BHP

Facsimile Communication

Resource Development
BHP World Minerals

DATE: 25 July 1997

TO: Nunavut Water Board

ATTENTION: Philippe di Pizzo/Dionne Filiatrault

FACSIMILE NUMBER: 403 360 6369

FROM: Dennis Wuertz

TOTAL NO. OF PAGES INCLUDING HEADER: 10

If there is a problem with this transmission please telephone (415) 774-2380

OUR FAX NO. IN SAN FRANCISCO (415) 774-2034

Philippe and Dionne,

Attached is the scope of work and purpose for the proposed construction of a temporary weir at the outlet of Stickleback Lake, just south of the Boston Camp. The weir is proposed to monitor the outflow of Stickleback Lake. Ultimately, the hydrograph resulting from this data-acquisition effort would be used in the design of the proposed tailings disposal facility which would be a part of the processing plant, should Boston become a mine. The design work, of course, would be required in the proposal of alternatives needed in the EIS, which we are assuming at this point, must be written in anticipation of the possibility that BHP decides that a mine is feasible.

I am attempting here to send you a map to locate Stickleback Lake (the outlet is where the proposed dam is labeled), but even better, I ask you to refer to the double-volume Environmental Baseline Studies Report(2 copies) that I sent to you early this year. In that document you will find several maps, hydrologic, fisheries and water quality data for the lake. Again, we are not proposing any consumptive use of water; only a temporary weir facility with transducer/data logger to gather volumetric measurements for an entire "open-water" season in 1998.

We must begin the construction of the weir soon, while the flow from Stickleback is basically a trickle. At this time of year, and particularly in August, you can step across the small creek. The light outflow will make the weir installation feasible. There in no true inflow to Stickback; it is fed only through ephemeral flows, and runoff from the relatively small watershed around the lake.

I hope that this information helps to explain better that which we are proposing. Call me if there is anything else that you need to assess the work.

Dennis

BHP Minerals - Hope Bay Belt Project

Attachment 2

Budget Estimate for Detailed Hydrological Investigations
at Stickleback Lake Near Boston Camp

	Item Description	Quantity	Units	Cost	Total
A	**Weir Construction and Monitoring**				
	- weir design (Allard) = 1/2 day	4	hrs	90	360
	- construction supervision (Webber)				
	- travel to/from site = 3 days	24	hrs	75	1800
	- time on site = 4 days	40	hrs	75	3000
	- transducer, datalogger and setup materials	1	lump	2200	2200
	- field tool kit	4	days	30	120
	- laptop computer rental	4	days	50	200
	- as-built drawing and report				
	- report production & word processing	1	lump	300	300
	- drafting	2	hrs	60	120
	- download data and calculate flows	16	hrs	75	1200
	- write and submit report	16	hrs	75	1200
	SUBTOTAL				10500
B	**Flood Frequency & Magnitude**				
	- data compilation and formatting	4	hrs	90	360
	- run software model	4	hrs	90	360
	- brief letter report	4	hrs	90	360
	- software useage	1	lump	200	200
	SUBTOTAL				1280
	TOTAL A+B				11780

DATE 7/29/97

MEMO FROM RICH REIN

ON SITE WEIR CONSTRUCTION COSTS

- FABRICATION OF METAL PLATE $500
- VARIOUS MATERIALS $500
- 700 SAND BAGS @ CRUSHED WASTE:
  BAG $4.00 x 700 $2800
  700 x 20Kg x 2.2 = 30,800#/100#/TRIP
- HELICOPTER TRIP @ 10 MIN = 7.5 Hr x 625 $4,700
- FUEL 30/45 L/HR x 7.5 Hr x $.390/L $1,900
- LABOR
  - FILL BAGS 8 MAN-DAY @ $400
  - PLACE BAGS @ MAN-DAY @ $400 } $8000
  - OTHER CONSTRUCTION 4 MA. DAY @ 400

TOTAL (CONSERVATIVE) $18,400

DENNIS
PLEASE CIRCULATE
+ INCLUDE DON HAYLEY
GET EVERYONE ELSE
THE COSTS. NEXT QUESTION
DO WE NEED A PERMIT?
ASK PEOPLE TO DIRECT
COMMENTS IF ANY TO
ME IN YOUR ABSENCE
THANKS RICH

Rescan Environmental Services Ltd.
Sixth Floor, Coopers & Lybrand Building
1111 West Hastings Street
Vancouver, British Columbia
Canada, V6E 2J3
Telephone: (604) 689-9460
Facsimile: (604) 687-4277
e-mail: rescang@rescan.com

Refer to File no. 5261_LET.DOC

July 23, 1997

Via Facsimile

BHP Minerals
550 California Street
San Francisco, California
94104-1020

Attention: Mr. R. Dennis Wuertz,
Environmental Manager
Project Development and Mining Services

Dear Dennis:

Re: Proposal for Detailed Hydrological Investigations at the Outlet of Stickleback Lake (Boston Project - NWT)

As per your request, we have compiled a scope of work and budget for two work items related to Stickleback Lake including 1) installation of an automated stream flow monitoring station, and 2) determination of flood frequency and magnitude.

I understand from Clem Pelletier that the purpose of the flow monitoring station will be to provide site-specific discharge data for comparison with flows previously predicted for Stickleback Lake. The flood flow estimates will be used for tailings dam design.

Two options exist for the measurement of flows. A hydrology station consisting of a staff gauge, pressure transducer and data logger or a "V-notch" type weir with data logger installed at the outlet of Stickleback Lake. Based on a cross section recently taken of the stream channel exiting Stickleback Lake, we recommend the weir with a 90° V-notch cut into a steel plate of approximate dimensions 12' x 6' x 1/4" thick (*i.e.*, boiler plate). The steel plate could be installed in the middle of the stream channel using steel bars (rebar) immediately behind the weir and sand bags on either side (abutments) for bracing. I have attached a simple sketch of the design as Attachment 1. As discussed, it would be best if the weir could be installed during the low flow period during August.

CANADA EXPORT AWARD

One major consideration will be the availability of fine to medium grained sand and the time to fill sand bags required for along the abutments of the weir. We expect that 600 to 800 standard size sand bags (30 x 50 cm and 20 kg each when full) will be required to fill the indicated 15 m wide section where flows are to be measured. The source of sand may be considerable distance away and this will require transport of filled bags by helicopter from the source to the weir site. In addition, the time to fill up to 800 bags may be several days. Alternatively, scrap metal may be used along abutment sections to reduce the number of sand bags required. Regardless, some sand bagging will be required to support any metal abutments.

For budgetary purposes we have assumed that BHP will procure required materials including the plate metal with the V-notch cut as per the final design. A detailed cross section should be taken by BHP at the weir site and Rescan will use this information to provide the final design. It is also assumed that BHP will fill and transport sand bags to the site via helicopter. Rescan will procure the data logger and pressure transducer.

During construction, we propose to have a hydrologist on site to supervise the construction and to install the pressure transducer and data logger required to continually monitor levels of flow through the v-notch weir.

For planning, we expect that three days will be required for the final design upon receipt of cross section information from BHP. If suitable metal is available at site, the V-notch weir should take no more than one day to fabricate. If this is not the case, it may take one week to have the weir built and sent to site. Time will also be required for filling and transporting sand bags to the weir site. It may take one person a full week to fill and transport the large quantity of bags and this should be done concurrently with the fabrication of the weir. For construction of the weir, we expect three to four days will be required for a BHP representative and one Rescan employee to complete the work. We propose to use our hydrologist, Mr. Frank Webber.

At the end of the field season, we will download the datalogger and calculate the flows for the time during which monitoring occurred in the current season. The downloading can be completed during field time already scheduled for the existing monitoring season. Keeping in mind that the datalogger must be removed prior to freeze-up to prevent damage to the equipment. Data analysis is expected to take two days and a report an additional two days to complete. This work will be undertaken by Mr. Webber. Provisions should be made in the 1998 budget for the re-installation of the data logger prior to freshet, periodic downloading of the datalogger and evaluation of the data at the end of the season.

To determine flood frequency and magnitude, discharge data from regional Environment Canada stations will need to be analyzed and adjusted to the catchment area for Stickleback Lake. We would use existing long term records for nearby stations which are available up to 1992 at no charge. This includes 24 years of data for Burnside River, 21 years for Ellice River, and 16 years for Freshwater Creek near Cambridge Bay. Data for more recent years is also available, however there may be additional costs for procuring this data from Environment Canada. We propose to use Environment Canada's commercial software package, CFA_3.1 to determine the flood frequency and magnitude.

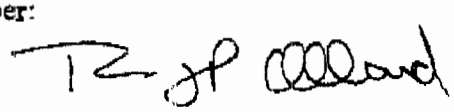
For budgetary purposes, data compilation and formatting for use in the CFA_3.1 software package will take 1/2 day. An additional 1/2 day will be required to run the model. A brief letter report will also require 1/2 day. Our senior hydrologist, Mr. Remi Allard, will complete the flood analysis. The cost for using the software will be $200.

A summary of the proposed budget is presented as Attachment 2. It is assumed that BHP will be responsible for airfares and accommodation for Mr. Webber's travel to site for supervision of weir construction.

I hope this brief proposal outlines the details you had requested. Should you have any questions please contact me at your convenience.

Sincerely,

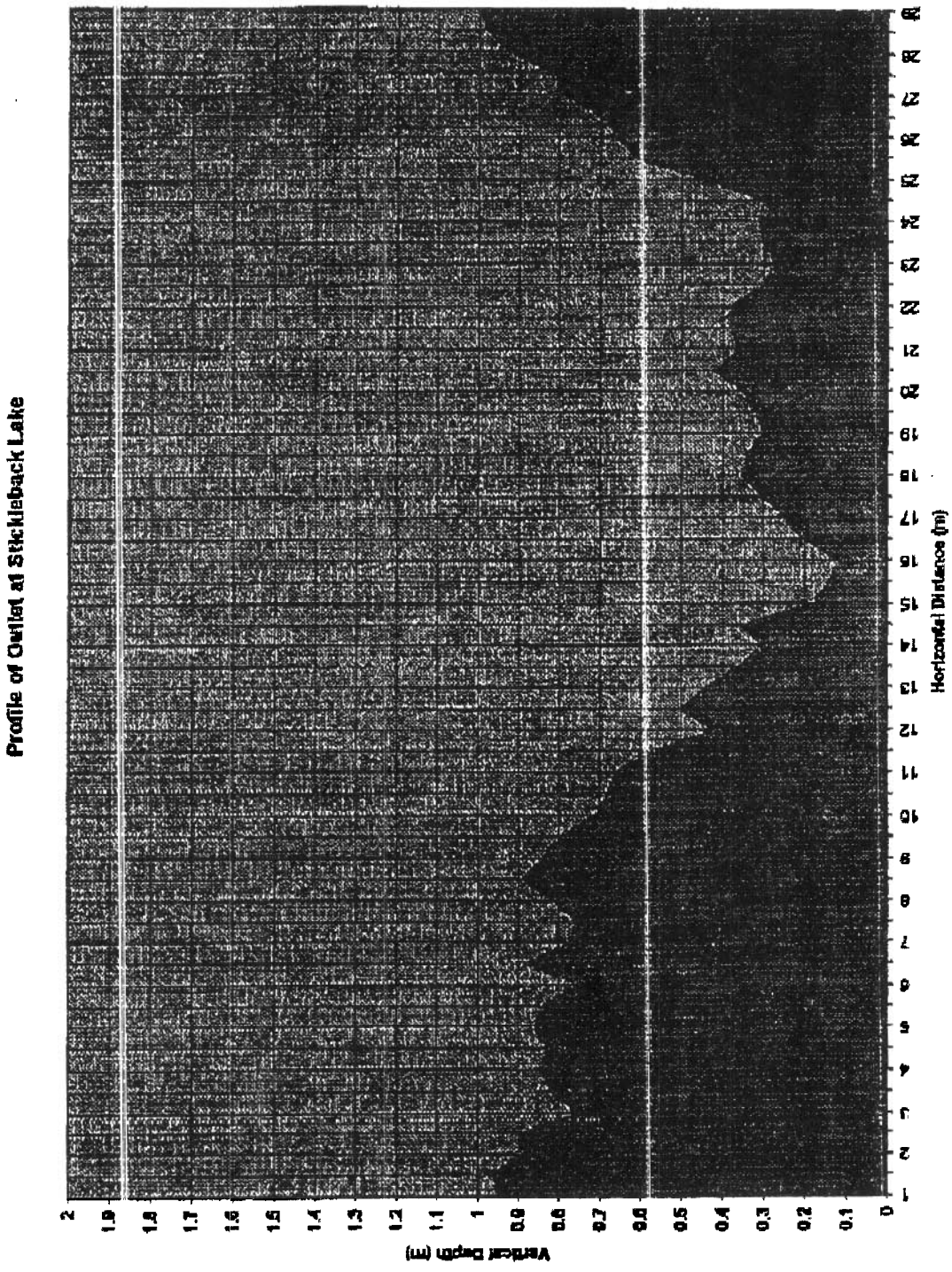
RESCAN ENVIRONMENTAL SERVICES LTD.
per:



Remi J. P. Allard, M.Eng,P.Eng
Team Leader, Water & Climate Group

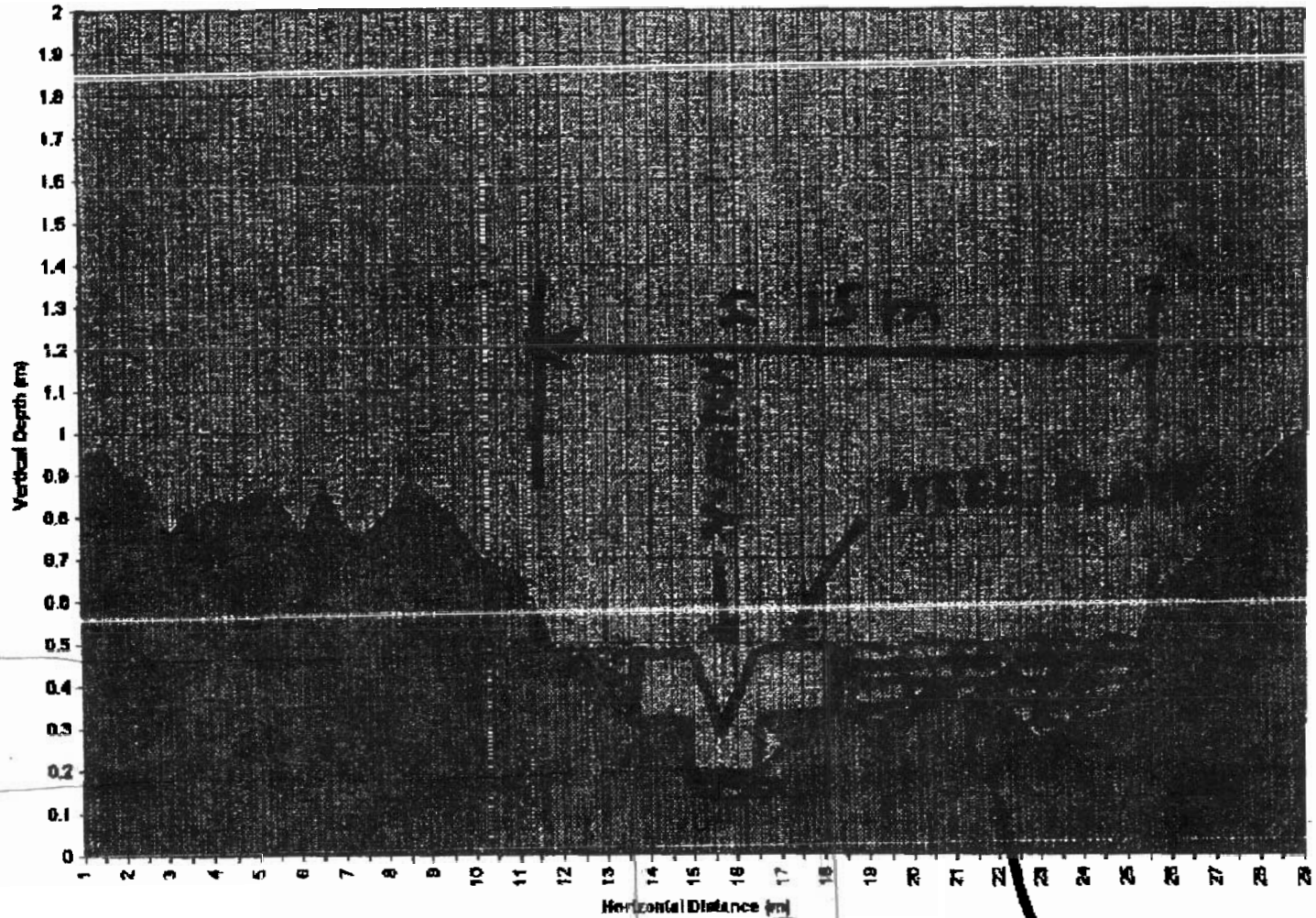
Attachments

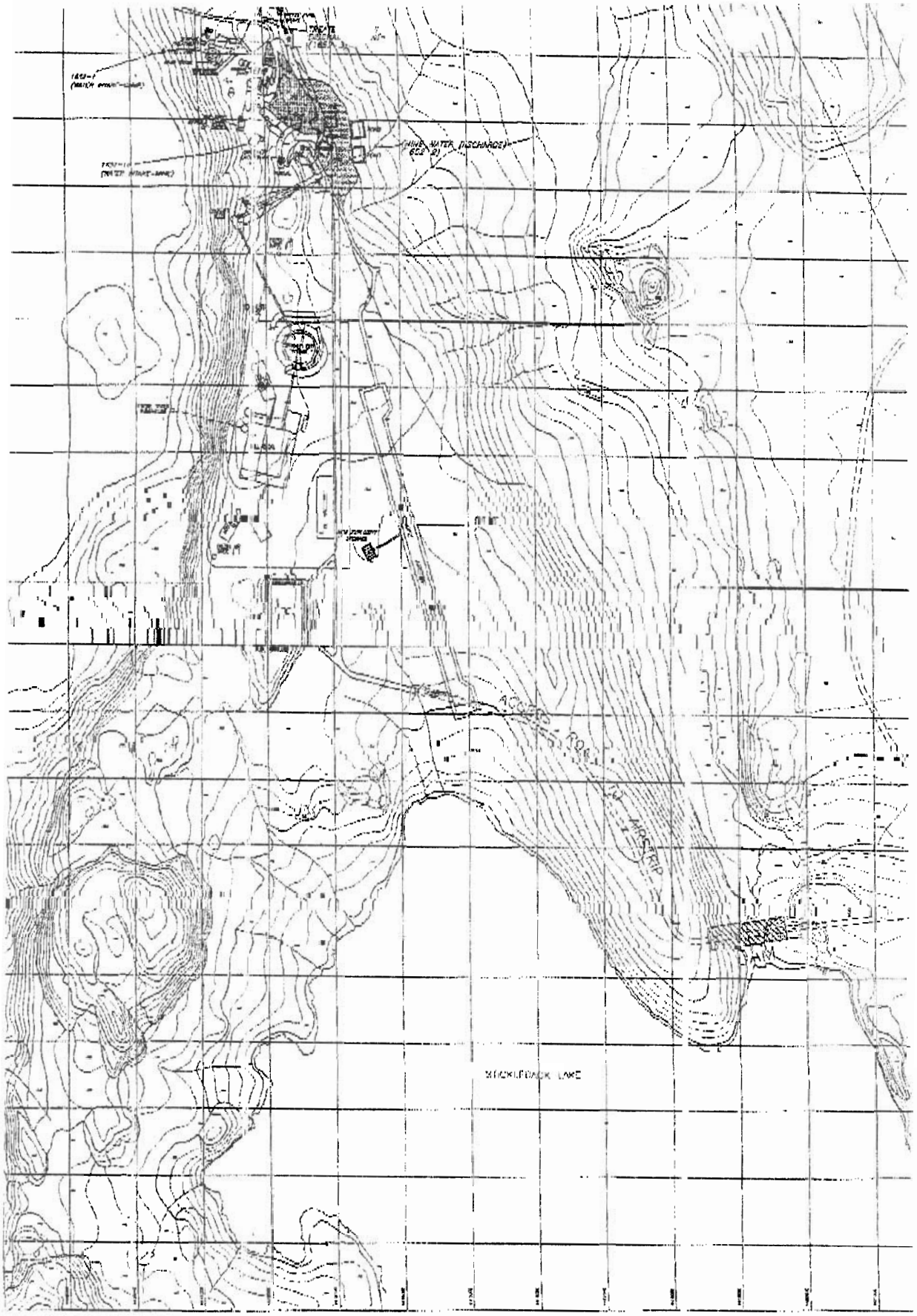
ATTACHMENT 1A



ATTACHMENT 1B

Profile of Outlet at Stickleback Lake




MINE WATER DISCHARGE
STICKLEBACK LAKE

NUNAVUT WATER BOARD
LICENCE APPLICATION FORM

Application for licence, amendment to licence, or renewal of licence

APPLICATION/LICENCE NO:
(Amendment or renewal only) NW4 BHP

1. NAME AND MAILING ADDRESS OF APPLICANT

BHP CANADA LTD.
1600-1050 WEST PENDER STREET
VANCOUVER, B.C.

Phone: 604 683 6921 Fax: 604 683 4125

2. ADDRESS OF HEAD OFFICE IN CANADA IF INCORPORATED

Phone:_____ Fax:_____

3. LOCATION OF UNDERTAKING (describe and attach a map, indicating watercourse and location of any proposed waste deposits)

BOSTON PROJECT, MAP ATTACHED: OUTLET OF STICKLEBACK LAKE
(SEE PROPOSAL SUBMITTED TO NWB JULY 25, 1997)

Latitude: 67 39' n Longitude: 106 22'W

4. DESCRIPTION OF UNDERTAKING (describe and attach plans)

CONSTRUCTION OF A WEIR (WITH TRANSDUCER AND DATA LOGGER) TP RECORD OUTFLOW FROM STICKLEBACK LAKE DURING OPEN WATER SEASON IN 1998. PURPOSE: BUILD HYDROGRAPH TO AID IN TAILINGS BASIN DESIGN.

5. TYPE OF UNDERTAKING

☐ Industrial ☐ Power ☐Agricultural
☐ Mining and Milling ☐ Conservation ☐Recreation
☐ Municipal
☐ Other (describe): _____

6. WATER USE

☐ To obtain water ☐ Flood control
☐ To cross a watercourse ☐ To divert water
☐ To modify the bed or bank of a water ☐ To alter the flow of , or store, water
X Other (describe): CONSTRUCT WEIR TO COLLECT HYDROLOGIC DATA (OUTFLOW)

7. QUANTITY OF WATER INVOLVED (litres per second, litres per day or cubic metres per year, including both quantity to be used and quality to be returned to source.)

VARIABLE. RELATIVELY LOW FLOW, BECAUSE NO INFLOW TRIBUTARIES

8. WASTE DEPOSIT (quantity, quality, treatment and disposal)

N/A

9. OTHER PERSONS OR PROPERTIES AFFECTED BY THIS UNDERTAKING (give name, mailing address and location; attach if necessary)

N/A

10. PREDICTED ENVIRONMENTAL IMPACTS OF UNDERTAKING AND PROPOSED MITIGATION

TEMPORARY PLACEMENT OF WEIR IN CREEK BED: FLOW WILL NOT BE ALTERED. DAMAGE NEGLIGIBLE. MATERIALS TO BE REMOVED.

11. CONTRACTORS AND SUB-CONTRACTORS (name, address and functions)

RESCAN ENVIRONMENTAL SERVICES: TECHNICAL SUPERVISION/DATA COLLECTION
1111 WEST HASTINGS ST., VANCOUVER, B.C., V6E 2N3

12. STUDIES UNDERTAKEN TO DATE (list and attach copies)

PROPOSAL W/DRAWINGS SUBMITTED TO NWB JULY 25, 1997

13. INSURE THE FOLLOWING INFORMATION IS ALSO INCLUDED

Land Use Permit	[X] Yes [ ] No	Date Expected: ILUP (KIA) Exp. Sept. 8, 1998
Supplementary Questionnaire	[ ] Yes [X] No	Date Expected_____
Inuktitut Summary of Project	[ ] Yes [X] No	Date Expected_____
MAP @ 1 : 250,000 (with camp, drill sites, etc.)	[X] Yes [ ] No	Date Expected__MAP SENT JULY 25, 1997_____

14. PROPOSED TIME SCHEDULE

Start Date:___MID-AUGUST 1997 Completion Date:_____AUGUST 31, 1997_____

MR. RICH REIN	FEASIBILITY MANAGER	AUGUST 1, 97
Name (Print)	**Title (Print)**	**Date**

APPLICATION FEE **Amount: $_____** **Receipt No.:_____**

WATER USE DEPOSIT **Amount: $_____** **Receipt No.:_____**

NUNAVUT WATER BOARD
LICENCE APPLICATION FORM

Application for licence, amendment to licence, or renewal of licence

APPLICATION/LICENCE NO:
(Amendment or renewal only)

1. NAME AND MAILING ADDRESS OF APPLICANT

BHP Minerals Canada Ltd.
1600-1050 West Pender Street
Vancouver, B.C.
Phone (604) 683-6521 Fax (604) 683-4125

2. ADDRESS OF HEAD OFFICE IN CANADA IF INCORPORATED

Phone:_____ Fax:_____

3. LOCATION OF UNDERTAKING (describe and attach a map, indicating watercourse and location of any proposed waste deposits)

Boston Project, Map Attached: Outlet of Stickback Lake (see proposal submitted to NWB 25 July 1997).

Latitude: 67° 39' N Longitude: 106° 22' W

4. DESCRIPTION OF UNDERTAKING (describe and attach plans)

Construction of weir (with transducer and datalogger) to record outflow from Stickback Lake during open water season in 1998. Purpose: Build hydrograph to aid in tailings basin design

5. TYPE OF UNDERTAKING

- ☐ Industrial
- ☐ Power
- ☐ Agricultural
- ☐ Mining and Milling
- ☐ Conservation
- ☐ Recreation
- ☐ Municipal
- ☒ Other (describe): Construct weir to collect hydrologic data (outflow)

6. WATER USE

- ☐ To obtain water
- ☐ Flood control
- ☐ To cross a watercourse
- ☐ To divert water
- ☐ To modify the bed or bank of a water
- ☐ To alter the flow of a store, water
- ☒ Other (describe): Construct a weir in streambed of Stickleback "creek"

7. QUANTITY OF WATER INVOLVED (litres per second, litres per day or cubic metres per year, including both quantity to be used and quality to be returned to source.)

Variable. Relatively low flow, because no inflow tributaries.

8. WASTE DEPOSIT (quantity, quality, treatment and disposal)

N/A

9. **OTHER PERSONS OR PROPERTIES AFFECTED BY THIS UNDERTAKING** (give name, mailing address and location; attach if necessary)

N/A

10. **PREDICTED ENVIRONMENTAL IMPACTS OF UNDERTAKING AND PROPOSED MITIGATION**

Temporary placement of weir in creek bed: flow will not be altered. Damage negligible. Materials to be removed.

11. **CONTRACTORS AND SUB-CONTRACTORS** (name, address and functions)

Rescan Environmental Services: Technical supervision/data collection
1111 West Hastings St. Vancouver BC V6E 2J3

12. **STUDIES UNDERTAKEN TO DATE** (list and attach copies)

Proposal w/drawings submitted to NWB 25 July 1997.

13. **INSURE THE FOLLOWING INFORMATION IS ALSO INCLUDED**

Land Use Permit	[X] Yes [ ] No	Date Expected ILUP (K'A) exp. Sept 8, 1998
Supplementary Questionnaire	[ ] Yes [X] No	Date Expected _____
Inuktitut Summary of Project	[ ] Yes [X] No	Date Expected _____
MAP @ 1 : 250,000 (with camp, drill sites, etc.)	[ ] Yes [ ] No	Date Expected Map sent 25 July 1997

14. **PROPOSED TIME SCHEDULE** (Construction)

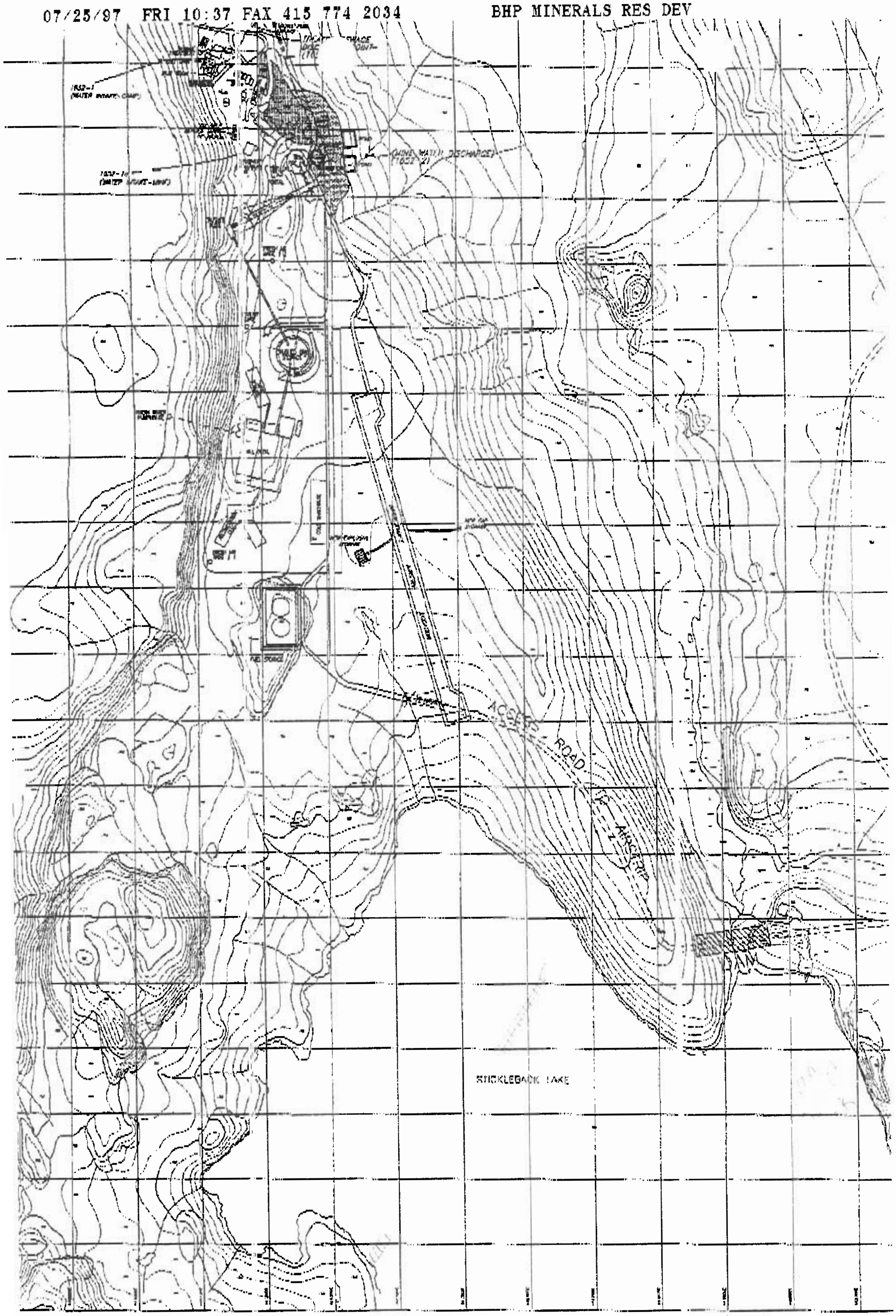
Start Date: Mid August 1997 Completion Date: 31 August 1997

Name (Print)	Title (Print)	Signature	Date
Mr. Rich Rein	Feasibility Manager	[signature]	97/8/1

APPLICATION FEE Amount: $ _____ Receipt No.: _____

WATER USE/DEPOSIT Amount: $ _____ Receipt No.: _____

*Application Fee check to be sent from BHP Vancouver Office CDN $ 10.00



critical dime

→ staff gauge

NUNAVUT WATER BOARD

RECORD OF CONVERSATION OR INTERVIEW

	Date 23/7/97	File no.
Recorded by - Philippe di Pizzo	☐ Personal Interview	☒ Telephone Conversation

Held with	Title	Location and Telephone
Dennis Wuesty	BHP	

Summary - design of a tailings facility for an EIS

Stickleback lake - S of Boston -

→ Build an hydrograph - need continuous data -

→ Must build a weir - flow during break up is quite 12' x 6' - boater plate - data logger to measure the flow