerous breaks. By simply barking, the dog alerts the prospector to his find.

Weather conditions proved to be an important factor in the dogs' ability to scent sulphur dioxide emis-

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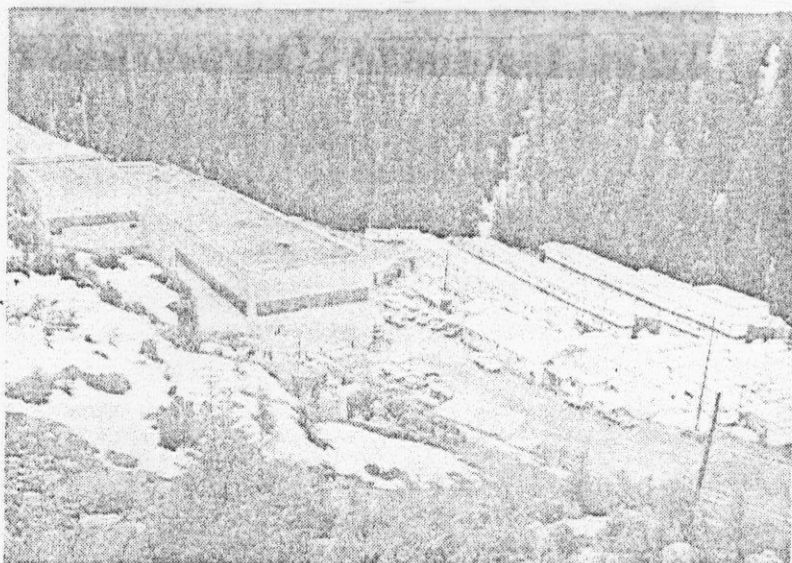


Photo by The Northern Miner

Amax concentrator off to the left with bunkhouse facilities for contractors at the right. *N-miner 08/05/80*

\$150-million expenditure

Amax moly complex planned by July, 1981

By David Duval

VANCOUVER — Mining companies in B.C. have always been viewed as easy targets for environmentalists and Amax Canada is no exception. The company is spending \$150 million to develop a mine-mill complex at Kitsault, B.C., which is scheduled to be operational by July, 1981. Throughput is expected to be 12,000 tons of molybdenum ore per day.

For years, these companies have maintained a low profile in their dealings with the media (the excep-

tion possibly being mining publications) but Amax is out to change all that. On a recent field trip The Northern Miner and people from other media organizations toured the company's Kitsault operation.

Among the environmental problems the company has had to overcome is what to do with tailings from its milling process. These will contain minute quantities of U236 (a decay product of uranium) which will be discharged into Alice Arm, an ocean inlet nearby. Both the

See Page 23

THE NORTHERN MINER May 8, 1980

23

Amax plans production

Page 1

company and the government have found that disposing the tailings in the inlet is the safest method available and studies by various groups say the radioactive decay products going into the water will be no higher than the background count in the area at present.

Among the reasons for doing it this way, said Wayne Lenton, vice-president and general manager of Amax Canada, is that there is simply no flat place to put the tailings since the mine is in a mountainous area. Also, any tailings pond would be in a high rainfall area which could result in uncontrolled run-off. An important point made by Lenton was that its permit to mine at Kitsault was based on successful studies that the tailings could be handled safely.

In 1972, Amax purchased the Kitsault property from Kennecott Copper Corp. whose subsidiary, B.C. Molybdenum, operated it on a 6,000-ton-per-day basis for over five years. Closure of the mine was due to low molybdenum prices along with the fact that Kennecott had to take a 20% discount on its product because of high amounts of lead in the concentrate. A new processing technique designed to produce molybdenum disulphide concentrate with an acceptable lead level is planned this time, the company says.

At present 400 construction workers are on the site working to complete mine buildings and shops and to develop housing and commercial developments for 450 miners and their families who will live in Kitsault.

By next year the town is expected to have a population of over 1,000 people. The first miners will arrive

in June to begin stripping nearly 2.5 million tons of overburden covering the open pit.

Ore reserves are calculated at 105 million tons grading 0.192% molybdenite which compares to 40 million tons grading 0.20% at closure. To mine the reserves the pit limits will simply be expanded.

Expansion of the mill building which had to have an additional 32 ft. added to it has been completed and the foundations for various ball and rod mills are in place. In one section of the mill, Amax had carefully cordoned off a section in which it had detected some PCB contamination. The PCB was used in the milling process by the previous operator. When the company realized that PCB was present they called in specialists from Edmonton to assess what could be done to remove the contaminated concrete and dirt below it which contained the hazardous chemical. Over \$100,000 was spent doing this, a company spokesman said. Once word got out that PCB had been detected at the site, the company received quite a bit of flak, he reported.

A \$11-million contract has been awarded by Amax for construction of a 34-km road which will connect the town to Terrace, B.C., which the company believes will contribute both to forestry and mineral exploration in the area. Tourist traffic is also expected to improve and facilities for tourists will be incorporated in town planning.

Although they wouldn't say in so many words, the possibility of getting funding from the government for this project has been thought of since the road could improve the economic viability of several mining projects in the area.

Strand Oil et al report on tests Alaskan well

CALGARY — Strand Oil and International Tika Resources and Peregrine Petroleum — three companies whose shares were suspended from trading on the ASE after the companies' request early last week — say that 7-inch casing will be set at 9,500 ft. in the Alaska Beke Inlet well in which the three companies hold interests of from 5% to 15%.

Log analysis and side wall cores have indicated three zones of primary interest to be tested through perforations and several zones of secondary interest.

Strand president, J. W. Worobec, says that the initial testing program could be completed within a week.

Mineral production in Canada in 1978 was estimated at \$19.7 billion, equal to 5% of Canada's gross national product.

ny Dividends

Northern Miner

Previous Payment	Remarks	Total * 1979	Total 1978
10c May 4	Initial	10c	.....
10c Dec. 29	Interim	.....	5c
10c June 30	Quarterly	\$1.80	\$2.40
10c Dec. 1	Annual	.....	1.7c
10c June 15	Quarterly	55c	60c
10c June 4	Quarterly	95c	\$1.06
10c Dec. 29	Interim	.....	38c
10c June 25	Quarterly	30c	10c
10c June 29	Semi-ann'l	20c	50c
10c Aug. 27	Quarterly	62.5c	42.5c
10c June 29	Interim	75c	\$1.00
10c July 27	Quarterly	55c	55c
10c June 22	Semi-ann'l	\$1.50	\$2.00
4c Apr. 27	Semi-ann'l	4c	5c
10c July 23	Quarterly	70c	80c
5c June 1	Quarterly	30c	15c
10c June 15	Quarterly	85c	\$1.85
10c Dec. 15	Interim	.....	10c
10c Aug. 27	Quarterly	34.6c	33.3c
10c June 19	Interim	\$1.00	.....
10c June 29	Interim	10c	20c
5c June 29	Quarterly	30c	50c
5c May 31	Quarterly	\$1.65	\$3.06
10c June 1	Quarterly	50c	.....
10c June 1	Quarterly	30c	70c
10c June 29	Semi-ann'l	40c	90c
5c Aug. 27	Quarterly	42c	53.5c
15c June 29	Quarterly	50c	92.5c
4c Dec. 15	Interim	.....	4c
10c Mar. 21	Quarterly	10c	50c
15c Aug. 24	Quarterly	\$1.95	\$5.52
10c Nov. 30	Quarterly	.....	70c
10c May 30	Interim	20c	20c
3c Oct. 31	Special	.....	3c
30c June 15	Quarterly	\$1.80	\$1.30
5c June 15	Initial	17.5c	.....
5c June 14	Interim	15c	10c
15c June 22	Semi-ann'l	\$2.50	\$1.75
25c June 18	Quarterly	75c	90c
45c May 31	Semi-ann'l	45c	80c
75c May 30	Semi-ann'l	\$2.20	\$1.29
100c Dec. 8	Special	.....	\$4.00
40c July 23	Semi-ann'l	40c	65c
25c Aug. 27	Semi-ann'l	90c	62.5c
15c June 15	Semi-ann'l	12.5c	22.5c
30c June 15	Quarterly	90c	\$1.20
15c June 29	Quarterly	30c	70c
40c June 22	Initial	40c	.....
7.5c June 25	Semi-ann'l	7.5c	12c
10c June 8	Interim	10c	10c
4c June 25	Semi-ann'l	4c	8c
			7c

Climax looking for production from B.C. moly mine mid-1981

VANCOUVER — Climax Molybdenum Corp., B.C., plans to begin production at its open pit molybdenum mine near Kitsault, B.C., in July, 1981, almost a year ahead of the original start-up date.

Work on the \$145-million project began in May this year and has been progressing well ahead of schedule. C. Allen Born, president tells The Northern Miner.

The property was first placed in production by Kennecott Copper in 1968 and was closed down in April, 1972. Climax, a wholly-owned subsidiary of Amax Inc. of Connecticut, plans to double the size of the concentrator from 6,000 tons to 12,000 tons a day and to resume production at a rate of about 10 million lb. of concentrate a year.

About 200 construction workers are currently on the site. The additional milling equipment has been ordered and work has begun on expanding the concentrator building and on the new 35,000 sq. ft. mine maintenance complex which will also house the administration and engineering offices.

Work is also proceeding on upgrading the dock facility at Kitsault and on the first portion of a 25-mile access road to the property. Tenders have been called and it is expected

Gulf raises production

CALGARY — Gulf Canada is to raise production at its Western Canadian refineries by 12,000 bbl. daily as a result of increased demand.

The production increases are scheduled to come mainly from expanded operations at the company's Edmonton refinery, with the balance from a smaller refinery at Kamloops, B.C.

that the heavy mining equipment will be ordered by the end of 1979.

Once in operation, the mine will employ about 450 people. Climax plans to enlarge the Kitsault town site to accommodate the employees and families and has begun refurbishing 56 existing houses. It plans to build another 50 houses in summer 1980.

Next year's program calls for completion of the concentrator and the mine maintenance complex and the road is scheduled for completion in 1981.

Engineering work preparing for the expanded mining operation has begun and the company expects to start pre-production stripping of the open pit early in 1980. The stripping ratio in regular production will be about 1:1. Ore reserves on the property are estimated to be sufficient for 25 years of operation.

New head for HBM&S Cdn. Metals Division

Harold S. Schwartz has been appointed to the newly-created position of president of the Canadian Metals Division of Hudson Bay Mining & Smelting Co., effective immediately. This is the latest in a series of changes among the company's top management (N.M., Aug. 16, 1979).

Mr. Schwartz joined the company in April as senior vice-president-metallurgy which was also a newly-created position in the Corporate Technical Services Group.

The Canadian Metals Division was formed in June, 1976, to rationalize mining, metallurgical and metals marketing operations in Canada.

REDCON GOLD MINES LIMITED

Rights Offering — Extension of Time

Due to problems of mailing the expiry date of the Redcon rights offering has been extended to 4:00 o'clock in the afternoon on Monday, September 10, 1979.

The rights offering consists of one additional share of the Company's capital at 30 cents per share for each five (5) rights held to shareholders of record on August 8, 1979.

H. S. Dolson
Secretary

103P120 BCMOLY

BRITISH COLUMBIA MOLYBDENUM LIMITED

LOSS EXPERIENCED AFTER WRITEOFFS IN 1969

CORRECTIVE MEASURES IMPROVE FUTURE OUTLOOK -

offs considerably higher, British Columbia Molybdenum outlines measures already taken or in

<u>YEAR TO DEC 31</u>	<u>1969</u>	<u>1968</u>
Molybdenite sales	\$9,698,131	\$7,152,215
Loss for year	1,863,220	1,152,172
Non-cash provisions	2,132,804	1,682,556
Net cash generated	269,584	476,384
Other cash sources	-	55,035
	<u>269,584</u>	<u>531,419</u>

Expenditures:

Plant & equip.net	1,505,187	1,108,704
Increase in work.		
cap.deficiency	1,235,603	577,285
Current assets	4,579,890	4,596,418
Current Liabilities	9,405,218	8,186,143
Work.capital,31Dec.		
- deficiency -	4,825,328	3,589,725
Long-term debt	17,000,000	17,000,000

auditors note also that a determination has not been reached as to the commercial startup date for tax purposes.

In his report on 1969 operations, Mr. Michaelson says output of molybdenite was 4% below budget because the amount of molybdenum contained in the ore mined was less than anticipated. This was partially offset by the company's mining and milling a total of 2,360,000 tons of ore, more than 100,000 tons above the amount projected at start of the year. He attributes the increase in costs to a point substantially higher than expected, largely to excessive maintenance and repair expenses on mine equipment arising from a shortage of skilled operators and mechanics. The capital expenditures included \$870,000 for improved and enlarged housing and recreation facilities which are expected to lead to a more stable work force with a favorable effect on costs. In its efforts to correct the major problem which persisted through 1969 due to lead contamination of molybdenite concentrates, the company found from geological studies and detailed mapping of lead distribution in the ore body that selective mining would not serve to avoid high lead areas. Consequently, a pilot plant to test a process of leaching the concentrates has been installed and is operating. Results to date indicate that lead contamination can be reduced by the new process. Engineering studies are being considered for a full-scale leaching plant.

Of the auth.cap. of 2,500,000 shs., B.C. Molybdenum had issued 1,600,002 shs. at 31Dec69. Regarding the long-term debt of \$17,000,000 in 5 3/4% Series A debentures, maturing 1976, carrying the full guarantee of Kennecott, each \$1,000 debenture carries 25 warrants entitling the holder to buy 25 shs. at \$10 p/s to 31Mar70; and at \$13 p/s to 31Mar73. As at 31Dec69, it is noted that 125 shs. had been purchased through exercise of warrants.

In reporting net cash generated by operations in 1969 lower than in 1968, the first full year of operation and a net loss after write-offs considerably higher, British Columbia Molybdenum outlines measures already taken or in process aimed at reducing costs. C.D. Michaelson, president of Kennecott's metal mining division, who heads B.C. Molybdenum, says estimated ore reserves were more than doubled as the result of completion of a diamond drilling program, although the average grade of molybdenum was slightly reduced.

The outlook for 1970, he states, is for somewhat lower operating costs with production to meet contracted sales at approx. the same level as 1969.

The net loss, as shown in the accompanying table, is after computing depreciation on a straight-line basis over the estimated useful lives of the assets. The auditors say, in this connection, that the maximum life of certain assets is restricted to 19 years based on the estimated life of the known ore reserves. The

93F/NW

Monthly Report - February 1979. Smithers Office - B.C.M.M.

Page 6

Jim Hobart - PAA Prospector

On February 26th Jim Hobart telephoned from Endako re the PAA Program. He wants to go back to an area south of Telegraph Creek.

Roy Hann - Granisle Copper

On February 28th Roy Hann from Granisle visited the office to talk about small high-grade mining.

MEETINGS

103P 120 1 ~~26~~ ~~266~~
property file
minerals file

Climax Molybdenum Co. of B.C. - Kitsault

On February 1st and 2nd I attended a meeting held in Smithers concerning the impending re-opening of the BC Moly (Kitsault) mine at Alice Arm. Present at the meeting were representatives from Climax (both Vancouver and Denver), Ministry of Mines (Victoria, Smithers and Prince Rupert), Ministry of Highways, Land Management Branch, Fish and Wildlife Branch, Parks Branch, Forest Service and Water Rights Branch, plus lawyers and surveyors representing Climax. The purpose of the meeting was to familiarize concerned government agencies with Climax' intentions and at the same time for Climax to get some guidelines to follow from the various agencies.

Al Borne, in charge of Climax in Vancouver, addressed the meeting. Geological reserves at Kitsault are now estimated at 105 million tonnes grading 0.20% MoS₂ which will ensure a mining life of a minimum of 25 years. From late 1967 to mid 1972 Kennecott Copper mined 10.2 short tons of ore

Monthly Report - February 1979. Smithers Office - B.C.M.M.

Page 7

yielding approximately 23 million pounds of molybdenum. Climax would like to start construction of a 40 km gravel access road to link the townsite at Kitsault with the Nass River Road near Aiyansh. Construction would proceed from both ends. Wright Engineering have been commissioned to do the design work. The townsite at Kitsault will house a working crew of 450 and when in total operation there should be a population of about 1500 people.

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Riding out the recession: a positive attitude by Amax of Canada and its new president

Named as the new president of Amax of Canada Limited in July 1981, James E. Foreman was faced with operating the newly-opened Kitsault molybdenum mine in the face of weakening markets and a prolonged environmental battle over tailings disposal. Reopening a mine after an eight-year shutdown can never be problem-free, but this one must have seemed like a challenge and a half.

Since that time, the federal government's scientific review panel has concluded that the tailings system is safe, the mine is operating according to design, and the Kitsault townsite is flourishing.

With a depth of experience in the minerals industry, Mr Foreman is no newcomer to the Kitsault operation in northwestern British Columbia. Prior to joining Amax in 1969, he served as general superintendent of the mine for 18 months when it was operated by British Columbia Molybdenum Limited, a subsidiary of Kennecott Copper Corporation. Amax acquired the Kitsault property in 1973 and, after several years of engineering and environmental studies, returned it to production at a rate of 12,000 tons/day, double its original capacity.

The \$194-million project included refurbishing the mill, adding a new

maintenance complex, new mining equipment, enlarging the townsite, and building a new dock. A \$3.2-million community and recreation complex and a \$1.9-million shopping mall were opened in April 1982 and a 26-mile, \$15-million road from Kitsault to the Nass Valley, linking up with Terrace, is expected to be completed this July.

Tailings controversy. Following claims by the Nishga Tribal Council that the deposit of mill tailings into the waters of Alice Arm would affect their fishery, the federal government set up a three-man review panel, headed by Dr J.E. McInerney, chairman of biology at the University of Victoria, to assess the tailing disposal guidelines.

The committee recently concluded that the tailings disposal system would not harm the fishery of Alice Arm and was environmentally preferable to on-land tailing disposal.

'All recommendations of the review panel are being implemented as quickly as possible', Mr Foreman told the *Western Miner*. 'Indeed, we are going beyond the recommendations in the development of an early warning fail safe system to monitor the disposed tailings to ensure there is no adverse impact.'

The company is proceeding with plans to modify or extend the pipeline under water and is carrying out research to determine if it is possible to further reduce concentrates of minerals (lead, cadmium and zinc) in the mill tailings.

The panel also recommended improving communications and involving the public in future approval processes.

'In hindsight, we didn't take that extra mile in communications', Mr Foreman says. 'The Nishga Indians are a fishing group dependant on the sea and as such had a bonafide reason to be concerned. We intend to do everything we can to show the Nishga people that there is no problem for their fishery now or for future generations.'

Production cutbacks. Like most molybdenum producers faced with rising world producer inventories, Amax has been forced to cutback production at the

James H Foreman



7 next page

mine. A 30% cutback was announced in February, reducing annual output from 9-million lb to 6-million lb. Employees at the 24 hour/day concentrator operation have been reduced to a five day/week from seven and the company plans to reduce its workforce through normal attrition. Currently there are 429 employees at the mine.

Mr Foreman is not too optimistic about the slumping moly markets, believing that in the short term, molybdenum will stay in an oversupply situation.

'We had not anticipated that the current recession would come as soon or last as long as it has', he says. He predicts a turnaround in the general economy beginning in the fourth quarter of 1982, but moly markets will probably lag behind.

New developments. Riding out the recession hasn't been easy for any mining company, but Amax appears to be weathering the storm relatively well. Its big challenge in Canada now will be development of the huge Mactung deposit which straddles the Yukon/Northwest Territories border. The company will put the experience gained at Kitsault to good use when development starts on the tungsten deposit at MacMillan Pass.

'Amax is continuing mine planning and environmental studies under an open planning concept, with a view to production late 1985 or early 1986', Mr Foreman reports.

Described by him as one of the best tungsten deposits in the world, Mactung has total geological reserves of 56.7-million tonnes grading 0.95% WO₃,

sufficient for more than 20 years of operation.

The orebody is flat lying and will probably be mined by room and pillar with delayed backfilling for the eventual recovery of the pillars. The proposed mill, using conventional gravity and flotation concentrating methods, will produce around 7-million lb/year of contained tungsten in concentrate, operating at a rate of 1000 tonnes/day.

Discussions are currently being carried out with 65%-owned Canada Tungsten Limited working towards an agreement for joint development of the 100%-owned Amax property.

Canada Tungsten currently supplies about 10% of the free world's tungsten (current capacity is around 440,000 short ton units (STU's) of tungsten high quality concentrate annually). When it comes on-stream, Mactung would double this capacity, placing Canada in a prominent position among the world's tungsten producers.

Although still in the evaluation stage, the Logtung open pit tungsten-molybdenum deposit located 100 miles west of Watson Lake in the Yukon is also an exciting development prospect. Reserves here are estimated at 163-million tonnes of 0.12% tungsten trioxide and 0.052% molybdenum disulphide.

Amax has completed engineering and mining simulation studies, metallurgical testing, cost estimates and financial analyses, and must now determine whether or not a full fledged feasibility study will be undertaken.

With these major projects on the boards, Amax is committed to an

aggressive development program in Canada at a time when many other foreign-owned companies are scaling down their activities in response to recent government policies such as the Foreign Investment Review Agency (FIRA) and the National Energy Policy.

Acknowledging that a lot of companies have been hurt by these restrictions, Mr Foreman adopts a more positive outlook on industry-government relations. In spite of the frustrations, he feels that it is in everyone's interest to find a way to bring government, business, environmental and special interest groups together.

'Amax's exploration philosophy here has not changed', he says. The company expects to spend between \$8- to \$9-million on exploration work in 1982, close to last year's record of \$10.6-million. Almost all the projects are under joint venture with partners contributing almost half of the projected expenditures.

Activities stretch across Canada with the bulk of the work concentrated on base and precious metals in BC, Yukon, Ontario and Quebec.

Common concerns. The troubles of the mining industry and their solutions have been discussed many times and Mr Foreman echoes the feelings of many of his colleagues when he expresses concern over recent tax changes introduced in the November 1981 federal budget.

In recognition of the high cost of living in the north, companies have traditionally provided housing, travel and medical benefits which until now have not been taxed as income by government. The recent budget, by taxing these benefits, will seriously restrict the industry's ability to attract good people of all professions to the remote and northern regions', Mr Foreman says.

Mr Foreman has worked on a variety of projects since joining Amax in 1969 as general manager of the company's zirconium production plant in Parkersburg, West Virginia. More recently he was senior vice president of conversion operations for the Molybdenum Division of Amax Inc, parent of Amax of Canada, and was also president of Amax Botswana Limited. He was responsible for all company molybdenum conversion plants in the US and Europe.

He obtained BS and MS degrees in metallurgical engineering at the Montana School of Mines and Washington State University respectively. He has an MBA and a degree in mineral engineering from Stanford University and has completed the Harvard Business School's advanced management program. He was also awarded an honorary professional degree of metallurgical engineering from the Montana College of Mineral Science and Technology.

W/M



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WMINER APR 82

Metal producers announce further cutbacks

Until the surplus of metal on world markets disappears, further cutbacks and layoffs are expected from Canadian metal producers. Adding to the list of mining cutbacks are the following.

Amax of Canada has reduced the mill rate at its Kitsault, BC operation from seven to a five day week. The cutback will reduce the mines' output by 2.5-million lb to an annual rate of 6.5-million. No layoffs are planned, however a reduction of 25-30 hourly paid employees is expected through attrition.

Brinco Mining Limited will shut down its Cassiar asbestos mine from 29 June to 3 Aug 1982 because of the depressed asbestos market. Approximately 600 employees will be affected by this closure.

Cominco Limited will shut down its lead-zinc smelter and mine in Trail and Kimberley for at least the month of July. Virtually all of the 6300 employees at the two locations will be affected. Together with the zinc production cutback presently in effect, the July shutdown will reduce annual production of lead by 18,000 tons, zinc by 40,000 tons, lead

concentrate by 15,000 tons and zinc concentrate by 13,000 tons.

As of 2 July about 80 workers are to be laid off from Noranda Mines Limited's Boss Mountain mine, located east of 100 Mile House in the Cariboo. Open-pit operations will be halted and the mine will switch to two shifts/day on the underground section from the current three-shift operation in an attempt to reduce losses. The mine has built up an inventory of 1.3-million lb of molybdenum, equal to eight month's production, and for the past few months the cost of producing the metal ore exceeded its selling price.

Placer Development Limited will close its Endako molybdenum mine this summer for 15 weeks. The shutdown will affect 565 employees.

Bethlehem Copper Mines near Kamloops BC is continuing to operate with 350 crew members after a layoff in December. In normal operations the plant strips two tons of waste for each ton of ore but currently is removing 0.7 tons of waste for each ton of ore.

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NMINER 21 OCT 82

Amax closes Kitsault open pit moly mine

Things continue to go from bad to worse in the molybdenum sector. The latest dose of bad news comes from Amax of Canada which has decided to close its Kitsault, B.C., open pit operation for three months beginning Nov. 5, affecting some 400 employees.

Actually, the mine has been operating on a 4-day week since Sept. 7, when employees returned to work following a one month vacation shutdown. Amax expected to maintain that operating status "but conditions have since deteriorated further than even market analysts had predicted," said Wayne Lenton, vice-president operations.

Amax said it will "continue to do everything it can in the current poor economic climate to allow resumption of operations as quickly as possible" and noted two of the company's molybdenum mines in Colorado would close until Jan. 3, 1983.

103P/6W

103P 261

103P 120

Times-Colonist

Victoria, British Columbia, Tuesday, March 2, 1982

Alice Arm appeal rejected by court

VANCOUVER (CP) — The B.C. Court of Appeal rejected Monday a challenge by the Nishga Indian band aimed at halting the dumping of mine tailings in Alice Arm, an ocean inlet north of Prince Rupert.

The Nishga had asked the court to declare invalid a provincial government pollution permit which allows Amax of Canada Ltd. to dump tailings from its molybdenum mine into the waters of Alice Arm.

The justices agreed with B.C. Supreme Court Justice David Hinds who in May, 1981, ruled that the permit granted in January, 1979, by the provincial pollution control branch was valid.

The Nishga maintain that the Kitsault mine tailings will harm fishing stocks in Alice Arm, their traditional fishing ground. Approximately 12,000 tonnes of mine tailings are dumped daily into the water.

103P/6W

103P 261

103P 120

NMINER 11 MAR 82

THE NORTHERN MINER March 11, 1982

Moly glut forces Amax cutbacks

VANCOUVER — Following the lead of other molybdenum producers in B.C., Amax of Canada has reduced the mill rate at its Kitsault operation from seven to a five day week. Wayne D. Lenton, vice president and general manager, told The Northern Miner the cut back would reduce the mines' output by 2.5 million pounds to an annual rate of 6.5 million.

No layoffs are planned, however a reduction of 25-30 hourly paid employees is expected through attrition.

According to John Sanders, mine

manager, the lower mill rate will allow the company to defer "additional haulage truck and dozer purchases that were scheduled this year" and surplus labour will be utilized to clean up outstanding projects.

Anticipating that it will stay on this schedule for the next 18 months, he cautions the exact timing is dependent on worldwide economic activity and molybdenum inventory.

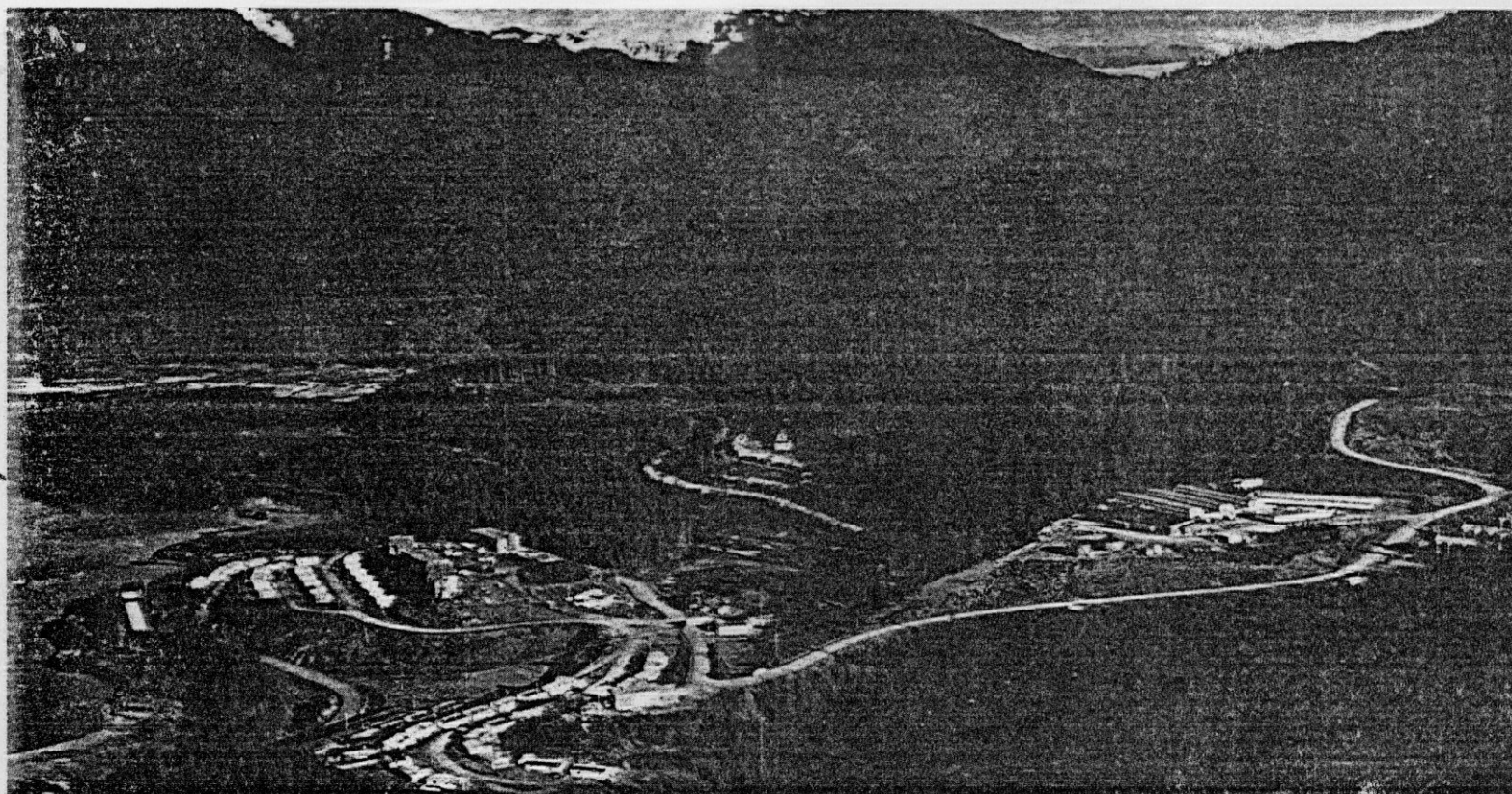
Meanwhile, work is proceeding on the new \$3.2 million community and recreation centre and the \$1.9 million shopping mall located in the downtown core of the town. The recreation complex will include a year-round swimming pool.

Amax reports that a public hearing is scheduled for Prince Rupert March 16 to hear submissions from several groups opposed to granting it an air emission permit. George Robbins, supervisor for environmental affairs, says exhaust emissions from the mine are "well within pollution control objectives" and they present no danger to human health or plant life. He notes that the principal constituent in the emissions is dust from their rock crushing process.

103P/6W

103P 261

103P 120



The Kitsault townsite lies on the shoreline of Alice Arm (Barry McLean photo)

Prop. File

AMAX: Spring opening for Kitsault

Early this month, Amax of Canada turned the key, starting up the mill at its Kitsault molybdenum mine 90 miles northeast of Prince Rupert in British Columbia, after an eight-year closure.

The property was first placed in production by BC Molybdenum Limited, a subsidiary of Kennecott Copper in 1968 and was closed down in April 1972 because of poor markets. Amax purchased the mine late in 1972 and following detailed

feasibility studies, began work on the \$194-million project in May 1979.

Scheduled mill throughput is 12,000 tons/day for an annual production of about 9-million lb of concentrate, double the previous production.

The project to date has included refurbishing and expanding the concentrator building, adding new mine equipment and a new 35,000 ft² mine maintenance complex, enlarging the

townsite, building a new dock and completing part of a 26-mile, \$15-million access road from Kitsault to the Nass Valley, linking up with Terrace and Prince Rupert. Access is currently by water or air only. (Refer to *Western Miner* March '80 for detailed review of the Kitsault operation.)

Current operations

The mine-mill complex was in its final stages of preparation at the time of Western

Britt Reid, Mill superintendent at Kitsault



Aerial view of the Kitsault molybdenum mine



103P/5

103 P120

3



C Allen Born, President of Ammax, looks along the tailings pipeline



Mine Superintendent Jack Devitt in the open pit area. In the background, a P&H 11-yd³ shovel loads one of the 85-ton trucks

Miner's visit to the property late in February.

Nearly half of the total complement of 450 full-time employees were on site and about 350 construction workers were completing projects in the mill ready for the April start-up. Commonwealth Construction is the main contractor, and has been responsible for most of the mill refurbishing program.

In the open pit, mining and road development started last July. Waste removal began in September 1980 and is currently averaging 25,000 to 30,000 tonnes/day. Approximately 2.8-million tonnes of waste had to be stripped prior to production. The current stripping ratio is 2 to 1 and some ore was already being stockpiled on pit benches, Mine Superintendent Jack Devitt reported.

The pit will be utilizing three 7.6 m³ P&H 1900 shovels, one 11.5 m³ Cat 992C loader; two 4.1 m³ Cat 980C loaders; 11 77-tonnes Cat 777 trucks, three Gardner Denver GD-100 rotary drills, plus

miscellaneous dozers, graders and service vehicles.

The mine has reserves of 105-million tons averaging 1.187% molybdenite, sufficient for a mine life of 25 years.

'We are placing a lot of emphasis on on-site training and will have four full-time people on staff for this purpose', Mr Devitt explained. Hiring of female employees is being activity pursued in order to establish a more normal balance in the community and to give those spouses desiring to work the opportunity to do so. Separate change rooms in the pit shop will accommodate 200 men and 60 women.

The new pit shop, will include office space, dry rooms and warehouse is virtually completed. The maintenance area includes eight bays capable of handling haulage trucks. Two bays will be allocated to dozer repair and one bay to welding area.

Our tour of the mill showed all major equipment to be in place. Most of the work still taking place was electrical and

instrument installation, Mill Superintendent Britt Reid pointed out.

The mill building has been expanded to the south to accommodate two additional grinding units and a small addition was made on the west side for reagent mixing and storage.

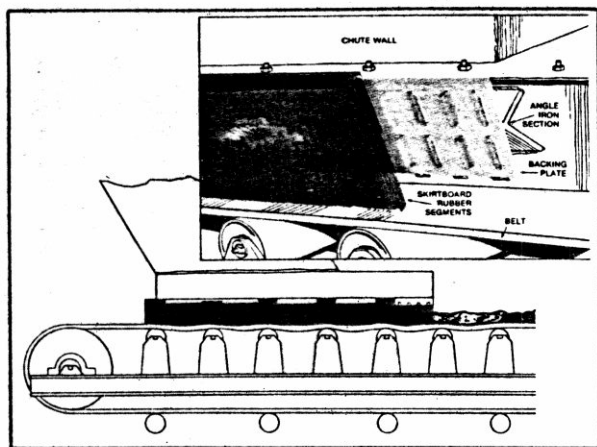
One ball mill and one rod mill have been added to the grinding circuit to give a total of three ball mills and two rod mills, Mr Reid said. Two new banks of rougher flotation cells have increased the flotation capacity by 133%.

As well as expansion of the grinding and flotation units, the mill project included improving the water supply, upgrading the electrical system, adding lead leach facilities and building the new tailings disposal system.

Tailings Disposal

The mine opening has not been without some controversy. Following claims by the Nishga Tribal Council that the deposit of

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mill tailings into the waters of Alice Arm will affect their fishery, the Minister of Fisheries and Oceans Romeo LeBlanc established a scientific review panel to assess the tailing disposal guidelines.

The three-man panel, under Chairman Dr J E McNerney, chairman of Biology at the University of Victoria, will examine the tailing guidelines and prepare two reports; an interim report and a final report by 1 July 1981. (W Winston Mair, a Victoria zoologist, had previously been named chairman of the panel, but he resigned early in March.)

For its part, Amax agreed to cooperate fully with the panel and President Allen Born is confident that the panel's findings will confirm Amax's scientific studies which showed that the tailing disposal will not pose any environmental problem and will not adversely affect the fishery.

Mr Born said that the scientific studies over four years culminated in 35 technical reports which led to the design of a disposal system on an environmentally-sound basis and which is compatible with the ecology of Alice Arm. Among other things, the studies examined ocean currents; the metal content of the water; sediments and animal tissues; the population of marine organisms present in the inlet; water clarity and the runoff of the rivers flowing into Alice Arm.

'By far the greatest proposition of the tailing solids — more than 90% — consists of silicate minerals comparable in nature to the minerals which comprise ordinary sand. Heavy metals, which are found in association with the silicates, constitute only a fraction of a per cent of the total amount of tailing solids discharged', Mr Born said.

The system has been designed so that the tailing will be carried by gravity from the mill via a 9.6km pipeline and through a series of drop boxes to Alice Arm. There it will be mixed with seawater and deposited 50m below the surface and will settle into a natural basin or trough at the bottom of the



The new pit shop will provide a maintenance area for all open pit equipment as well as office space, dry rooms and warehouse for both pit operations and maintenance

inlet at depths of up to 380m.

Mr Born noted that the company had advertised its application for a disposal permit in 1975 and no objections were lodged at that time.

Townsite

The town of Kitsault, situated at tidewater, is flourishing. Amax has expanded the original townsite left after the previous operation closed. Fifty-six houses that were mouthballed for seven years were refurbished and supplied with new appliances. Work is completed on construction of 210 new studio and one-and-two-bedroomed apartments and 55 new single-family houses.

The houses are available for either rent or sale. Amax is selling the three-bedroomed houses which cost \$85,000 to build for an average price of \$40,000. The down payment is around \$3000 and the mortgage is carried at 11%. The company requires a guaranteed sell-back of the unit although an employee will benefit from the expected appreciation in value of the property; price appreciation will be related to annual increases in the consumer price index.

Housing construction will proceed in stages until the town reaches a maximum population of around 1000 people.

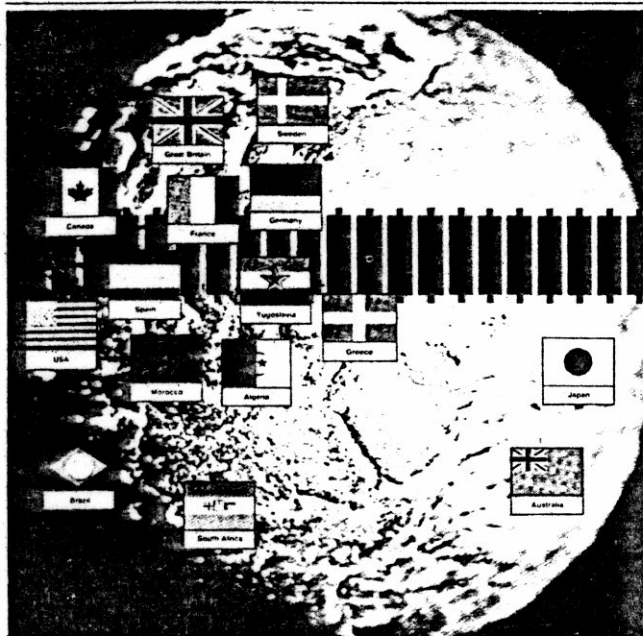
A new shopping centre is part of the plan. A new school has been built and a large recreation centre will be started during the summer of 1981. The existing recreation centre, also remaining from the previous operation, includes a lounge, games room, curling rink and small theatre.

There are three daily Trans Provincial Airline flights between Kitsault and Prince Rupert, and a weekly RivTow barge service. The road link with the Terrace-Stewart Highway is scheduled for completion this fall.

With an annual payroll of \$13-million, the new mine will bring economic benefits to BC's northwest region.

'Generally, the spin-off benefits in mining are two dollars for each direct dollar invested', according to Mr Born. 'By tripling the \$194-million you get a rough estimate of the net economic benefit of the project.'

Amax will pay an estimated \$532-million in federal and provincial income and mineral resource taxes over the life of the mine. Employees will pay another \$2.9-million annually in income taxes. WM



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Amax says Kitsault tailings system won't harm environment

By David Duval

KITSAULT — Fish chowder anyone? This might be the main course at the official opening of Amax of Canada's Kitsault mine sometime this summer if President Allan Born has his way. Furthermore, if the Nishga Indian Tribal Council has its way, he may be eating it for the 25-year life of the mine.

Unconvinced the Amax tailings system won't harm Alice Arm (an ocean inlet), the Nishga have suggested Mr. Born eat a daily portion of fish from the inlet for that period. And hook, line and sinker, he's prepared to do it for good scientific reasons, he believes.

Installed at a cost of \$7.3 million, the tailings system was approved by both federal and provincial regulatory authorities and was conditional upon the effluent meeting strict guidelines for metal concentrations as detailed in the approval memorandum. Studies commissioned by Amax have concluded the concentrations are actually lower than those set out in the guidelines, in many cases.

Mr. Born states the tailings are "little more than sand and fresh water," comparable to natural sediments discharged into Alice Arms by rivers and streams. He notes that the previous operators (B.C. Molybdenum) discharged their tailings into a local creek which ran into the ocean inlet with no discernible effect on the local fishery.

Since the greatest danger to inlet waters results from dumping tailings close to surface (biologists have determined these waters are the most productive) Amax designed its system to discharge 50 m below water after studies found the tailings would settle to the bottom of the inlet at 380 m.

Why then are the Nishga so upset? Industry sources think the Nishga are using Amax as a lever in their dispute with the federal government over land claims. Sensitive to native peoples, the government has established a scientific review panel to assess the tailings disposal guidelines within a 3-month period. Mr. Born says the panel is not conducting a new study, just reviewing the old.

He is completely confident the tailings systems will have no detrimental effect on the environment and that the mine will be in production on schedule, in April.

A strict monitoring program of Alice Arm will be conducted throughout the operating life of the mine as required by various government regulatory agencies. This will ensure the standards are met, he says. The Nishga have been invited to participate in the monitoring process but have declined so far.

Meanwhile, the push is on to complete the Kitsault project by April. The Northern Miner discovered while visiting the property. Amax of Canada vice-president and general manager Wayne Lenton reports about \$155 million of the total \$194 million budget has been spent already. Completing the final installations are 350 construction workers, 250 of whom are with Commonwealth Construction, the prime contractor. This company has over two-thirds of the \$73 million construction program in the mill. A tour of the plant with mill superintendent Britt Reid showed all the big equipment was installed. It was just a matter of hooking everything up, he said. The company has 30 people in the mill and is short-staffed in special trade areas including millwrights, electricians, heavy duty mechanics and instrumentation people, he added.

Stripping in the open pit began last September and is currently averaging 30,000 metric tons daily says John Sanders, mine manager. Approximately 2.8 million metric tons of waste has to be stripped prior to production. Any ore grade material encountered is being stockpiled on pit benches.

Among the more notable pieces of mining equipment in the pit are three P&H 1,900 shovels and three Gardner Denver GD-100 rotary drills. Mr. Sanders states that all the drills are electric, eliminating the problem of hydraulics and thus excessive downtime on the equipment. One important feature he mentioned regarding the drills was the excess of bailing air made available by the 1,700 cfm compressor installed on the unit.

He also said that slurry explosives would be used in the pit since most drill holes are wet. Du Pont has constructed a slurry plant at the mine-site to supply the product. There are many advantages using this type

explosive, says Amax. It eliminates the necessity pumping out holes prior to blasting as well as the use of in-hole liners, which are required when loading wet holes with ANFO (ammonium nitrate and fuel oil). Another important factor relates to the fact the slurry will "sleep" for an indefinite period meaning holes can be loaded well in advance. Environmentally, slurry is safer says Wayne Lenton since with straight ANFO there's always the danger of nitrates (which are soluble in water) seeping into the water system.

Few surprises cropped up when mining began in the pit and no serious problems are anticipated. Jack Devitt, mine superintendent says records from the previous operators are available to the company so Amax knows what to expect.

Located 7 km from the Kitsault townsite the pit has reserves of 105 million tons averaging 0.187% molybdenite, sufficient for 25 years of operation at a 12,000 ton per day mill rate. Each year, 9 million lb. of molybdenum will be produced.

Nearly 200 Amax employees are on the site and approximately 400 will be required when full production is reached in Jan. 1982. By that time Kitsault's population is expected to climb to 1,000 or more.

Employees and their families will be housed in a \$49 million townsite. The houses include 56 units left over from the previous operators which have been completely renovated. Fifty-five new homes are being completed and additional accommodation is available in the form of apartments (studio, one and two bedrooms) renting for \$100-\$150 per month. Rental housing is also available at \$200 per month and all rents include utilities. Those interested in buying a house can probably afford the investment since Amax is selling houses it built for \$85,000 (excluding land costs) for an average of \$40,000. The downpayment is about \$3,000 and the mortgage is carried at 11%. However, the company requires a guaranteed sell-back of the unit.

A 24-km access road which will complete the link to the Stewart-Terrace highway is being built by Amax at a cost of \$15 million. This will enable Kitsault residents to drive into the interior starting this fall and open up the area for tourism and other developments, says Amax.

Supplies are brought into Kitsault by barge and the town has air service from Prince Rupert 140 km to the southwest.

N MINER
5 MARCH 81

103P/6W

103P/12E

103P 248

261

103P 120

GCNL #55 18-03-80 AMAX OF CANADA LIMITED 103P/Law 103P-264 103P 120
LOCALIZED CONTAMINATION AREA TO BE REMOVED -

Amax of Canada Limited will remove a quantity of soil which shows a low level of contamination by PCBs (polychlorinated biphenyls) found near its Kitsault molybdenum mine which is under construction near Alice Arm, northwestern B.C. The PCBs were apparently spilled from a closed system concentrate dryer during the time the mine was operated on the site by B.C.Moly. That mine closed in 1972. F

C.Allen Born, president of Amax, said the contaminated area is localized and will be fenced off until the contaminated soil is removed. Tests show drinking water at the mine has not been affected, but further testing will be carried out by Amax and the B.C.Ministry of Environment to monitor the situation and gather more data.

Samples taken of well water used for drinking at the camp Feb.14 and Feb.18 were tested and no PCBs were detected.

Information that soil was contaminated was supplied March 14,1980 by the Ministry of the Environment which carried out tests of soil and water at the site.

When the previous mine was closed in 1972, all tanks, thickeners and flotation cells were drained and flushed, and 14 barrels of PCBs shipped to the U.S.A. for disposal.

About 35 gallons remained in the concentrate dryer. Amax contracted with Kinetic Contaminants Ltd. of Edmonton, specialists in the field, who supervised removal of the remaining PCBs, the dryer and all ancillary equipment from Kitsault.

Amax contacted the Ministry which took samples of soil around the dryer site.

"They confirmed soil under the dryer is contaminated with 195 parts per million of PCBs,"Mr.Born said. "That soil is now considered PCBs waste material and has to be removed until the remaining areas show less than 100 parts per million."

At the present time, the company does not know how much soil has to be removed, Mr.Born said.

Canadian Obas Oil Limited. Carolin will be manager and operator of the mine with a 50% net carried interest in its production after pay back. Production is scheduled to begin late 1980.

103P/6W ID 08163 MAP# 103P-234

CLIMAX MOLYBDENUM CORP.:

Work on the \$145-million molybdenum open pit project near Kitsault, BC, is progressing well ahead of schedule. Climax, a wholly-owned subsidiary of Amax Inc of Connecticut, now plans to begin production in July 1981, almost a year ahead of the original start-up date. The property was first placed in production by Kennecott Copper in 1968 and was closed down in April 1972. The current program is doubling the size of the concentrator to 1200 tons/day and the company plans to resume production at a rate of 10-million lb/year of concentrate.

CRAIGMONT MINES LIMITED:

Higher copper prices contributed to improved earnings for the nine months ended 31 July 1979. Net earnings rose to \$8,772,000 or \$1.73/share, compared to \$2,410,000 or 47¢/share in the same period of 1978. Revenue increased to \$33,892,000 from \$16,649,000 in 1978.

Current prices allow mining of a lower grade ore which will make it possible to continue operations until the Fall of 1980. Drilling on the Chu Chua prospect has not revealed any additional ore over the estimated 2-million tonnes grading 2% copper previously reported.

CYPRUS ANVIL MINING: The company closed its lead-zinc operations at Faro, Yukon on 17 September 1979 because of a strike by members of the United Steelworkers of America.

DENISON MINES LIMITED: Denison Mines Limited has acquired all the assets of Reserve Oil and Gas Company of Denver through a merger of Reserve with a wholly-owned US subsidiary of Denison.

Under the agreement, common and preferred shareholders of Reserve receive a cash payment of \$27.50 and \$40.15 respectively. Total payment for the 19-million shares, warrants and options outstanding will be around \$525-million.

Reserve Oil and Gas is engaged in a range of energy activities though Mohawk Petroleum Corporation, Western Crude Oil, Canadian Reserve Oil and Gas and other subsidiaries.

DICKENSON MINES LIMITED: Earnings for the first half of 1979 rose to

\$1,739,000 or 47¢/share, compared to \$569,000 or 17¢/share in the first six months of 1978.

Tons milled amounted to 59,643 compared to 51,915 and gold production totalled 26,111 oz compared to 27,169 oz in 1978. Ore reserves stand at 398,968 tons grading 0.555 oz/ton gold, compared to 352,945 tons grading 0.574 oz/ton at the same time last year.

ELDORADO NUCLEAR LIMITED: Earnings for the first six months totalled \$2.7-million on revenues of \$54.4-million. For the quarter ended 30 June, 1979 earnings were \$1-million on revenues of \$33.3-million, compared to \$19.8-million earned on \$81.4-million last year. The record earnings in 1978 resulted from the sale of uranium concentrates from inventories accumulated in previous years, which have now been reduced to normal operating levels.

ESSO MINERALS CANADA: Start-up of the company's \$32-million lead-zinc project at Gays River, Nova Scotia, is scheduled for early November 1979. The mine will initially treat the stockpiled ore from underground development work which began in April 1978, and will begin full production early in 1980.

The mill will treat 525,000 tons/year of ore producing 50,000 tons of concentrate with a combined lead-zinc content of about 7%. Of the total, 32,000 tons will be zinc concentrate. Ore reserves are sufficient for a mine life of 10 years with a possible five to 10 years of additional reserves.

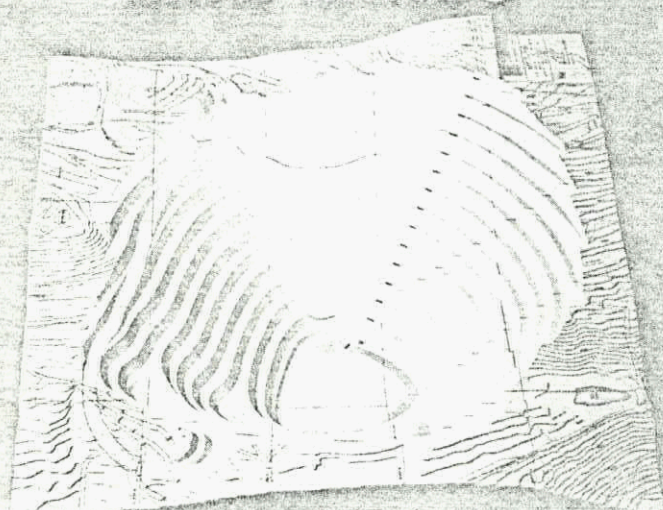
The company is a division of Esso Resources Canada Limited, which is a wholly-owned subsidiary of Imperial Oil Limited.

GRANDUC MINES LIMITED: For the six months ended 30 June 1979, the company recorded net earnings before extraordinary items of \$552,898 or 15¢/share. The forgiveness of debt and accrued interest which was negotiated with Newmont Mining Corporation and Hecla Mining Company produced \$4,672,452 as an extraordinary item, resulting in net earnings of \$5,445,350 or \$1.60/share. This compares to a loss of \$154,585 or 6¢/share for the same period of 1978.

Esso Resources Canada Limited, the new owner and operator of the Granduc mine, is currently preparing the property to begin production in the second quarter of 1980.

KERR ADDISON MINES LTD: The company's wholly-owned subsidiary, Agnew Lake Mines Limited, is curtailing operations at its uranium property near Espanola, Ontario. Mining activities will be reduced over the next six months and the property will be placed on a salvage leach basis, whereby leaching and milling operations will continue as long as it

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Strand Oil et al report on tests Alaskan well

CALGARY — Strand Oil and Gas, International Tika Resources and Peregrine Petroleum — three companies whose shares were suspended from trading on the ASE at the companies' request early last week — say that 7-inch casing will be set at 9,500 ft. in the Alaska Inlet well in which the three companies hold interests of from 5% to 15%.

Log analysis and side wall cores have indicated three zones of primary interest to be tested through perforations and several zones of secondary interest.

Strand president, J. W. Worobec, says that the initial testing program should be completed within a week.

Mineral production in Canada in 1978 is estimated at \$19.7 billion, equal to 5% of Canada's gross national product.

Dividends

Northern Miner

Previous Payment	Remarks	Total * 1979	Total 1978
1c May 4	Initial	10c	.....
1c Dec. 29	Interim	.....	5c
1c June 30	Quarterly	\$1.80	\$2.40
1c Dec. 1	Annual	.....	1.7c
1c June 15	Quarterly	55c	60c
1c June 4	Quarterly	95c	\$1.06
1c Dec. 29	Interim	.....	38c
1c June 25	Quarterly	30c	10c
1c June 29	Semi-ann'l	20c	50c
1c Aug. 27	Quarterly	62.5c	42.5c
1c June 29	Interim	75c	\$1.00
1c July 27	Quarterly	55c	55c
1c June 22	Semi-ann'l	\$1.50	\$2.00

1c Apr. 27	Semi-ann'l	4c	5c
1c July 23	Quarterly	70c	80c
1c June 1	Quarterly	30c	15c
1c June 15	Quarterly	85c	\$1.85
1c Dec. 15	Interim	.....	10c
1c Aug. 27	Quarterly	34.6c	33.3c
1c June 19	Interim	\$1.00	.....
1c June 29	Interim	10c	20c
1c June 29	Quarterly	30c	50c

1c May 31	Quarterly	\$1.65	\$3.06
1c June 1	Quarterly	50c	.....
1c June 1	Quarterly	30c	70c
1c June 29	Semi-ann'l	40c	90c
1c Aug. 27	Quarterly	42c	53.5c
1c June 29	Quarterly	50c	92.5c
1c Dec. 15	Interim	.....	4c
1c Mar. 21	Quarterly	10c	50c
1c Aug. 24	Quarterly	\$1.95	\$5.52
1c Nov. 30	Quarterly	.....	70c

1c May 30	Interim	20c	20c
1c Oct. 31	Special	.....	3c
1c June 15	Quarterly	\$1.80	\$1.30
1c June 15	Initial	17.5c	.....
1c June 14	Interim	15c	10c
1c June 22	Semi-ann'l	\$2.50	\$1.75
1c June 18	Quarterly	75c	90c
1c May 31	Semi-ann'l	45c	80c

1c May 30	Semi-ann'l	\$2.20	\$1.29
1c Dec. 8	Special	.....	\$4.00
1c July 23	Semi-ann'l	40c	65c
1c Aug. 27	Semi-ann'l	90c	62.5c
1c June 15	Semi-ann'l	12.5c	22.5c
1c June 15	Quarterly	90c	\$1.20
1c June 29	Quarterly	30c	70c
1c June 22	Initial	40c	.....
1c June 25	Semi-ann'l	7.5c	12c
1c June 8	Interim	10c	10c
1c June 25	Semi-ann'l	4c	8c
1c Dec. 22	Annual	.....	7c

Climax looking for production from B.C. moly mine mid-1981

VANCOUVER — Climax Molybdenum Corp., B.C., plans to begin production at its open pit molybdenum mine near Kitsault, B.C., in July, 1981, almost a year ahead of the original start-up date.

Work on the \$145-million project began in May this year and has been progressing well ahead of schedule, C. Allen Born, president tells The Northern Miner.

The property was first placed in production by Kennecott Copper in 1968 and was closed down in April, 1972. Climax, a wholly-owned subsidiary of Amax Inc. of Connecticut, plans to double the size of the concentrator from 6,000 tons to 12,000 tons a day and to resume production at a rate of about 10 million lb. of concentrate a year.

About 200 construction workers are currently on the site. The additional milling equipment has been ordered and work has begun on expanding the concentrator building and on the new 35,000 sq. ft. mine maintenance complex which will also house the administration and engineering offices.

Work is also proceeding on upgrading the dock facility at Kitsault and on the first portion of a 25-mile access road to the property. Tenders have been called and it is expected

Gulf raises production

CALGARY — Gulf Canada is to raise production at its Western Canadian refineries by 12,000 bbl. daily as a result of increased demand.

The production increases are scheduled to come mainly from expanded operations at the company's Edmonton refinery, with the balance from a smaller refinery at Kamloops, B.C.

that the heavy mining equipment will be ordered by the end of 1979.

Once in operation, the mine will employ about 450 people. Climax plans to enlarge the Kitsault town site to accommodate the employees and families and has begun refurbishing 56 existing houses. It plans to build another 50 houses in summer 1980.

Next year's program calls for completion of the concentrator and the mine maintenance complex and the road is scheduled for completion in 1981.

Engineering work preparing for the expanded mining operation has begun and the company expects to start pre-production stripping of the open pit early in 1980. The stripping ratio in regular production will be about 1:1. Ore reserves on the property are estimated to be sufficient for 25 years of operation.

New head for HBM&S Cdn. Metals Division

Harold S. Schwartz has been appointed to the newly-created position of president of the Canadian Metals Division of Hudson Bay Mining & Smelting Co., effective immediately. This is the latest in a series of changes among the company's top management (N.M., Aug. 16, 1979).

Mr. Schwartz joined the company in April as senior vice-president-metallurgy which was also a newly-created position in the Corporate Technical Services Group.

The Canadian Metals Division was formed in June, 1976, to rationalize mining, metallurgical and metals marketing operations in Canada.

REDCON GOLD MINES LIMITED

Rights Offering — Extension of Time

Due to problems of mailing the expiry date of the Redcon rights offering has been extended to 4:00 o'clock in the afternoon on Monday, September 10, 1979.

The rights offering consists of one additional share of the Company's capital at 30 cents per share for each five (5) rights held to shareholders of record on August 8, 1979.

H. S. Dolson
Secretary

103P/60
George Cross News Letter

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103P 120

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WESTERN CANADIAN INVESTMENTS

CLIMAX MOLYBDENUM CORPORATION OF BRITISH COLUMBIA

- + A Review of the Production Plans For the Kitsault Molybdenum Mine at Alice Arm, B.C.
- + Start-up of the 12,000 Ton Per Day Concentrator is Scheduled For March, 1982
- + Capital Cost is Forecast at \$135,000,000 and Will Create 450 Permanent Jobs

C.Allen Born, president of Climax Molybdenum Corporation of British Columbia and president of Canada Tungsten Mining Corporation Limited recently presented a paper on the development plans for the Kitsault Mine, located at Alice Arm, 85 miles north of Prince Rupert, B.C. The following story reviews a portion of the material in his paper.

The orebody, which has been developed by open pit mining methods, is located about 4 miles from the existing townsite at an elevation of 2,000 feet. British Columbia Molyb-

GEOLOGY AND MINERALIZATION

The Kitsault orebody occurs in metamorphosed and altered Hazelton and Bowser Lake formations east of the Coast Range Crystalline Complex. Molybdenum mineralization is related to complex stocks of Early Tertiary age.. The Coast Range Crystalline Complex in the Alice Arm area consists of numerous diorite, granodiorite and quartz diorite intrusives which are believed to be 45 to 55 million years old.

Intrusion of the alaskite phase produced the first molybdenite mineralization as minor disseminated rosettes.

A second period of mineralization followed the alaskite, Initial quartz-feldspar veins cut by quartz-molybdenite veins, and, lastly, quartz-pyrite veins.

After the second period of mineralization, intramineral porphyries were emplaced. This event was followed by the third period of mineralization, which is identical to the second period, except that veins of this age are not cut by intramineral dikes.

The fourth episode of mineralization, similar to periods two and three, is characterized by wide, banded quartz molybdenite veins.

Most of the molybdenite occurs in quartz veins, with minor amounts disseminated in alaskite and as molybdenite paint on fracture surfaces. Generally, the highest grade material is in the central portions of the ore lobes. Mineralization occurs along the contact between the Lime Creek stock and hornfels in the west, north and east, but cuts across the center of the stock in the southern part of the orebody. Galena, sphalerite and copper-lead-bismuth sulfosalts occur primarily in late polymetallic veins. Galena is present as either attachments on or encapsulated within the molybdenite grains. Alteration of the ore body has decided effects on the rock competency and milling characteristics of the ore. Generally, silicified and feldspathized rock is more competent and slightly harder than the unaltered rock. Argillization and sericitization reduces competency and softens the rock.

water requirements are 5,500 gpm and the existing water system will be expanded to provide this. New control panels are needed for primary crushing, secondary crushing, grinding, flotation and leaching. On the primary crusher, the grizzly needs rebuilding. A 10,000-ton live stockpile will be built to correct a coarse ore storage problem. Two secondary screens will be installed in the secondary crushing and screening plant. A second crusher will be added for tertiary crushing. The concentrator's capacity will be raised from 6,000 to 12,000 tpd. The rougher grinding circuit will be expanded to 3 ball mills and 2 rod mills by adding one of each and there will be other additions and modifications to the grinding and flotation circuits. A lead leach circuit will be built. The mill control center will be enlarged.

denum, a Kennecott Copper Corp. subsidiary, developed the mine and built a 6,000 tons per day concentrator that operated from 1968 to 1972 to produce some 20,000,000 pounds of molybdenum from 10,000,000 tons of ore - average grade 0.20% MoS₂; average mill recovery 90%; stripping ratio 1.5 waste to 1 ore.

Amax bought the mine from Kennecott in 1972.

Mr. Born said geological reserves are estimated at 127,000,000 tons grading 0.20% MoS₂. Insufficient drilling below the 1,200 foot elevation prevents estimating grades with any degree of confidence.

Studies indicate, depending on head grade, average recoveries of 85-95% MoS₂ could be achieved at an average grind of 40-45% plus 100 mesh in the rougher circuit. The final concentrate would contain over 90% MoS₂. Since the concentrate would otherwise be high in lead, Nokes' reagent will be added to grinding and flotation stages and the final concentrate will be subjected to a hot hydrochloric acid leach. These two steps would bring the lead to less than 0.02%.

Project development in 1979 will comprise townsite refurbishing and engineering. The 1980 program entails ordering equipment and delivering that needed for development, continuing work on the dock and townsite and initiating work on the concentrator, access roads, tailing disposal, mine office and shop, primary crushing, coarse ore storage and secondary and tertiary crushing and screening. Pit shape-up will start near mid-year and continue into mid-1981 when preproduction stripping will start. This will continue through the first quarter of 1982 when the mill and crusher will be checked out for start-up at the end of March, 1982.

Major pieces of mine equipment include 10-yard shovels, 15-yard loaders, drills, 85-ton trucks, 35-ton trucks, dozers, rubber tired dozers, graders and a crushing plant for road gravel.

About the mill expansion, Mr. Born said, at a maximum milling rate of 16,000 tons per day, which is needed to average 12,000 tpd, mill

(Continued on Page 2)

WALL & REDEKOP CORPORATION

<u>NINE MONTHS ENDED OCTOBER 31</u>	<u>1978</u>	<u>1977</u>
Gross Revenue	\$17,800,000	\$15,500,000
Net Earnings Bef. Extra. Item	\$483,423	\$283,726
-Per Share	26 $\frac{1}{2}$ ¢	15 $\frac{1}{2}$ ¢
Extraordinary Item	-	\$201,483
Net Earnings	\$483,423	\$485,209
Net Earnings Per Share	26 $\frac{1}{2}$ ¢	26-3/5¢

CLIMAX MOLYBDENUM CORPORATION OF BRITISH COLUMBIA

CONTINUED FROM PAGE ONE - Mr. Born stated that expansion of the townsite to accomodate a population of about 1,200 people with a married/single ratio of 65%/35% is needed to provide the projected work force of 450 people. A new town center, recreation center, commercial center will be added to the existing facilities which consist of 56 single family houses and single men's quarters. The school will be relocated. A new sewage treatment plant will be constructed and lines will be installed to connect it to townsite buildings

The dock facilities need to be rebuilt so that 2,000-ton barges can be accomodated at low and high tide. He said that, in an effort to reduce the isolation of Kitsault, an access road is planned to connect the townsite to existing roads in the Nass River valley which lead to the town of Terrace. This would also improve transportation for service and supplies into the site. The road would be a typical logging style, gravel surfaced, wide enough for two-way traffic and no steeper than 10% grade.

Improvements would be necessary to the existing Clary Lake Road. This would be followed by new construction beginning at Clary Lake and proceeding approximately 21 miles, over very rugged terrain, to existing logging roads.

Climax will reopen B.C. moly mine

VANCOUVER — Climax Molybdenum Corp. of B.C., wholly-owned subsidiary of Amax Inc. of Greenwich, Conn., plans to reopen the open pit mine and resume milling at its molybdenum property near Kitsault, B.C.

Plans to resume production are reported by Amax, which also announced that C. Allen Born has been elected president of Climax Molybdenum. Mr. Born will continue as president and chief executive officer of Canada Tungsten Mining, which is 65% owned by Amax.

Production is slated to begin in 1982 at a mill capacity of 12,000 tons of ore a day. Output is expected to approximate 10 million lb. of molybdenum concentrate a year for 25 years.

Climax Molybdenum B.C. project to cost \$135 million at Kitsault

By R. J. ROBERTS
Assistant Editor

VANCOUVER — In the best news emanating from the British Columbia mining industry in recent years is the announcement that Climax Molybdenum Corp. of British Columbia, wholly-owned subsidiary of Amax, Inc., Greenwich, Conn., plans to resume production

beginning in 1982 at its open pit molybdenum mine near Kitsault, B.C.

The project will cost \$135 million, provide employment for about 450 construction workers for approximately two years, and offer permanent employment for about 500 at an annual payroll in the area of \$10 million.

Reopening of the mine and mill holds particular interest to the Stewart area, the economy of which was seriously depressed by the recent closing of the Granduc mine. The Climax property is near Alice Arm, about 45 air miles southeast of Stewart.

The announcement of the project follows last month's report that Newmont Mines (N.M., Aug. 31, 1978) plans to bring into production at a cost of \$23.4 million the Copper Mountain orebodies near Princeton.

See Page A21

Climax Molybdenum

Continued from Page A1

and the official opening in April of the \$85 million copper mining, milling and smelting complex of Afton Mines, subsidiary of Teck Corp., near Kamloops.

Together, these projects are a good sign that B.C. mining is on recovery road. In the background are a number of major potential producers awaiting favorable metal markets and more conducive tax structures.

Climax Molybdenum plans to start procurement of equipment and begin construction next spring. C. Allen Born, newly elected president of the company, told The Northern Miner. Mr. Born now will be wearing two hats in that he also is president and chief executive officer of Canada Tungsten Mining, 65% owned by Amax.

The property was first placed into production with a 6,000 ton mill by Kennecott Copper in January, 1968. The operation was closed down in April, 1972.

Climax plans to double the size of the mill to 12,000 tons a day and to produce annually approximately 10 million lb. of concentrate. The company is looking to commence production about mid-1982. Ore reserves are sufficient for 25 years of operation, Mr. Born said.

During this summer the company completed a survey for a 22 mile road, which is to be constructed from Kitsault to link to the Terrace-Stewart road, providing access by road to Prince Rupert. This will be another means of access to the property now reached only by barge and air. Also, a major dock facility is to be built at Kitsault in preparation for moving in equipment and supplies. The Kitsault townsite is being enlarged to accommodate about 500

employees and their families.

Tenders have been called for the required heavy mining equipment, which will include 12 85-ton trucks, three 10-yd. shovels, three drills for blast holing, two 15-yd. loaders, two 10-yd. loaders and a mobile crane.

There will be considerable pre-production stripping of the open pit in preparing it for the expanded 12,000 ton a day production. Once this has been accomplished, the stripping ratio in regular production will be about one ton of waste to one ton of ore.

No additional equipment has yet been ordered for the mill, which is being increased to 12,000 ton a day capacity. The primary crusher is large enough to handle the added capacity. Mill additions will include a 12-ft. by 16-ft. rod mill; a 14.5-ft. by 18-ft. ball mill; two 7-ft. by 7-ft. regrind mills; flotation cells, and a lead leaching unit.