

**REPORT ON HEARINGS
NAMEW LAKE MINE/MILL**

THE CLEAN ENVIRONMENT COMMISSION

SEPTEMBER 12, 1989



**HUDSON BAY MINING AND SMELTING CO. LIMITED
NAMEW LAKE MINE AND MILL**

TABLE OF CONTENTS

	<u>PAGE</u>
BACKGROUND	1
THE HUDSON BAY MINING AND SMELTING CO. LIMITED PROPOSAL	3
The Geographical Setting and Resources of the Area	3
General	6
Mine Development	7
Mill Operation	8
Tailings and Wastewater	9
Depressurizing/Dewatering	12
Depressurizing/Dewatering Effluent Disposal	13
(a) Underground Injection	14
(b) Storage	14
(c) Discharge to the Rocky Lake Basin	14
(d) Discharge to Namew Lake Basin	15
(e) Other Discharge Alternatives	18
Wasterock	18
Storage and Handling of Gasoline and Associated Products	19
Dust Control	19
Noise Control	20
Solid Waste Disposal Ground	20
Sewage	21
Freshwater Supply	21
Effluent Monitoring Programs Established	21
Underground Monitoring Program	22
Surface Monitoring Programs	22
Questions	22
CITIZEN AND OTHER PRESENTATIONS	28
A. The Pas, Manitoba	28
Mr. Ed Johanson	28
Mr. Roger Smith	29
Ms. Jan Malanewich	30
Mr. Britton	30
Manitoba Department of Natural Resources	31
Mr. Bruce Wright	31
Mr. Frank Render	33
Mr. Al Beck	33
Manitoba Environment Department	33
Mr. Larry Strachan	33
Mr. Clem Moche	34



**HUDSON BAY MINING AND SMELTING CO. LIMITED
NAMEW LAKE MINE AND MILL**

TABLE OF CONTENTS

	<u>PAGE</u>
B. Cumberland House, Saskatchewan	34
Ms. Delores Laliberty	34
Ms. Rose Dussion	35
Mr. Allen Felix	36
Mayor Leonard Morin	37
Manitoba Environment Department	39
Mr. Larry Strachan	39
Saskatchewan Environment Department	40
Mr. Randy Sentis	40
Mr. Robert Kent	43
 SUMMARY, DISCUSSION AND CONCLUSIONS	 43
 RECOMMENDATIONS	 49

FIGURES

Figure 1	4
Figure 2	10



HUDSON BAY MINING AND SMELTING CO. LIMITED

NAMEW LAKE MINE AND MILL

BACKGROUND

On July 8, 1987, the Hudson Bay Mining and Smelting Co. Limited registered a proposal under the Clean Environment Act with respect to a mine and mill operation for the development of a nickel/copper ore body lying under Namew Lake 64 kilometres due south of Flin Flon and 1.6 kilometres east of the Manitoba/Saskatchewan border. The construction of a mine shaft and mill facilities were proposed to be located on the south-east shore of Namew Lake with an adjacent tailing disposal area and ponds for the storage of mine water, mill effluent, and tailings area effluent, prior to discharge to Namew Lake.

Under the terms of the Clean Environment Act, once registered under the Act the Company was enabled to complete its plans for the development of the mine, construct the mine and mill facilities, and commence production prior to the issuance of an environmental licence.

On April 3, 1989, the Company filed a new registration of the proposal under the new Environment Act, including Environmental Impact Assessment documents which detailed a depressurizing/dewatering requirement which had not been anticipated prior to the onset of mine development work and which necessitated the disposal of much more mine water than had originally been anticipated.

During the second week of April, 1989, the Environment Department advertised its consideration of the licencing of the operation under the Environment Act. A number of concerns and objections were received by the Department from local citizens of both Manitoba and Saskatchewan, including the Northern Village of Cumberland House and the Northern Settlement of Sturgeon Landing, both located in the Province of Saskatchewan, and on

BACKGROUND (continued)

May 3, 1989 the Environment Minister, the Hon. J. Glen Cummings, requested the Clean Environment Commission to hold a public hearing on the proposal pursuant to Section 7(3) of the Environment Act.

On May 29, 1989, following the Commission's scheduling of a hearing in The Pas, the Honourable J. Glen Cummings advised the Commission that he had discussed the mining development with the Saskatchewan Environment Minister, the Honourable Herb Swan. Because of the questions raised by citizens of Saskatchewan, and with the concurrence of Mr. Swan, Mr. Cummings requested that the Commission hold a second hearing in the community of Cumberland House, Saskatchewan, to provide better opportunity for the receipt of input into the matter under consideration by Saskatchewan citizens and organizations, as well as to receive a submission from the Saskatchewan Department of Environment.

After giving notice and advertising in appropriate newspapers, the Commission convened a hearing in The Pas, Manitoba, commencing on June 1, 1989 at 10:00 a.m., in the Royal Canadian Legion Hall. On the following day the Commission viewed the mine site and operations. Citizens attending the hearing were invited to accompany the Commission on this inspection. On the morning of June 15, 1989, the hearing was re-convened in Cumberland House, Saskatchewan, terminating in the late afternoon of that day.

Both hearing sessions were chaired by Mr. Stan Eagleton. Other Commissioners in attendance at The Pas were Mr. Arnie Barr, Mr. Maurice Blanchard, Mr. Ed Gramiak, Mrs. Joan Vestby and Dr. Barrie Webster. At Cumberland House, Commissioner Len Flett replaced Mr. Ed Gramiak.

BACKGROUND (continued)

THE HUDSON BAY MINING AND SMELTING CO. LIMITED PROPOSAL

The presentation of the mine and mill development proposal of the Hudson Bay Mining and Smelting Co. Limited was made by Mr. Wayne Fraser, Director of Safety and Environment, assisted by the following staff members: Mr. John Ross, General Manager of the Flin Flon Division; Mr. Brigg Sigismund, Manager of the Flin Flon mines; Mr. E. Bron, Project Manager for the Namew Lake project; Mr. Brian Salamondra, Superintendent of the Namew Lake Mine; Mr. Gil LaBarre, Mill Superintendent of the Namew Lake mill; Mr. Steve West, Environmental Supervisor; Mr. Gerald Forsyth, Environmental Technologist in charge of water; and Mr. Rob Corden, Technologist in charge of civil construction.

A somewhat abbreviated presentation of the Company proposal, originally delivered at The Pas, Manitoba was repeated by Mr. Fraser at Cumberland House, Saskatchewan, on June 15, 1989.

The Geographical Setting and Resources of the Area

Namew Lake, on which the mine is located and takes its name, is situated in the Saskatchewan River watershed (Figure 1). Waters from Amisk and Athapapuskow Lakes in Saskatchewan and Manitoba drain southwards through the Sturgeon Weir River into Namew Lake, which in turn discharges to Cumberland Lake located in the Province of Saskatchewan to the Saskatchewan River. Most of Namew Lake is located in Saskatchewan.

The area surrounding Namew Lake consists of black and white spruce forest cover with frequent areas of poorly drained muskeg.

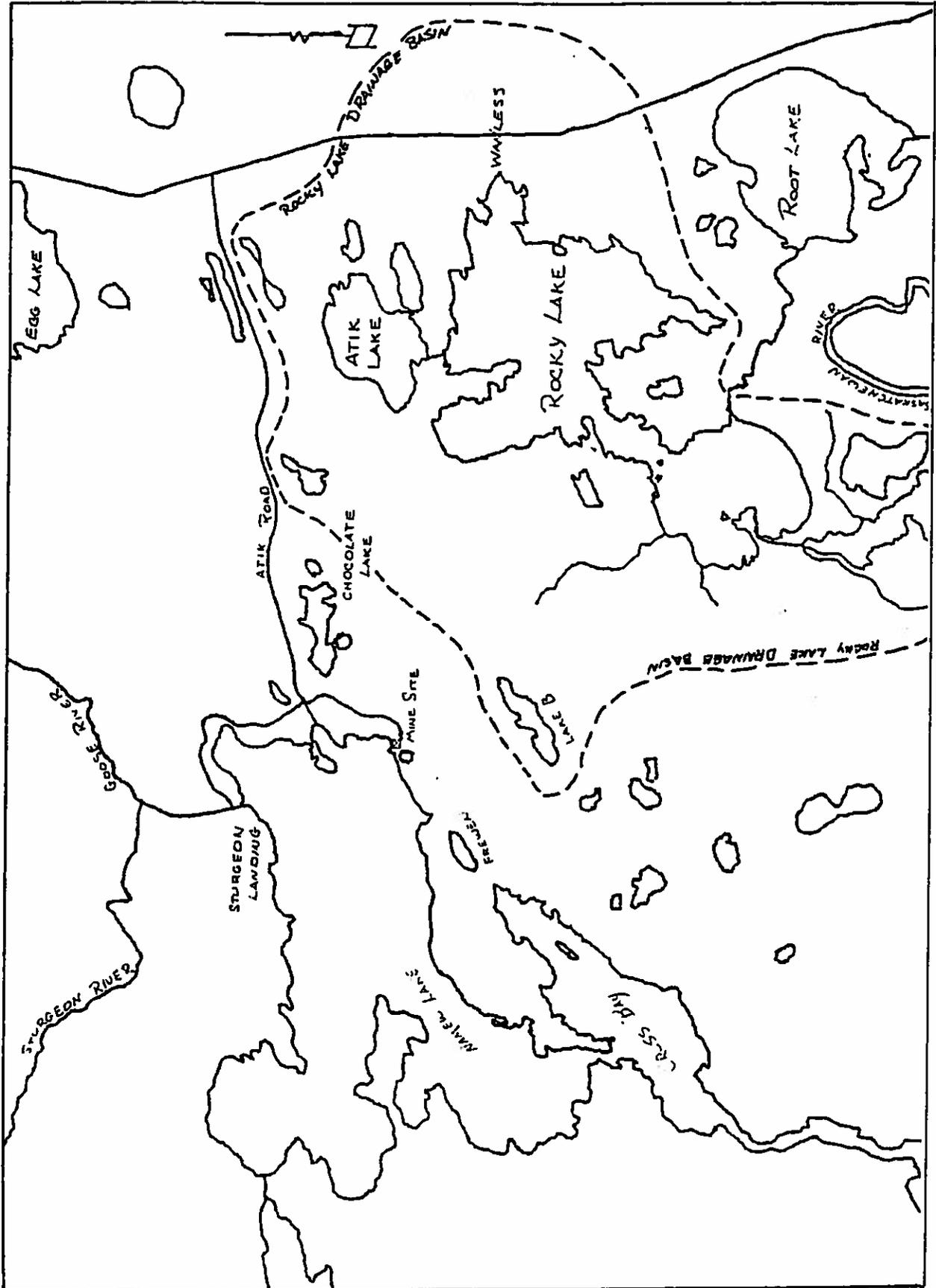


Figure 1

THE HUDSON BAY MINING AND SMELTING CO. LIMITED PROPOSAL (continued)

Primarily because of initial concerns respecting wildlife, Hudson Bay environment staff had early meetings with the Regional representative of the Wildlife Branch, with the conclusion reached that very little impact to local wildlife will result from the proposed mining development. There may be some impact on smaller fur-bearing animals and because the access road and mine/mill site falls within Registered Trapline #35, ongoing discussions are being held with the trapper.

Namew Lake supports a moderate sports fishery and three commercial fishery licences — two in Saskatchewan and one in Manitoba, with a commercial market yield of \$25,000 in 1986, including pickerel, pike, and whitefish. Several meetings have been held between Hudson Bay environment staff and the Manitoba Regional Fisheries Specialist regarding protection of the fishery from damage resulting from the mine/mill operation, the major concern being the quality of liquid effluent discharge into Namew Lake.

Discussions were held between Hudson Bay staff and Regional Forestry Branch staff to determine the most feasible route to follow in the development of access roads, a power transmission line, the tailings disposal area, and the mine/mill site to reduce forestry damage as well as to assess final damage claims. Claims for damage to the forest have been paid in the amount of approximately \$16,000.00. Regular meetings will continue to ensure that forestry concerns and recommendations are implemented during the operation of the project.

The Heritage Resources Branch was also consulted and no concerns about the development were identified.

The community of Sturgeon Landing is located on the shore of Namew Lake at the Sturgeon River. The community of Cumberland House is located on Cumberland Lake into which Namew Lake drains. Both of these communities are located within the Province of Saskatchewan.

THE HUDSON BAY MINING AND SMELTING CO. LIMITED PROPOSAL (continued)

Other features of the area that were considered in planning the development of the mine are 3 small lakes - Chocolate, Frewan and an unnamed Lake. These are shown on figure 1. Chocolate Lake is approximately 5 km north east of the minesite. This lake discharges to Namew Lake near the mine. Frewan Lake is located 10 km south of the mine site with a discharge to Cross Bay of Namew Lake. The unnamed lake (Lake B) is 5 km south of the minesite. This lake is in the Rocky Lake drainage basin and drains to the south basin of Rocky Lake. Rocky Lake is part of a separate drainage basin. The east shore of the main basin of Rocky Lake is used extensively by cottagers. Rocky Lake drains through Root and Reeder Lakes to the Saskatchewan River.

General

The Namew Lake nickel/copper mine and mill development and operation is a joint venture by Hudson Bay Mining and Smelting (60%) and Outokumpu of Finland (40%). Hudson Bay operates the joint venture.

The presence of the ore body was indicated by an electromagnetic survey of the area in 1980, leading to drilling in 1984 which discovered the ore body. Continued drilling in 1985 substantiated the importance of the deposit.

The mine/mill complex is located on the shore of Namew Lake adjacent to the Manitoba/Saskatchewan border with both the ore body and the mining and milling facilities located within Manitoba on Provincial Crown Land in Township 60, Range 20, W.P.M.

The Namew Lake mine/mill complex represents a capital investment of approximately \$85 million with an annual operational expenditure of approximately \$50 million for wages, services, material and supplies. Employment at the mine/mill will be 140 Hudson Bay Mining and Smelting Co. Limited (HBM&S) employees and 15 contractor employees. Most if not all of the

THE HUDSON BAY MINING AND SMELTING CO. LIMITED PROPOSAL (continued)

workers remain in an adjacent camp since the shifts are of 12 hours duration and a work week is four days. At the end of the shift, workers return to their homes which are located principally in Flin Flon.

Ore reserves at the Namew mine are estimated at 2.58 million tonnes grading 2.44% nickel and 0.9% copper with significant amounts of platinum and palladium. At the planned production rate of 475,000 tonnes per year, or 1,300 tonnes per day, the mine life will be 5.5 years, although development work and/or new exploratory work in the area, if successful, could extend the life of the mine and the mill beyond this time period.

The ore body is located in the Flin Flon greenstone belt beneath a pillar of dolomite and sandstone varying in depth from 2m to 30m.

Mine Development

Mine development commenced in 1985 with the sinking of a shaft to a depth of 411.5m with lateral development at the 120m and 320m levels. The first ore was produced late in 1988 by drifting through the ore above the 120m level. The ore deposit will be mined by the long hole raising method and long hole drift and fill. Electric long hole drill rigs will be utilized to drill and blast from drill raises 3m in diameter.

Approximately 225,000 tonnes of fill will be required annually to replace the extracted ore. The mill tailings are unsuitable for mine backfill and so limestone will be quarried and crushed on the surface and delivered underground via a fill raise. Some of the waste rock produced during mine development is being utilized for mine site development and for the upgrading and maintenance of the mine access road. The remainder will be used for mine backfill.

THE HUDSON BAY MINING AND SMELTING CO. LIMITED PROPOSAL (continued)

Dewatering and depressurizing requirements in the mine are expected to be high. Water discharges as high as 400 L/s will probably be necessary. Mine wastewater, consisting of seepage and mine process water, will be collected within the mine and pumped to the surface at a rate of 16 L/s. Mine dewatering and depressurizing operations will collect water prior to its entry into the mine workings and this water will not be mixed with the mine seepage/process water. The mine wastewater, when pumped to the surface, will be directed to a designated wastewater storage pond where suspended solids will settle out and where further treatment can be done, if required, prior to discharge.

Mill Operation

The mill was completed in 1988 with a design capacity of 1900 t/d.

Essentially, all the sulphide minerals in the ore will be recovered by the flotation and separation processes of the mill. The gangue, or waste minerals in the ore, will be rejected in the mill process to the tailings collection pond. The final copper concentrate from the mill assays about 28.5 % copper and 1.3 % nickel. The nickel concentrate assays 17.5 % nickel and 1.0 % copper. Concentrates are treated with flocculent, thickened to about 60 % solids and then filtered. Processed concentrates are shipped elsewhere for smelting and refining. Copper concentrate is trucked to Flin Flon. Part of the nickel concentrate is trucked to Thompson and part shipped to the nearest railhead for shipment to Fort Saskatchewan. Filtrate water is combined with thickener overflow streams and passed through a clarifier for removal of suspended solids. The overflow from the clarifier is discharged to the wastewater storage pond.

A number of reagents are used in the mill operation to separate the copper and nickel from the ore. These include sodium carboxy methyl cellulose, a water soluble polymer which is used to depress the gangue material in the bulk rougher flotation; potassium amyl xanthate, a collector

THE HUDSON BAY MINING AND SMELTING CO. LIMITED PROPOSAL (continued)

that is commonly used for the bulk flotation of sulphides; methyl isobutyl carbinol, an alcohol frother used in bulk roughing and cleaning stages; lime which is used in the separation circuit to depress nickel; polyacrylamide flocculent which is used to treat both concentrates prior to entering the thickeners; sodium cyanide which may be used in the separation circuit to enhance the separation of copper from nickel. The addition rate of these reagents ranges from 19 to 500 kg/day exclusive of lime which is used in much higher concentrations. In all cases, these reagents are either incorporated into the concentrates or residual concentrations can be found in the mill tailings or the process wastes from the mill operation.

In the event that sodium cyanide is used, some cyanide will be destroyed by aeration and some by natural degradation in the wastewater storage pond. In the event that natural degradation fails to reduce cyanide down to acceptable levels, a cyanide destruction plant will be employed probably based on oxidation using hydrogen peroxide.

It is not expected that any of the chemicals will lead to adverse environmental effects in the final effluent. The Company has also given assurance that the wastewater storage pond effluent will meet the requirements of the Federal Metal Mining Effluent Regulations which include bioassays. The wastewater storage pond effluent has been tested for toxicity and the quality has exceeded the requirements of the Federal Metal Mining Regulation for toxicity.

Tailings and Wastewater

Tailings and wastewater management will utilize three storage ponds — a tailings pond, a reclaim water reservoir, and a wastewater storage pond (figure 2). In addition, as a result of the unanticipated volume of mine water encountered during mine development, it is proposed that Chocolate Lake be utilized to receive mine depressurizing/dewatering effluent.

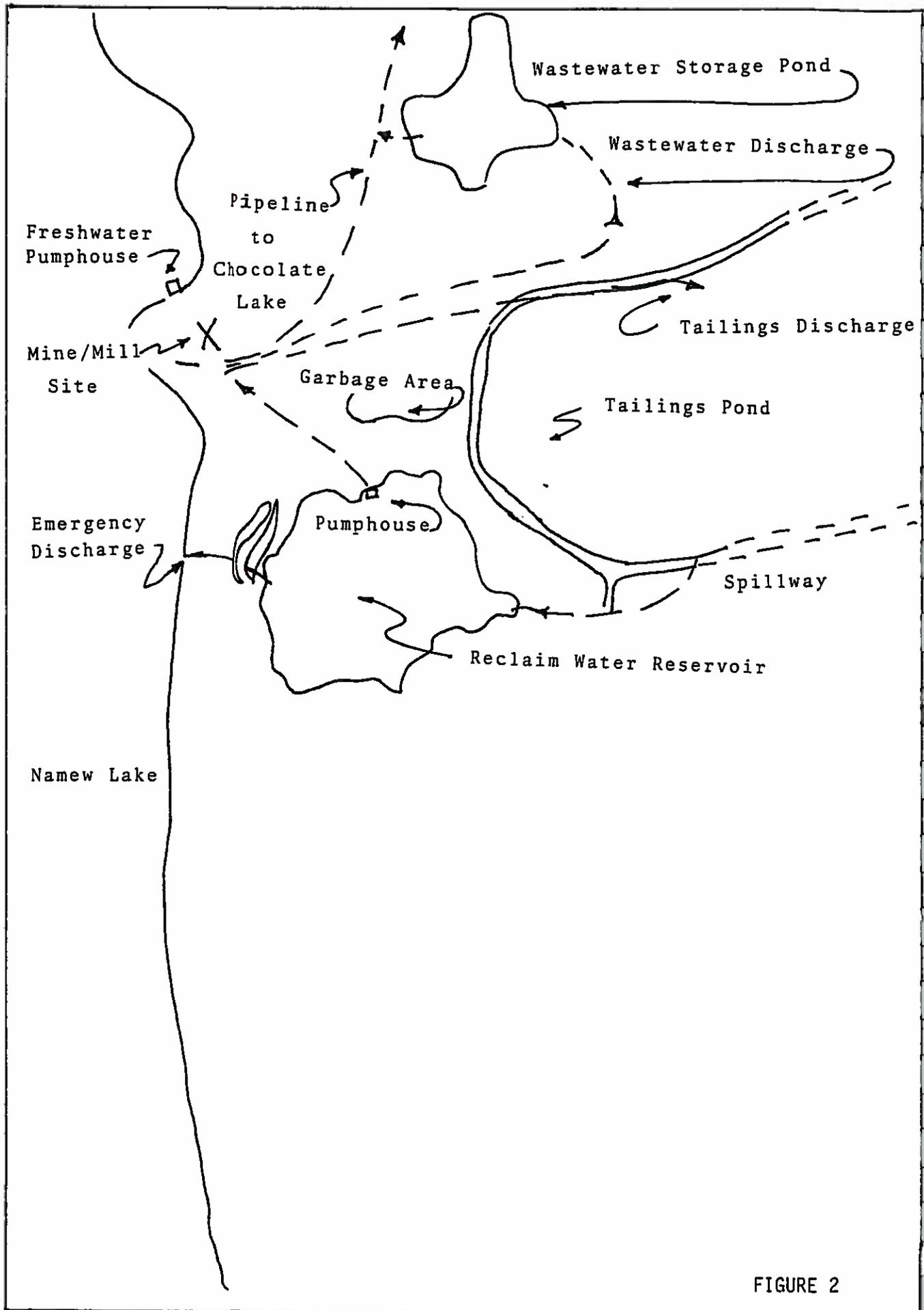


FIGURE 2

THE HUDSON BAY MINING AND SMELTING CO. LIMITED PROPOSAL (continued)

The tailings material separated from the mineral in the ore following the bulk crushing and cleaning process will be deposited in the tailings pond at an estimated volume of 1600 tonnes/day. Over the 5.5 year life of the operation, an estimated 2.2 million tonnes of tailings will be deposited. The tailings will be of low sulphur content ranging from 0.4 to 0.7%. Acid generated, will be neutralized by alkaline material in the tailings. Acid not neutralized will remain in the tailings and will have to be addressed by the tailings rehabilitation plan. The major impact of tailings will be the inundation of the tailings pond with 2m of tailings. Amelioration of this area will be included in the rehabilitation plans.

Discharge of the clarified effluent from the tailings pond will be collected in the reclaim water reservoir for reuse in the mill with no discharge to the environment. The reclaim water reservoir has a capacity of approximately 884,000 m³ and will accommodate the overflow from the tailings pond. The anticipated rate of overflow is 32 L/s which will be augmented by surface run-off. The mill pumphouse will withdraw water from the reclaim pond at a rate of 35 L/s. Provisions have been made to remove excess water from the reclaim pond to the wastewater storage pond during periods of higher than normal runoff and to add mine wastewater to the reclaim system during periods of lower than normal runoff in order to balance the mill water requirement. Therefore, under normal conditions there will not be any discharge from the reclaim water reservoir. There is a spillway with stop logs that will permit discharge to Namew Lake in the event of an extraordinary precipitation event. The reclaim pond system will be operated to protect the dykes and prevent any but an usual overflow. It is estimated that approximately 80% of the mill water requirements will be met with reclaimed water.

The wastewater storage pond has a storage capacity of 87,000 m³, which will provide 10 days of detention. Inflow to the pond consists of mine water at a rate of 16 L/s and mill process water at a rate of 13 L/s. The mill wastewater has a pH of 12 and its re-use in the mill may cause problems with the metallurgy. The chemistry of the mill process wastewater will contribute

THE HUDSON BAY MINING AND SMELTING CO. LIMITED PROPOSAL (continued)

to the precipitation of heavy metals and is therefore beneficial to the treatment of the water in the wastewater storage pond in meeting effluent requirements. In the event that the desired effluent limits are not achieved from the wastewater storage pond, additional treatment would have to be provided prior to discharge. At the outset, it was proposed to discharge effluent directly to Namew Lake. The proposal is now to discharge effluent from the wastewater storage pond to the depressurizing/dewatering pipeline. As noted, this pipeline is proposed to be discharged into Chocolate Lake. This will provide only one effluent discharge point — from Chocolate Lake to Namew Lake.

Depressurizing/Dewatering

In order to allow safe mining to proceed, it was determined that extensive dewatering and depressurizing of the host rock surrounding the ore body would be required. The volume, combined with its salinity, constituted a massive water problem. The Company retained a hydrogeological consultant to advise on remedial measures. The consultant reported in early December, 1988, that depressurizing of the water-bearing zone surrounding the ore body would be required to reduce water risks to a minimum. The consultant estimated that withdrawal of 500 L/s for 70 days would totally depressurize the surrounding rock. Ongoing dewatering at an estimated rate of 250 L/s would be required to maintain the depressurized state. Without this process in place the mine might become totally flooded as mine development progressed.

At the time of the hearing the mining of ore had been much reduced from the scheduled 1300 tonnes per day because of this water with hazard mining operations being confined to the upper mining level where the risk of flooding was acceptably low.

In order to reduce the waterflows, exploration drill holes into the ore body through Namew Lake had been located and resealed.

THE HUDSON BAY MINING AND SMELTING CO. LIMITED PROPOSAL (continued)

Initial depressurizing commenced May 22, 1989, with the resultant discharge directed to the tailings area. The ponds were re-engineered and earthworks constructed to allow for storage of all depressurizing water for a minimum 90-120 days. Additional construction for further storage would also be a possibility but the costs would be very high.

It is now estimated that depressurizing/dewatering effluent discharged from the mine will contain 1500 to 2000 ppm total dissolved solids, principally chloride salts of sodium and calcium.

In order to provide for other disposal of this water, a pipeline had been constructed to direct the depressurizing water to Chocolate Lake. This line had not yet been placed in service at the time of the Commission's hearings.

At a later date, it is intended that depressurizing water be recovered from the tailings pond and disposed of by other environmentally acceptable means.

Depressurizing/Dewatering Effluent Disposal

The principal environmental effects of disposal of the dewatering/depressurizing effluent will be on the aquatic ecosystem.

Several options for the storage or disposal of this water were considered by the company. Evaluation of the various options were done in relation to the following assumptions that:

- (1) The depressurizing effluent is not toxic to fish.
- (2) The optimum total dissolved solids (T.D.S.) for fish is 200 mg/l.

THE HUDSON BAY MINING AND SMELTING CO. LIMITED PROPOSAL (continued)

- (3) The depressurizing effluent will not lead to solids deposition or other effects not naturally reversible following completion of the pumping operation.

A number of options for disposal of the depressurizing water were examined, as follows.

(a) Underground Injection

Underground injection of the water back into the originating or some other rock formation was considered. This was rejected as an option since the rock formations surrounding Namew Lake would either be unable to accept the volume of water or the injected water would short-circuit directly back to the mine.

(b) Storage

This is not a practical option due to the volume of water and the surrounding flat terrain. An estimated 28 square kilometers of land would be inundated over the life of the project.

(c) Discharge to the Rocky Lake Basin

The Rocky Lake drainage basin comprises some 500 square miles and is located east of the Namew Lake minesite. Rocky Lake drains south, through Root and Reeder Lakes before entering the Saskatchewan River upstream of The Pas.

THE HUDSON BAY MINING AND SMELTING CO. LIMITED PROPOSAL (continued)

Discharge of depressurizing water to Rocky Lake could involve various combinations of free discharge, ditching or piping, and the use of an unnamed lake located at about the midpoint between the minesite and Rocky Lake. This lake would provide some dilution at the outset of the discharge. The drainage basin feeding Rocky Lake would provide a dilution factor of 21:1 to the anticipated effluent volume from the mine.

Rocky Lake supports an active sports fishery on the northern portion of the lake and has numerous cottages along the east shore. The region between Rocky and Namew Lakes is a wildlife management area. Downstream from Rocky Lake, Ducks Unlimited operate a water control structure for management of marshlands between Root Lake and the Saskatchewan River.

The south end of Rocky Lake, which would receive effluent from depressurizing and from which water discharges from Rocky Lake, serves as the primary spawning and rearing area for the Rocky Lake fishery. Two commercial bait fish operation conduct activities on this portion of the lake. Current total dissolved solids (T.D.S.) in Rocky Lake is 300-350 mg/l which is already in excess of the fisheries optimum level of 200 mg/l. The discharge of the Namew Mine depressurizing effluent at an estimated level of 1500 T.D.S. and a flow of 7000 g.p.m. would, at the 21:1 dilution, add a further 70 mg/l of T.D.S. to the lake water. This would move the water quality further from the optimum, and negative effects on the fishery would probably result.

(d) Discharge to Namew Lake Basin

The Namew Lake drainage basin comprises some 5600 square miles north of the Namew Lake minesite. Both Amisk and Athapapuskow Lakes drain to Namew Lake via the Sturgeon Weir River; Namew Lake in turn discharges through Cross Lake and Cumberland Lake to the Saskatchewan River. Long-term hydrological records show that maximum flow through the lake is approximately five times the minimum. The minimum flow is in a 50:1 ratio to the anticipated maximum

THE HUDSON BAY MINING AND SMELTING CO. LIMITED PROPOSAL (continued)

Namew Lake Mine depressurizing water volume. Water volume in Namew Lake is about twice the annual flow-through.

Namew Lake supports a moderate sports fishery and three commercial fishing licences - two in Saskatchewan and one in Manitoba. The commercial yield in 1987 had a market value of \$25,000 with pickerel, pike and whitefish being the fish of value. The small community of Sturgeon Landing is located on the north shore of the lake at the Sturgeon Weir River; commercial fishermen and sports fishing outfitters work out of this community.

Water entering Namew Lake contains a T.D.S. of approximately 90 mg/L. The discharge from Namew Lake contains a T.D.S. of 115 mg/l. This T.D.S. addition, which represents about 50 tons per day of combined salts, is sourced primarily in the lake bottom where upward hydraulic pressure from the underlying sedimentary rocks provide an artesian flow of saline water. This is the same water which is causing problems in the Namew Lake mine.

Mr. Fraser's analysis noted that the T.D.S. naturally present in Namew Lake is much less than the optimum 200 mg/L. He believed that the addition of the depressurizing water would bring the T.D.S. closer to the optimum T.D.S. for the fishery which, in the Company's view, could be beneficial. On the other hand, the Company expects that the underground depressurizing program will reduce the natural entry of saline water through the Lake bottom, and will reverse the hydraulic force such that water will enter the underlying rock from the Lake. The net result would be that, if no additional saline water is added to the Lake, the T.D.S. at the Lake outlet will, over the course of several years, approach that of the incoming water. The addition of depressurizing water to Namew Lake would, however, add back minerals to the Lake.

Two small Lakes in proximity to the mine could serve as holding reservoirs prior to discharge of depressurizing effluent to Namew Lake. The ability to hold the water prior to discharge provides a benefit in that the water from the mine will contain an initial T.D.S. of some 4000 mg/L,

THE HUDSON BAY MINING AND SMELTING CO. LIMITED PROPOSAL (continued)

decreasing to a projected 1500 mg/L after depressurizing has been achieved. Retention of the initial discharge would allow dilution to be gained prior to discharge of the higher T.D.S. water to Namew Lake. The temperature of the depressurized water would also approach that of Namew Lake as a result of retention in an intermediate lake. A uniform temperature would assist in preventing stratification of the Chocolate Lake discharge in Namew Lake.

One of these intermediate lakes, Chocolate Lake, is located 5 km north and east of the minesite. The lake appears to contain a limited fish population consisting of minnows and northern pike. The lake discharges via a creek to Namew Lake, which it enters close to the minesite. The lake, averaging 4 - 4.5m in depth and about 300 hectares in surface area, is located in a flat swampy area. Attempts to increase the holding capacity of this lake with dykes or dams would be difficult.

Chocolate Lake currently holds a volume of water equal to three or four times a 70 day discharge of 530 L/s. Addition of dewatering effluent to this lake could be done at one of several locations, with a point towards the east end being the most desirable to prevent flow short-circuiting to the lake outlet. Both the lake and the creek are located in the Province of Manitoba.

Frewan Lake, the second of these lakes, has a large holding capacity. Discharge from Frewan Lake takes place into Cross Bay of Namew Lake. This portion of Namew Lake has little fishery. However, both Frewan Lake and Cross Bay are located in the Province of Saskatchewan and would require approval from that jurisdiction. This option was rejected as a consequence.

A Direct discharge to Namew Lake was also considered. Mixing to equalize the mineral concentration of the depressurizing water and to bring the temperature to that of Namew Lake would not occur with a direct discharge. Significant mixing of the discharge to the lake might therefore not occur in all seasons and the discharge could be disruptive to shoreline habitat.

THE HUDSON BAY MINING AND SMELTING CO. LIMITED PROPOSAL (continued)

(e) Other Discharge Alternatives

Two other discharge formats were examined - a pipeline to the Sturgeon Weir River and one to the Goose River. The outcome would be a discharge to Namew Lake at Sturgeon Weir in both cases. In rejecting these proposals, the Company noted that both pipelines would be long and thus expensive and also subject to freezing. In the case of the Goose River discharge, dilution would be minimal. In the Case of Sturgeon Weir, the discharge would occur in Saskatchewan.

After consideration of the foregoing discharge options the Company selected storage in Chocolate Lake and subsequent discharge into Namew Lake as the best alternative. In support of this alternative, additional studies were under review with fisheries experts and will be scheduled for the near future. This examination would be used in the determination as to whether Chocolate Lake, with the increased level of T.D.S. would be acceptable as a rainbow trout fishery. Hudson Bay will support or undertake this rainbow trout stocking program if it is reasonable and desirable.

Additional toxicity tests on the effluent were being conducted.

Wasterock

Wasterock generated at the site during mine development was used for site development, upgrading and maintenance of the mine access road and auxiliary service roads around the mine/mill complex.

Wasterock generated by the mining operations will be used for backfill underground. A limestone quarry is being developed for use as backfill when wasterock is not available. The wasterock will not contain chemically-active ingredients (ie. sulfur) at levels which will cause concerns or impacts.

THE HUDSON BAY MINING AND SMELTING CO. LIMITED PROPOSAL (continued)

Storage and Handling of Gasoline and Associated Products

All petroleum products are being stored and handled in accordance with Manitoba Regulation 97/88R under the Environment Act.

Dust Control

Dust emissions from the Namew Lake mine/mill complex are expected to be well below the standard imposed on the Snow Lake concentrator in Clean Environment Commission Order No. 765. This is a result of the complete enclosure of the ore handling system. The crusher and conveyor systems produce dust due to the nature of the operation. These have been enclosed and have been equipped with an air ventilation system which utilizes a water scrubber to clean all exhaust air, which in turn is replaced by heated, fresh make up air. The milling and concentrating operations all occur on slurry material and do not produce dust.

Fugitive dust emissions from vehicle traffic on the mine access road and on site will be handled through routine maintenance and good housekeeping practices. During extended periods of hot, dry weather an environmentally acceptable dust stabilization compound will be used as required to control this dust. It is estimated that heavy vehicle traffic will be limited to 8-10 transport trucks per 24 hour day, while moderate levels of light vehicle traffic will occur. If airborne dust from drilling and blasting at the limestone quarry occurs, the operation will be temporarily shut down.

THE HUDSON BAY MINING AND SMELTING CO. LIMITED PROPOSAL (continued)

Noise Control

Ore handling facilities are completely enclosed with an insulated double skin exterior wall. Pumphouses and other satellite structures are well insulated and equipped with efficient, relatively noiseless equipment. The mine ventilation system is fitted with a silencer and has been enclosed and equipped with efficient mufflers.

In an effort to minimize the impact of noise levels emitting from the operation on Namew Lake, a buffer line of trees has been left standing between the shoreline of the lake and mine/mill site. This buffer has the effect of dampening and eliminating most of the noise generated on site as well as preserving the natural appearance of the site when viewed from the lake.

It is anticipated that the limestone backfill quarry site will be the most significant source of noise generated by the entire operation. This operation will be seasonal and can be operated when the effect of the noise levels generated by the drilling, blasting, and limited crushing will have a minimum impact on the environment (spring and fall).

Solid Waste Disposal Ground

A solid waste disposal ground approval has been received from the Environmental Control Branch for the solid waste disposal site.

The disposal site is segmented into three separate areas for burnables, non-burnable and for storage of used barrels and salvageable wastes. The solid wastes will be periodically capped with a layer of waste rock and clayfill material and allowed to naturally revegetate. All required signing has been erected to aid in the proper operation of the site. Burning will only be undertaken once authorization is received from the Department of Natural Resources.

THE HUDSON BAY MINING AND SMELTING CO. LIMITED PROPOSAL (continued)

Sewage

An estimated 30 cubic meters per day of sewage and domestic wastewater will be generated at the mine/mill complex. This water will be collected through a series of gravity flow sewer lines in the sewage lift station located on the northern side of the site. From there, it will be pumped to a two-stage above-ground sewage holding tank. Effluent is decanted from the holding tank and discharged to the tailing pond. The solids will be removed by contract to an approved waste disposal ground.

Freshwater Supply

A Water Rights Licence was issued to Hudson Bay Mining and Smelting Company from the Water Resources Branch of the Department of Natural Resources to withdraw fresh water for the various minesite uses from Namew Lake. Domestic water will be disinfected. Approval has been received for the water supply and distribution system and wastewater collection system from the Environment Department.

Effluent Monitoring Programs Established

Effluent monitoring programs have been established at the Namew mine/mill site to gather effluent quality data to allow determination of the type of treatment required. Regular monitoring programs will also indicate changes in effluent quality which could result in changes being required to treatment techniques.

THE HUDSON BAY MINING AND SMELTING CO. LIMITED PROPOSAL (continued)

Underground Monitoring Program

Sampling locations were chosen underground at different levels to monitor the quality of various flows which ultimately report to the final underground sump for discharge to surface. The underground samples are collected by Mine Department personnel on a bi-weekly basis and delivered to the Hudson Bay Analytical Department in Flin Flon for analysis.

Surface Monitoring Programs

Effluent discharges from underground and surface Mill operations are directed to effluent containment areas adjacent to the mine/mill complex. Weekly samples of Mill process water discharge, tailings discharge and final discharge from the tailings containment area prior to entering the reclaim reservoir, are collected by Mine Department personnel and delivered to the Hudson Bay Analytical Department for analysis. Bi-weekly samples of Namew Lake raw water supply and minewater discharge from the final underground sump to surface are collected by Mine Department personnel and delivered to the Hudson Bay Analytical Department for analysis.

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Questions

In response to questions at The Pas hearing, Mr. Fraser stated that discharge from Chocolate Lake to Namew Lake would be through a natural drainage channel but that, at present, the lake was 1 - 1.25m below normal and because of drought conditions there had probably not been any discharge for three or four years. Chocolate Lake is in the order of 18m above Namew Lake.

With regard to Registered Trapline #35, the Chocolate Lake proposal had been discussed with the trapper and stabilization of the lake water level should benefit the trapper's activities.

HBM&S CO. LIMITED PROPOSAL - QUESTIONS (continued)

Mr. Fraser stated that the need for unusual measures to depressurize the mine became apparent only in November, 1988 as mine development progressed. Until this problem is overcome mining has been restricted to the upper level of mine development, so that mining was being done at only 30% of the production budget and less than 10% of capacity. Mining at this level of production would not normally be economic.

In answer to a question from Mr. Phil Leonard of the Rocky Lake Cottage Association, Mr. Fraser stated that the estimated depressurizing/dewatering pumping rate was down from the original estimate, when the report was compiled, to a current estimate of 300 L/s. A ridge surrounding Chocolate Lake would prevent outflow into Rocky Lake. Toxicity tests had been conducted on the depressurized water at about the 4,000 p.p.m. T.D.S. level without toxic effect on rainbow trout and other aquatic life. At this concentration, jackfish would probably be adversely affected. The depressurizing operation should not have any direct affect on the water or water levels in Rocky Lake.

In answer to other questions, Mr. Fraser confirmed that the current consideration by the Company was not to discharge water from the wastewater pond directly to Namew Lake but to inject it into the depressurizing water pipeline and by this means discharge it to Chocolate Lake along with effluent from the mine wastewater storage pond. He stated that the pH of the wastewater pond discharge was too high to re-use in the mill process - that metal recovery in the mill process could be affected by the high pH. He also stated that in the event of an emergency discharge to Namew Lake during an extreme rainstorm event, attempts would be made to pump down the water level of the reclaim pond and return the effluent to the tailings pond area.

In response to another question, Mr. Fraser said that the net acid generating potential of tailings from the Namew Lake mine and mill operation is of the order of only 0.4 to 0.5% sulphur as compared to tailings from the Flin Flon operation in the range of 20 - 25% sulphur. The Flin Flon tailings has a net acid generating potential of almost 500 kg of acid per tonne of

HBM&S CO. LIMITED PROPOSAL - QUESTIONS (continued)

tailings. Such acid conditions can result in the release of heavy metals from the tailings residue. Such metals can then reach the nearby receiving streams. It is fortunate that the sulphur content of the ore is so low at the Namew Lake mine.

In response to a question from Mr. Ed. Johanson, representing the Manitoba Environmental Council, Mr. Fraser was of the opinion that the stocking of Chocolate Lake with rainbow trout would be good proof of a discharge of mine water to Namew Lake from Chocolate Lake that would be acceptable to the water of Namew Lake.

Answering another questioner, Mr. Fraser explained that due to the mining method employed in the Namew Lake mine with a resultant fine grind of the tailings that backfilling this material into the mine was not a practical consideration.

In answer to another question, Mr. Fraser stated that if the depressurizing water stays at a T.D.S. level of 4,000 or becomes higher, dilution would likely be the only practical method of reducing the concentration to an acceptable level for discharge.

In response to a question from Mr. Larry Strachan, Chief of Environmental Control Programs of the Environment Department, Mr. Fraser agreed that a single point discharge from Chocolate Lake would be a logical licencing requirement. He also favoured the formation of a committee to develop a rehabilitation plan for the mine for implementation following mine closing and abandonment. In the event that cyanide is used in the mill operation, the Company would expect to meet standard discharge limits.

Questioning of Mr. Fraser continued at Cumberland House on June 15th following his condensed presentation of the Company proposal on that occasion.

HBM&S CO. LIMITED PROPOSAL - QUESTIONS (continued)

In response to questions by Mayor Morin of Cumberland House, with regard to impurities in mine/mill effluent, Mr. Fraser said that the Company's proposal was that effluent from the wastewater pond entering the pipeline to Chocolate Lake would meet Federal Mine/Mill Regulation Limits, which he felt were achievable and had been demonstrated to be reasonable for substances such as nickel and copper. A further part of the proposal is that there be a limit of 2,000 p.p.m. T.D.S. for effluent discharged into Chocolate Lake.

Mayor Morin had further questions about the quality and constituents of the proposed discharge from Chocolate Lake to Namew Lake. In response, Mr. Fraser referred to tests conducted on samples of the brackish water from the mine depressurizing process. Bioassay tests had been conducted by an independent laboratory on samples up to 4,000 mg/L T.D.S. without any lethality. Tests on mill process wastewater was also proven to be non-toxic.

Mr. Fraser said that flow into Namew Lake from the Sturgeon Weir River would, at minimum flow, provide an 80:1 dilution ratio for the wastewater and depressurizing water discharge from the mine. At average flow the dilution ratio would be 160:1. He also said that the proposed establishment of a trout fishery in Chocolate Lake would provide the ultimate test as rainbow trout are the species used in Federal Metal Mining Liquid Effluent Regulations for bioassay purposes.

Brian Christianson, Fisheries Habitat Co-ordinator for Saskatchewan Parks, Recreation and Culture stated that the two species of fish used for the tests referred to by Mr. Fraser, are extremely tolerant of salt. He would be more impressed if the tests had been done on pike or walleye. He agreed with Mr. Fraser that the tests chosen were standard protocols which Mr. Fraser said had been recommended to him by the Manitoba Fisheries Branch; however, he said that in Saskatchewan rainbow trout had been grown in water with a strength of 20,000 p.p.m. T.D.S. because rainbow trout can live naturally in seawater. It was Mr. Christianson's opinion that 2,000 p.p.m. would be very tough on pike or walleye.

HBM&S CO. LIMITED PROPOSAL - QUESTIONS (continued)

In response to further questions from Mr. Christianson, Mr. Fraser said that Rocky Lake was in a neighboring drainage basin to Namew Lake. Rocky Lake is a much smaller drainage basin and discharges through Root and Reeder Lakes to the Saskatchewan River.

In response to another question, Mr. Fraser re-iterated that the extent of the dewatering/depressurizing problem had only become known in November, 1988. Biological data collection work was still underway at Chocolate Lake since insufficient time had been available to complete the data collection and analysis.

Mr. Fraser showed a graph of the observation well that had been drilled into the Winnipeg groundwater formation near Namew Lake with a water level 20 cm above that of the lake. Since the start of the depressurizing program underground water pressure had dropped from 450 p.s.i. to about 80 p.s.i. and the water in the observation well had been reduced to a level 2.5m below the surface of Namew Lake. This indicated that salt water may no longer be entering the bottom of the Lake due to pressure below the Lake.

In response to questions from Mr. Leon McAuley, a citizen of Cumberland House Mr. Fraser said that discharge of the mine/depressurizing water to Rocky Lake would have been considerably less expensive than the cost of pumping to Chocolate Lake.

Mr. Fraser again went over the Chocolate Lake and Rocky Lake disposal alternatives, as previously presented at The Pas, in some detail. This discussion was joined by Mr. Christianson, who also said that there was insufficient information available for him to assess the affect on Namew Lake of the Chocolate Lake disposal option; however, he would prefer to have the discharge go to Rocky Lake because then Saskatchewan would not have to deal with possible problems - it would remain Manitoba's problem. This position drew support from Mr. McAuley.

HBM&S CO. LIMITED PROPOSAL - QUESTIONS (continued)

In response to the foregoing, Mr. Fraser said that he was only seeking the best environmental solution regardless of political boundaries and that his information, and the opinion of the Manitoba Fisheries Branch officer, was that Namew Lake would be adequately protected through the use of Chocolate Lake as an initial receiving body for the discharge of effluent from the mining operation. In response to a question, Mr. Fraser said that differences in land elevation were such that Chocolate Lake could not be drained by gravity into Rocky Lake.

Mr. Cliff Potter of the Saskatchewan Environment Mines Pollution Control Branch agreed that there was some salt water entering Namew Lake (he calculated 11 tonnes per day) but he stated that studies undertaken on behalf of the Company by A.E.C.L. to determine where the salt water was entering the bottom of Namew Lake were inconclusive. Major discharges into the bottom of the lake were not discovered. He believed that at times there was an upward pressure on the lake bottom and at times a downward pressure. The known information was not conclusive. Based on the limited information available, he did not believe that there was presently a significant mineral loading on Namew Lake from underground water in comparison with the discharge proposed by the Company.

In response, Mr. Fraser said that his calculations of natural loading on Namew Lake amounted to 50 tonnes per day. Mr. Potter agreed that he had used the same data; however, his calculations had used the average concentration values whereas the Company had used the extreme values.

Mr. Potter also had questions about post abandonment rehabilitation, tailing pond seepage, acid generation potential, and leachability. In this regard, Mr. Fraser agreed with a suggestion that, under the prevailing circumstances, a representative of Saskatchewan Environment could be asked to sit on a rehabilitation committee along with members of the public.

CITIZEN AND OTHER PRESENTATIONS

A. The Pas, Manitoba

Mr. Ed Johanson representing the Manitoba Environmental Council presented a brief on behalf of the Council.

The brief drew attention to the relatively short notice given for the hearing which did not provide sufficient time for the volunteer Council members to assess the project proposal as thoroughly as they would have wished.

Council believes that a good environmental impact assessment (E.I.A.) must contain at least three things. 1) A description of the environment to be affected, especially its ecosystems and vulnerable components, 2) a description of the potential impacts of the operation on the organisms and ecosystem involved, and 3) an analysis of how these impacts would affect the organisms and ecosystems involved. As well, an Environmental Protection Plan should identify ways of eliminating negative environmental impacts or reducing them to an "acceptable" level.

Although some of these elements are inadequately covered, the total documents submitted contain all of these components. However, the description and identification of ecosystems and vulnerable species in the Company proposal is weak. More onus should have been put on the developer to get basic biological data as well as the hydrologic and chemical data which was compiled.

A further deficiency was that little resource data was provided for Chocolate Lake or for Namew Lake in the vicinity of the proposed discharge points.

CITIZEN AND OTHER PRESENTATIONS - THE PAS (continued)

Mr. Roger Smith, who operates a fishing and hunting lodge at Sturgeon Landing on Namew Lake spoke on his own behalf as well as representing the interests of the Native people who live at Sturgeon Landing.

He stated that the lakes and forests in the vicinity provide hunting, trapping, and some commercial fishing for the local population. As well, the river and lake are the primary source of drinking water, as the water from drilled wells is not used by the Native people.

Mr. Smith referred to the disastrous conditions imposed on the environment by other abandoned mining operations in the north and wanted assurance that this project would not have a similar result.

Mr. Smith and the other Sturgeon Landing people are opposed to the use of Namew Lake for disposal of saline waters from the mining operation - or other mine effluent - either directly or indirectly via Chocolate Lake. Too many uncertainties exist.

As regards employment benefits, only one person from Sturgeon Landing is working at the mine and he did not believe that any person from Cumberland House was so employed.

He stated that the roads had not been sufficiently improved or maintained for the volume of truck and passenger vehicle traffic generated by the mine and that present traffic and road conditions were both a hazard and a discouragement to the use of the road by himself and his lodge guests. Shift changes at the mine were an exceptionally bad time for traffic.

He stated that the original information about the Mining development was that nothing was going to be dumped into Namew Lake but now things are changing and he is very concerned.

CITIZEN AND OTHER PRESENTATIONS - THE PAS (continued)

In response to Mr. Smith's concern over road conditions Mr. Baron, who is in charge of Namew Lake operations for H.B.M. & S. said that ongoing discussions were being held with the Manitoba Department of Highways for upgrading the road, particularly with regard to dust control.

Ms. Jan Malanewich made a presentation on behalf of Mr. John Bodnar who had prepared information on behalf of the Rocky Lake East Shore Cottage Owner's Association.

The proposed development is of great concern to the people of Rocky Lake, Wanless, Cumberland House, and Sturgeon Landing. The pollution of fish habitat has greatly affected other areas of mining development. The depressurizing and dewatering requirement deals with only assumptions about unknown quantities and quality of water. Traditional approaches may be inadequate to cope with these unknown values.

These unknown factors are unacceptable to the licencing of this operation.

Mr. Britton, of Flin Flon, represented the Concerned Citizens Against Pollution.

He related problems with air and water quality in the Flin Flon area caused by H.B.M. & S. mining and smelting activities. A great deal of damage to the surrounding environment had resulted.

He warned that the proposed operation will have to be watched closely. Further treatment to that proposed by H.B.M. & S. should be carried out on the liquid effluent. An alternative filtration method should be considered. An absolutely binding rehabilitation agreement, including restoration of the tailings area, is necessary. Perhaps a performance bond should be required.

CITIZEN AND OTHER PRESENTATIONS - THE PAS (continued)

Manitoba Department of Natural Resources

Mr. Bruce Wright, Regional Fisheries Branch Representative of the Manitoba Department of Natural Resources, did not have a prepared presentation but agreed to discuss the proposal and its possible affect on the fisheries of Namew Lake and Chocolate Lakes and to answer questions.

He stated that the Fisheries Branch mandate was to manage the fisheries resource but that the matter of the possible impact of the mining activities on the fisheries resource was the responsibility of the Environment Department. However, based on only limited experience by himself and his colleagues with saline discharges and saline water, he was of the opinion that the alteration to Namew Lake from mine discharges would not be significant or long term in nature. He felt that the impacts would be acceptable, provided appropriate monitoring was done.

With regard to Chocolate Lake, Mr. Wright stated that he would like to see the enhancement of that lake by replacement of the fish population with rainbow trout, based on feasibility studies being done. He believed that such a program would be the first of its kind in the north, i.e. the use of a lake as a mixing zone or settling basin for mine effluent discharge and still stocked and utilized as a sport fishery. Such a program would demonstrate to the public that the Company was not destroying the fishery but rather enhancing it for useful value to fishermen.

In addition, the presence of rainbow trout would act as a monitor not only for the water quality of Chocolate Lake but also for the quality of water discharged from Chocolate Lake to Namew Lake.

In response to a question, Mr. Wright said that a T.D.S. level of 200 supports a very productive fishery in some lakes; however, he deferred the question of the optimum level of T.D.S. for fish to the Environment

CITIZEN AND OTHER PRESENTATIONS - THE PAS (continued)

Department. He was also aware that some lakes with a T.D.S. level well above 200 mg/L support a very productive recreational or a commercial fishery. He said that in the provincial Swan Creek fish hatchery the well water used has a T.D.S. of about 2300 p.p.m. and the fish are very healthy.

In response to another question, Mr. Wright said that current feasibility studies on Chocolate Lake are necessary to determine if the lake has sufficient oxygen in its natural state to carry a fish population over winter and if the lake depth is sufficient for fish to survive in the warmer summer months. The present pike population of the lake are stunted but he was unable to say if this was from overpopulation and lack of food or because of present water quality.

Mr. Wright placed a far greater priority on the protection of Namew Lake than Chocolate Lake and advocated the placement of water quality limits on mine discharges sufficient to ensure that the fishery resource of Namew Lake is not adversely impacted.

Mr. Roger Smith observed that even if saline effluent which would flow from Chocolate to Namew Lake was not toxic to the Namew Lake fishery, it could change the ecology of the lake and adversely affect fish spawning areas and conditions. Mr. Wright's response to this was that the presence of thriving trout in Chocolate Lake should verify a good water quality and he was not aware of fish spawning areas on the portion of Namew Lake that would receive discharge from Chocolate Lake. However, there was the possibility of fish damage due to an environmental change in Namew Lake and that is why the setting of adequate quality levels on effluent would be important.

Mr. Wright agreed with a suggestion by Mr. Clem Moche, an environmental engineer with the Environment Department, that a contract or agreement, signed by the Fisheries Branch and the Company, with regard to a program of stocking and maintaining the fishery on Chocolate Lake would be useful so that rights and obligations would be understood by both parties.

CITIZEN AND OTHER PRESENTATIONS - THE PAS (continued)

Mr. Frank Render, a hydrogeologist with the Water Resources Branch of the Department of Natural Resources, in response to a question, gave a brief summary of his view of the origin of the saline water surrounding the mine and the possible scenarios that might be encountered in the depressurizing/dewatering program with regard to continued water volume and salinity. There was a wide range of possibilities. Mr. Render stated that in his opinion there was a possibility that the mine depressurizing program would restrict some of the saline water normally surging upwards into the lake - as had been suggested by Mr. Fraser - so that, by good luck, a balance would be achieved; however, in Mr. Pender's opinion, this was pure speculation.

Mr. Al Beck, a water quality specialist with The Manitoba Environment Department, in response to a question said that the level of 200 mg/l T.D.S. was a very quick and simple measure of an acceptable level for fish. An analysis of what constituents made up the 200 T.D.S. eg. chlorides, sulphates, carbonates etc. was the ultimate determination of the benefit or disbenefit to fish.

In response to another question, Mr. Beck said that he did not believe that the current proposal by the Company to discharge mine effluent to Chocolate Lake and thence to Namew Lake would adversely affect Namew Lake as a domestic water supply to a significant degree; however, protection of the Namew Lake fishery should, in general terms, assure the suitability of Namew Lake as a domestic water source - fish being more sensitive than humans to water quality, generally speaking. Mr. Beck believed that the use of Chocolate Lake, as proposed, would help to protect Namew Lake.

Manitoba Environment Department

Mr. Larry Strachan, Chief of Environmental Control Programs of the Manitoba Environment Department, agreed that the Chocolate Lake option was the most environmentally suitable one.

CITIZEN AND OTHER PRESENTATIONS - THE PAS (continued)

Mr. Moche an Environmental Engineer with the Environment Department, recommended the use of Manitoba Water Quality Objective 2A as being a proper one to apply to the classification of Chocolate Lake; with a mixing zone of about 10% of the Lake. In Mr. Moche's opinion, the application of this classification plus the stocking of the lake with trout should provide adequate protection.

Mr. Moche also recommended that it would be reasonable to specify water quality criteria for the effluent discharging from Chocolate Lake to Namew Lake, for the end of the pipe discharging into Chocolate Lake, and for effluent from the wastewater storage pond before injection into the pipeline conveying depressurizing water and mine water to Chocolate Lake.

Mr. Moche stated that his department had requested the Company on two occasions to quantify environmental impact in terms of effluent quality and its impact on receiving waters. He stated that the Company had failed to respond and under the new Environment Act the onus was on the proponent to provide that kind of information that was lacking in the present consideration.

Mr. Moche also suggested that, to relieve road traffic hazards, safety exits or temporary pull-off areas could be constructed at intervals along the road to the mine so that vehicles could pull off to the side out of harms way when fast moving vehicles are seen to be approaching ahead. The Company could negotiate with the Department of Highways about the construction of these.

B. Cumberland House, Saskatchewan

Ms. Delores Laliberty made a presentation on behalf of the Cumberland House Band.

CITIZEN AND OTHER PRESENTATIONS - CUMBERLAND HOUSE (continued)

The Cumberland House Band is very concerned about the potential environmental impact of discharge effluent from the Namew Lake mine and mill operation on the water quality of Namew Lake and then downstream on Cumberland Lake. The Band draws its domestic water supply from Cumberland Lake.

She stated that there had not been any consultation about the mining project with the Band and the following major concerns will have to be addressed:

1. Federal Environmental Assessment reviewed by the Federal Minister of Environment.
2. Public hearings in Saskatchewan, preferably Cumberland House.
3. Water Quality standards established, since there doesn't seem to be any evidence of standards set.
4. Identification of impact to drawdown area.
5. Baseline information required on effluent discharge.
6. Information on seepage of water discharge.
7. Tailings reclamation programs required.

In response to a question following the presentation, Ms Rose Dussion, Environmental Worker for the Band indicated that the Lake water surrounding Cumberland House had already been badly impacted by the Saskatchewan Hydro-electric power plant development upstream on the Saskatchewan River. The already serious adverse impact of this development was a cause of concern that the water quality might be even further impacted by the Namew Lake mine.

CITIZEN AND OTHER PRESENTATIONS - CUMBERLAND HOUSE (continued)

Mr. Allen Felix, District Representative, Prince Albert District Chiefs Council stated that he is a politically elected official as well as being the Chief of Staff Executive Officer in the operations of the Prince Albert District Chiefs Council. With Mr. Felix was Tammy Oleksyn, the Council's Environment Offices. Mr. Felix's presentation was also made on behalf of not only the Cumberland House Band but also the Peter Ballantyne Band, who were unable to attend the hearing.

The Prince Albert District Chief's Council has played an active role in the Environmental Impact Assessment process in Saskatchewan.

Mr. Felix had four main points to make:

1. The Namew Lake mine/mill operation will have severe environmental impacts on the Namew Lake and Cumberland House waterways.
2. A Federal Environmental Assessment and Review should be conducted on the mine and mill operations at Namew Lake.
3. There is insufficient information on the effects of the effluent discharge on individuals using the lake water for human consumption. Also, the effect of the mine effluent on the fisheries and wildlife resources have not been determined.
4. The Peter Ballantyne Band is a signatory to Treaty #6 and the Cumberland House Band is a signatory to Treaty #5 between these Bands and the Federal Crown.

The proposed project contemplates a substantial violation of those treaty rights. The discharge of effluent from the mine/mill would violate the Bands' Treaty and riparian rights to water and to hunting, trapping and fishing.

CITIZEN AND OTHER PRESENTATIONS - CUMBERLAND HOUSE (continued)

The Bands have rights to an unpolluted source of water and damage to the fishery will violate the Bands' rights to fish and to economic development.

Mr. Felix stated that he was not against development but was concerned about health hazards posed by the mining development.

Mayor Leonard Morin of Cumberland House stated that the livelihood of the Cumberland House Band was basically derived from trapping and fishing and that these activities were the backbone of the Cumberland House Community prior to construction of the Squaw Rapids Dam, upstream on the Saskatchewan River. These Band activities did not pollute the environment. Cumberland House is an island surrounded by Cumberland Lake, the Saskatchewan River and the Tearing River. Namew Lake discharges to Cumberland Lake.

Cumberland House is a mixed community of Treaty people and Metis people. The Band has Treaty rights but the Metis people do not have special rights.

Of all the 44 northern communities, Cumberland House is the most southerly and is in a special area, unique because of big game - moose, elk, deer, and bear; wild birds - ducks and geese; and fish - sturgeon, pike, walleye, whitefish, goldeye, etc. These resources provide a living for the local inhabitants. The living was good until the Squaw Rapids Dam destroyed this livelihood and, since then, the traditional lifestyle has changed considerably. Tourism is a part of the community's industry.

Because of the adverse effects of the Squaw Rapids Dam and the resultant destruction of trapping, fishing, and hunting, the Band filed a Statement of Claim for \$200 million but has since reached a settlement for less than this amount. During this process the Band also filed a court injunction against the Francis Finlay Dam in Nipawin and again reached a settlement agreement.

CITIZEN AND OTHER PRESENTATIONS - CUMBERLAND HOUSE (continued)

Part of the foregoing settlement involved \$1 million for a new water treatment plant, with a reservoir beside the Big Stone River at the point of discharge from Cumberland Lake. Before this was constructed the Community had a well but the water was not of good quality and water had to be conveyed from the river by pail. The Cumberland House Community is now concerned that the new, good water supply is in jeopardy from toxic contaminants in the discharge from the mine. The treatment plant will not remove toxic chemicals from the water.

The Cumberland House Community is strongly opposed to the discharge from the Namew Lake mine. This flows from Namew Lake to Cumberland Lake. Because of a dam on the Terring River, the water is diverted around the island to the Saskatchewan River and clear drinking water is obtained, by means of the dam, from the Sturgeon Weir water system.

The Community also is concerned that pollutants in the discharge will destroy some of the best fishing and spawning areas in Cross Bay and Cumberland Lake. Concerns include possible health effects for both humans and wildlife. Offensive odours or air emissions were another concern. There was also the possibility of seepage from the mine. Mayor Morin stated that there had been no previous consultation with the Cumberland House Community on the matter Namew Lake mine development.

Mayor Morin was interested in Mr. Fraser's statements about possible improved road services and employment opportunities.

Mr. Morin asked if there had been an Environmental Impact Assessment done by the Province of Saskatchewan.

In summary, the Cumberland House community is strongly opposed to the discharge of effluent from the Namew Lake Mine into Namew Lake.

CITIZEN AND OTHER PRESENTATIONS - CUMBERLAND HOUSE (continued)

Manitoba Environment Department

Mr. Larry Strachan representing Manitoba Environment read a letter from Mr. Al Beck of the Manitoba Environment Water Standards and Studies Section. This letter addressed a discussion, held at the hearing at The Pas, about optimum T.D.S. values for fisheries. This letter confirmed that in a very general and non-specific way, a level of 200 mg/l T.D.S. might be a rule-of-thumb to assess conditions for optimum fisheries production potential but in reality the make-up of the constituents of the T.D.S. would be the important factor. It is the carbonate fraction of T.D.S. that is the component that best promotes fisheries production.

Mr. Beck's letter also contained his opinion that the use of Chocolate Lake, as proposed, would be beneficial to thermal acclimation and mixing of the discharge effluent and that, under such conditions, it would be difficult to follow a discharge plume from Chocolate Lake for any distance into Namew Lake. Assuming wastewater discharge to Chocolate Lake will meet Manitoba's Surface Water Quality Objectives set for the protection of cold water aquatic life, and that saline discharge will not exceed a T.D.S. value of 2000 mg/l, it was Mr. Beck's assessment that there would be no detrimental effect on the fishery of Namew Lake. The establishment of a trout fishery in Chocolate Lake would provide an added measure of protection to Namew Lake, since rainbow trout are more sensitive to most contaminants than other fish species indigenous to Namew Lake. There would likewise not be a hazard to the continued use of Namew Lake as a domestic water supply, recognizing, of course, that disinfection of all surface waters, before domestic use, is a standard recommended practice.

Mr. Christianson agreed that, while rainbow trout are more tolerant of saline water conditions, it is appropriate to use trout for tests of the concentration of other chemicals or elements that may be present in mine water, as they may be more susceptible to such things as heavy metals.

CITIZEN AND OTHER PRESENTATIONS - CUMBERLAND HOUSE (continued)

In response to a question, Mr. Strachan outlined the protection of water quality that would be given by the suggested application of Manitoba's 2A Water Quality Objectives to Chocolate or Namew Lakes. Mr. Beck had suggested in other correspondence with the Commission that a mixing zone in the order of a 100m radius should be considered for application to the discharge of effluent from Chocolate Lake to Namew Lake in order to allow for mixing in such a zone.

In response to another question, Mr. Strachan confirmed that Manitoba's Surface Water Quality Objectives contain specific maximum level limits for a wide variety of contaminants, including heavy metals.

Saskatchewan Environment Department

Mr. Randy Sentis, Assistant Deputy Minister of Saskatchewan Environment and Public Safety made the final presentation at the Cumberland House hearing.

He stated that information provided by the proponent had been forwarded to Saskatchewan Environment for review. In commenting to Manitoba, Saskatchewan raised a number of concerns related to the project and, since the original submission was received, some additional information had been provided; however, on the basis of information provided it is still not possible to adequately assess the project, and its environmental impacts.

People residing in the area, including Cumberland House and Sturgeon Landing, are very concerned about the quality of their environment, and possible effects on resources resulting from the project.

Despite the fact that the development has been ongoing for more than two years, the proponent has not been in direct contact with area residents. Public consultation is of critical importance in the planning and assessment of major development projects for the identification of local concerns.

CITIZEN AND OTHER PRESENTATIONS - CUMBERLAND HOUSE (continued)

Baseline environmental data are lacking to assess effects on wildlife, vegetation, and the social community. Data are also lacking on aquatic resources and water quality. Impacts on aquatic ecosystems are of primary interest. Basic limnological/hydrological data are required.

With regard to the project description, uncertainties remain with respect to the quality and quantity of depressurizing water. There are large variations in both estimated discharge quantities and T.D.S. content. The proponent's conclusion that an increase in T.D.S. will benefit Namew Lake cannot be supported. In addition, the proponent has not described the effects of depressurizing on regional systems.

More information is required on the characteristics of all waste streams, the efficiency and effectiveness of treatment systems, and final discharge quality.

Possible seepage from the tailings management area and wastewater ponds has not been adequately addressed. It is inappropriate to use clean runoff to meet contaminant discharge standards.

Saskatchewan Environment supports a single point of discharge for all project effluents; preferably in a Manitoba drainage area or alternatively Chocolate Lake.

In the absence of adequate data, it is impossible to form an adequate assessment of possible impacts of the project on the environment. Impacts on the terrestrial environment seem to have been disregarded. The proponent seems to believe that if effluent discharge standards are met, impacts on aquatic systems will be minimal. Standards have not been established for some water quality parameters, including metals. If Chocolate Lake is utilized, surface water quality objectives should be established, including a limited mixing zone and the objectives should be used to establish effluent loading limits for both the mine/mill and the depressurizing system.

CITIZEN AND OTHER PRESENTATIONS - CUMBERLAND HOUSE (continued)

For the purpose of monitoring the biological impacts, Saskatchewan Environment commends H.B.M. & S. for their commitment to establish a rainbow trout fishery in Chocolate Lake in 1989.

Project documentation suggests that the proponent wishes to monitor the operation and react to problems as they are identified. While monitoring is important, it does not substitute for a comprehensive pre-operation evaluation of potential impacts, which is necessary to determine environmental acceptability.

Saskatchewan is concerned that if the project is approved, they would have no input to the establishment of release standards, or access to monitoring data. Projects which directly overlap provincial boundaries demand a co-operative approach to ensuring environmental protection.

No contingency plans have been provided outlining planned actions in the event of a dam spill, containment pond seepage, etc. This is especially important in view of the proximity of the project to Namew Lake.

Saskatchewan believes that decommissioning and abandonment procedures should be considered and addressed in the design of a mining and milling project — not at the end — particularly where long-term effects may be felt in Saskatchewan. The tailings, wastewater handling and waste rock sites are areas requiring attention now.

In conclusion, Mr. Sentis stated that the Province of Saskatchewan seeks assurance that, if approved, the Namew Lake project proceed in an environmentally acceptable manner. Information available does not allow adequate assessment of effects. Saskatchewan asks that a joint environmental control system be established between Saskatchewan and Manitoba regulatory agencies, including joint inspections and a co-operative approach to determining requirements for licencing, monitoring and reporting.

CITIZEN AND OTHER PRESENTATIONS - CUMBERLAND HOUSE (continued)

Commenting on the Saskatchewan presentation Mr. McAuley supported the conclusions and, in addition, felt that the Federal Government should be involved in the case of a Federal/Provincial waterway.

Ms. Laliberty commented that the review period for participants had not been sufficient to allow adequate preparation for and participation in the review and consideration of the impacts on the area residents.

Mayor Morin supported the Saskatchewan Environment presentation. He also re-iterated that the Cumberland House water treatment system would not protect against toxic chemicals in the water.

Mr. Robert Kent, from Edmonton, representing Environment Canada, stated that Environment Canada will provide comments to the Province of Manitoba on the adequacy of the Environmental Impact Assessment. Minewater effluent from the Namew Lake mine will be subject to the Metal Mining Liquid Effluent Regulation under the Federal Fisheries Act. In addition, the Federal Environmental Assessment and Review Office officials are reviewing the Company's development in consultation with the Department of Fisheries and Oceans and the Department of Indian and Northern Affairs to determine if the Federal process should apply.

SUMMARY, DISCUSSION AND CONCLUSIONS

Namew Lake Mine is a joint venture of H.B.M.&S., Flin Flon and Outokumpu of Europe. It is a nickel-copper mine located 64 km south of Flin Flon within 1 1/2 km of the Manitoba-Saskatchewan boundary. The project was registered under the Clean Environment Act of Manitoba in July, 1987. Under this Act, applications only had to be filed prior to construction and operation of a facility.

SUMMARY, DISCUSSION AND CONCLUSIONS (continued)

The mine site is located within the drainage basin of Namew Lake which is part of the Saskatchewan River Watershed Division. The main inlet to Namew Lake is the Sturgeon Weir River which drains Amisk Lake in Saskatchewan and Lake Athapapuskow with its tributaries in Manitoba. The main mining complex of HBM&S is contributory to this drainage basin. Namew Lake is located principally in the Province of Saskatchewan and discharges to Cross Lake through Whitey Narrows and hence to Cumberland Lake. Cumberland Lake in turn drains into the Saskatchewan River. The Saskatchewan River within a short distance of Cumberland House enters Manitoba.

The mine is accessed by a gravel road serviced by the Manitoba Department of Highways which has its junction with PTH #10 near Atik, North of The Pas. This road services the community of Sturgeon Landing, Saskatchewan. A 6 or 7 km extension to the road was required to service the mine/mill site located at the south east corner of Namew Lake.

Mine development began in 1985 with the sinking of a shaft. This shaft is located on the shore of Namew Lake. Lateral development to intersect the ore body took place at the 120 and 320 m level. Most of the ore body is located beneath Namew Lake in the Cambrian rock formation. Ore reserves are estimated to last 5.5 years at a planned production rate of 1300 tonnes/day. Mill construction was completed in the fall of 1988. The ore is ground in subsequent stages to a fine product. A flotation process is used to recover the sulfide minerals which contain the metal. The underflow from this process constitutes the mill tailings and is discharged to a tailings pond. The concentrate is separated into copper and nickel. The waste product from this process is discharged to a wastewater storage pond.

The tailings pond is decanted and the effluent is discharged to a reclaim pond. Water from the reclaim pond is re-used in the mill. Approximately 80% of the mill water requirements will be met with reclaimed water. The Company reported that mill process wastewater cannot be re-used since the high alkalinity would be detrimental to the nickel flotation

SUMMARY, DISCUSSION AND CONCLUSIONS (continued)

process. As well as mill process wastewater, seepage wastes from the mine are discharged to the wastewater pond. At the proposed flow rate of mill process and mine water, approximately 10 days detention is available in the wastewater storage pond. The Company reported that the objectives for substances listed in the Federal Metal Mining Liquid Effluent Regulations would be met on the wastewater pond effluent.

Unlike all of the mining operations that the Commission have dealt with throughout the years, Namew Lake has been the only mine prevented from reaching full production because of a massive water problem. Underground development had to be stopped in late 1988 due to major water inflows during the development of lateral drifts. A hydrogeological consultant retained by the Company established that the rock surrounding the ore body contained major fractures which under full water pressure could flood the lower part of the mine very quickly. Depressurizing of the water bearing zone was shown to be required in order to drop the pressure in the mine, prevent flooding and allow full development of the mining operation. Unfortunately, the water to be removed is brackish containing an average of 4000 mg/l total dissolved solids (T.D.S.). This compares to a T.D.S. range in Namew Lake ranging from 90 to 115 mg/l and Rocky Lake from 300 to 350 mg/l. The average rate of pumping of the depressurizing water projected over the life of the mine is estimated by the Company at 300 L/s (4000 i.g.p.m.) which includes freshwater to dilute the flow to a T.D.S. of 2000 mg/l.

A number of alternate wastewater discharge routes were examined by the Company but all but one (Rocky Lake) involved Namew Lake.

Aside from the Namew Lake wastewater discharge via Chocolate Lake, a discharge route to the Goose River, Sturgeon Weir River, Cross Bay on Namew Lake via Frewan Lake and the south Bay of Rocky Lake via Lake B were considered as alternatives. Two of the candidate routes - Sturgeon Weir River and Frewan Lake would both require the approval of the Saskatchewan Department of the Environment because of their Saskatchewan location. The dilution

SUMMARY, DISCUSSION AND CONCLUSIONS (continued)

available at the Goose River location would be minimal and the pipeline to reach this location would be extremely long. The Rocky Lake discharge route was discredited by the Company since the T.D.S. in the Lake ranges from 300-350 mg/l and the flow through the system would result in a further increase in T.D.S. of 65 mg/l. In the view of the company representative, this increase of T.D.S. could have some impact on this area of Rocky Lake since it serves as a primary spawning and rearing area for the Lake fishery.

The Namew Lake proposal as advertised included only a reference to discharge of wastewater from the mining operation to Namew Lake; however, representatives from the East short cottagers group of Rocky Lake were present in large number at The Pas hearing. They had concerns about the depressurizing of the rock formation and its impacts on Rocky Lake. They also had concerns about the possibility of seepage from any part of the mining operation reaching Rocky Lake. Direct discharge of effluent to the south basin of Rocky Lake was not considered by them to be a possibility since it had been discredited by the Company in its proposal. The reference presented by the Company relating to T.D.S. and spawning areas did not necessarily discredit the discharge of the wastewater to the south basin of Rocky Lake. It did note that eggs and larvae of fisheries fish are usually the most sensitive to changes in mineral concentration although the documentation seemed to be dealing with saline rather than brackish water (sea water at 3.5% and saline water at 1%). In the case of the Namew Lake mine wastewater, the discharge is at a concentration of 0.2% before dilution in the receiving water. Rocky Lake is also part of the Root and Reeder Lake drainage system which borders on several Indian Reserves. There were no representatives at the hearing from the Indian Reserves located near Reeder Lake since the newspaper ads only mentioned a Namew Lake discharge proposal.

The Company has proposed to discharge effluent from the wastewater storage pond into a pipeline containing the depressurizing water. The pipeline is to discharge to the east end of a small lake some 6 km north east of the mine site known as Chocolate Lake. The outlet from Chocolate Lake is located

SUMMARY, DISCUSSION AND CONCLUSIONS (continued)

at the west end of the Lake. Chocolate Lake is a tributary to Namew Lake in the vicinity of the mine site. The Company has proposed that the discharge be restricted to a T.D.S. level of 2000 mg/l with the expected discharge being 300 L/s (4000 i.g.p.m.). In the event that this T.D.S. concentration is exceeded, make-up from Namew Lake will be used to dilute the effluent. The purpose of utilizing Chocolate Lake is to act as a reservoir in adjusting the temperature of the effluent and equalizing the chemistry of the discharge. If the depressurizing water was to be discharged directly to Namew Lake, there was a concern that thermal stratification would occur with a concentration of the brackish water in one area of Namew Lake. This concentration of wastewater could significantly impact the area of the lake containing the higher level of mineralization. The Environment Department representatives felt that the Chocolate Lake discharge would mix with Namew Lake and would not be prejudicial to the Lake fishery. The view was also expressed that the impact to the water supply at Cumberland House would be insignificant. The Company reported that both lethal and chronic toxicity tests had been conducted on the depressurizing water as well as the effluent from the wastewater pond and the results had exceeded the toxicity requirement under the Federal Metal Mining Regulations. The Company had also agreed to work together with the Fisheries Branch in stocking Chocolate Lake with trout. It was the expectation that Chocolate Lake would become a valuable sport fishery with the introduction of trout. A Manitoba Fisheries Branch representative felt that not only would the trout fishery be attractive but would also act as a large scale bioassay to monitor the wastewater before discharge to Namew Lake.

At the request of the Minister of Environment of Saskatchewan, the Commission were asked to reconvene a hearing at Cumberland House, Saskatchewan in order to communicate directly with residents in that area located on Cumberland Lake. This includes the community of Cumberland House and 2 Indian Reserves. There is also a settlement and an Indian Reserve located at the inlet to Namew Lake at Sturgeon Weir Landing. The residents of Sturgeon Landing were represented by a resort operator and outfitter from this location

SUMMARY, DISCUSSION AND CONCLUSIONS (continued)

at the hearing at The Pas. Cumberland House and the 2 Indian Reserves were well represented by both local officials and a district representative from the Prince Albert District Chiefs which includes the 2 reserves located on Cumberland Lake. Representatives with the Saskatchewan Departments of Environment and Natural Resources were in attendance to make a presentation and question the proponent. The concern expressed by all of the presentations was to the effect that although the Namew Lake Mine project is located in Manitoba, the principal portion of the wastewater receiving water is located in Saskatchewan and therefore the impacts would occur in the Saskatchewan portion of Namew Lake. The Commission was told that residents of Sturgeon Landing, Cumberland House and the 2 Indian Reserves were dependent upon the waters of Namew, Cross and Cumberland Lake for its fishery both sport, commercial and for sustenance purposes. The residents also depend upon the Lake system as a water supply. Cumberland House withdraws water from the outlet of Cumberland Lake for municipal water supply purposes following treatment. Residents located along the Lake withdrew water for domestic purposes.

The majority of the presentations to the Commission indicated that the information contained in the proposal by the Company was incomplete and lacked sufficient detail for the residents and the agencies to be assured that there were not impacts that would affect the residents' health and livelihood as well as aesthetics. Perhaps the main theme was the view that since no benefits accrue to Saskatchewan and its residents, the wastewater should not be discharged to Namew Lake. Saskatchewan representatives were opposed to the dilution of the wastewater with fresh water from Namew Lake to meet a discharge limit. It was also noted that wastewater from the wastewater pond would also be significantly diluted by the addition of depressurizing water before being released to Chocolate Lake.

The Commission concludes that there are still uncertainties with regard to the merits and validity of a trout fishery in Chocolate Lake and also concerning the impacts on Namew Lake from the outflow of Chocolate Lake,

SUMMARY, DISCUSSION AND CONCLUSIONS (continued)

particularly near the discharge location. The major uncertainty is connected with a lack of knowledge of the volume and character of the underground depressurizing water. Based upon figures provided by the Company on the volume of Chocolate Lake, the volume of wastewater, and the spring run-off contributions to Chocolate Lake, the T.D.S. of the outflow from Chocolate Lake will be significantly less than the T.D.S. of the depressurizing water discharge to Chocolate Lake (2,000 mg/l) for a period of at least 1 year. Chocolate Lake, without any other source of inflow and based on laminar flow, would provide a residence time of close to 1 year. Whatever impacts occur in Namew Lake will be much less than those which would occur in Chocolate Lake. The Commission believes that this period of time would provide an opportunity for investigations to be undertaken by the Company with guidance from representatives of all parties who have an interest in Chocolate and Namew Lakes.

RECOMMENDATIONS

The Commission recommends:

1. That a temporary licence be issued to the applicant for the Namew Lake Mine project, expiring on July 31, 1990, that will permit the Company to discharge water from the depressurizing of underground rock and effluent from the wastewater storage pond into the east end of Chocolate Lake.
2. That the combined flow of water and wastewater from depressurizing and from the wastewater storage pond of the said project be stored effectively in Chocolate Lake so that the temperature of the discharge from the lake will correspond as nearly as possible with water in the near shore area of Namew Lake at the location of the outflow of Chocolate Lake and so that Chocolate Lake will also act as an averaging basin for the chemical characteristics of the inflow.

RECOMMENDATIONS (continued)

3. That the Manitoba Department of Environment establish limits on the wastewater storage pond effluent of the said project to meet cold water aquatic life water quality objectives in Chocolate Lake exclusive of the discharge from the depressurizing effluent but taking into account a mixing zone in Chocolate Lake. (Manitoba Surface Water Quality Objectives, 1988; Sections 1.9 and 2.2.1).
4. That the discharge from the underground mine depressurizing program from the said project be pumped to Chocolate Lake at a rate and concentration not exceeding 300 L/s (4000 i.g.p.m.) and 2000 mg/l total dissolved solids.
5. That the mill tailings effluent from the said project be recycled to the mill for use as process water at a rate of at least 80% of the mill water requirements. Investigations should continue into the reclamation of additional mill tailings or mill process wastewater.
6. That a Committee consisting of a representative of the Manitoba Department of the Environment, Manitoba Department of Natural Resources - Fisheries Branch, Manitoba Department of Natural Resources - Water Resources Branch, Saskatchewan Department of the Environment, Saskatchewan Department of Natural Resources, a resident of Cumberland House and a resident of Sturgeon Landing be formed to collaborate with the applicant for the following purposes:

RECOMMENDATIONS (continued)

6. (a) to identify an effective monitoring program on all aspects of the liquid wastewater handling system of the project to be undertaken by the applicant. In the interim, until the committee is functional, the applicant shall undertake a monitoring program (Notes 1 and 2) as identified on pages 37 & 38 of the applicant's presentation to the Commission and overhead 15 presented at the hearings in June, 1989 by the applicant;
- (b) to identify limnological surveys that the Company will undertake on Chocolate and Namew Lakes that will enable the evaluation of the impacts of the wastewater discharges from the project on Namew Lake and also the ability of Chocolate Lake to support a population of sport fish;
 - (i) surveys to be undertaken shall include samples and analysis of the domestic water supply of the communities of Cumberland House and Sturgeon Landing.
- (c) to identify a program that the applicant will undertake on Lake B south of the minesite and also the south basin of Rocky Lake to determine the impacts on walleye rearing in the south basin in the event that a decision must be made to utilize this drainage route for wastewater from the project;
- (d) to collaborate with the Company in identifying the best method of operating the reclaim, tailings and wastewater storage ponds to prevent emergency spills through the overflow structures directly to Namew Lake under all but extreme conditions of precipitation;

RECOMMENDATIONS (continued)

- (e) to identify a tailings pond rehabilitation program.

This Committee shall be chaired by a representative of the Manitoba Department of the Environment who will, in collaboration with the Saskatchewan Department of the Environment select a representative from the Saskatchewan Department of the Environment, the Saskatchewan Department of Natural Resources, and a representative from each of the Saskatchewan communities of Cumberland House and Sturgeon Landing. This selection process shall begin immediately and the Committee shall begin meetings before August 31, 1989. The applicant shall be responsible for payment of the expenses of the Saskatchewan members of the Committee to attend the meetings.

- (i) This Committee shall make a report at the end of each month to the "Director" of the Manitoba Department of Environment.

- 7. The Company shall make a full report, including up to date information from its hydrogeological consultant, on the status and results of the Company's depressurizing/dewatering program including an assessment of the hydrogeological effects on the surrounding area affected and the quantity and quality of the water being withdrawn. This information shall be made available to the Committee prior to its first meeting (August 31).

RECOMMENDATIONS (continued)

8. That the Clean Environment Commission shall convene a hearing or hearings to hear representations based on the studies undertaken by the Company on behalf of the Committee named in Clause 6, and any other recommendations of the Committee, the main purpose of which hearings would be to determine possible further mitigative measures that might be undertaken on the wastewater discharge or to prescribe an alternative discharge method. This hearing shall be held on or about July 1, 1990.

In this regard, should the Committee determine before this date that Namew Lake is being or will likely be adversely affected to an unacceptable degree, the Committee shall request the Clean Environment Commission to hold a hearing to review the situation before this date.

NOTE 1 [Recommendation 6(a)] - Copy of Overhead 15

MONITORING:

- Quality
 - Flows
 - (A) Underground Flows - bi-weekly
 - (B) Mill Process
 - Tailings Discharge
 - Tailings Weir - weekly
 - Reclaim Reservoir
 - Depressurizing
 - Mine Final Sump
 - (C) Namew Lake Supply - bi-weekly
-
- Intended Quality - Federal Limits
 - Aquatic Toxicity Tests
 - Receiving Body - Quality Monitoring
 - Limnology, etc.

NOTE 2 [Recommendation 6(a)] - pages 37 and 38 of Applicant's Presentation to the Commission

Monitoring programs have been established at the Namew mine/mill site to gather effluent quality and flow data on the various streams, discharges and receiving bodies. These programs will also indicate changes in effluent quality which could require incorporation of or changes to treatment techniques.

Sampling locations have been chosen underground at different levels to monitor the quality of various flows which ultimately report to the final underground sump for discharge to surface. The underground samples are collected by Mine Department personnel on a bi-weekly basis and delivered to the Hudson Bay Analytical Department in Flin Flon for analysis.

Effluent discharges from underground and surface mill operations are directed to effluent containment areas adjacent to the mine/mill complex. Weekly samples of mill process water discharge, tailings discharge and final discharge from the tailings containment area prior to entering the reclaim reservoir, are collected by Mine Department personnel and delivered to the Hudson Bay Analytical Department for analysis. Bi-weekly samples of Namew Lake raw water supply and minewater discharge from the final underground sump to surface are collected by Mine Department personnel and delivered to the Hudson Bay analytical Department for analysis.

Monitoring program results will be considered with respect to standards established for quality. It is intended that the effluent quality of the wastewater storage pond discharge and tailings/reclaim pond system discharge, if there is any, will meet the Federal Mine/Mill effluent regulation limits and pass aquatic toxicity tests as outlined in the Canadian Fisheries Act. (Metal Mining Liquid Effluent Guidelines). Final discharges to Namew Lake will produce, outside of an immediate mixing zone, only trivial or non-significant elevations of constituents. Appropriate lake quality sampling and monitoring surveys will none-the-less be conducted.



