

ARIS SUMMARY SHEET

District Geologist, Kamloops

Off Confidential: 91.10.10

ASSESSMENT REPORT 20358

MINING DIVISION: Kamloops

PROPERTY: Ben
LOCATION: LAT 50 46 00 LONG 121 37 00
UTM 10 5624571 597555
NTS 092113E
CLAIM(S): Ben 1-2
OPERATOR(S): Pacific Bentonite
AUTHOR(S): Hawson, H.
REPORT YEAR: 1990, 21 Pages
COMMODITIES
SEARCHED FOR: Bentonite
KEYWORDS: Bentonite, Coal, Glacial till
WORK
DONE: Drilling
ROTD 41.0 m 6 hole(s)
MINFILE: 092INW084

LOG NO: 10-12	RD.
ACTION:	
FILE NO:	

LOG NO: 22-01	RD.
ACTION: <i>Date received bill from amendment</i>	
FILE NO:	

**Report
On
Drilling Investigation
For
Pacific Bentonite
Claims Ben 1 & Ben 2, Record No. 8939 & 8940
Mineral Title Reference Map No. 921/132
In The
Kamloops Mining Division
Latitude 50 45N Longitude 121 35W
Annual Work Approval Number: KAM 90-0300196-680**

By

**H. Hawson, P. Eng.
Consulting Engineer**

**GEOLOGICAL BRANCH
ASSESSMENT REPORT**

20,358

September 1990

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Introduction

The BEN 1 and BEN 2 claims of Pacific Bentonite are located on the west side of Upper Hat Creek Valley. Hat Creek is 240 kilometers northeast of Vancouver, BC. The claims are reached by 25 kilometers of paved highway from Pavilion and 2 kilometers of active logging road. The paved highway is the Cache Creek/Lillooet Highway 12. The location is shown of Figure 1.

The land slopes gently to the northeast. It is semi-arid land and mainly for cattle range. The vegetation is a mixture of open spaced pine and spruce with some meadows.

The property includes 2 four post claims BEN 1 and BEN 2 with a total of 35 units, record numbers 8939 and 8940.

The NTS location is 92/1/13E; latitude 50 45N; longitude 121 35W.

The bentonite is a stratigraphic unit that underlies the Hat Creek coal basin, but is upslope above the coal in its surface exposure. It has been extensively core drilled by BC Hydro during the exploration for Hat Creek Thermal Project. The findings of this work indicated that the bentonite was to be removed as the open pit coal mine is being expanded. There are no current plans to proceed with the coal mine, however.

The bentonite is potentially a valuable commodity with uses in drilling, civil engineering and in a variety of absorbent applications.

Operations to extract the bentonite by Pacific Bentonite are unlikely to result in a source of conflict with BC Hydro for extraction of the coal.

Current investigation by Pacific Bentonite in September, 1990 consisted of sampling surface outcrops and drilling of a total of 6 shallow auger holes for a total of 41m of drilling. These auger holes were drilled in an attempt to delineate surface outcropping of claystone and to infill geological data. Also, plastic standpipe piezometers were placed in 3 of the holes to enable groundwater levels to be measured.

Purpose of the Investigation

Bentonite clay is an industrial mineral having varied uses. The clay in the Hat Creek claims could find application for drilling muds, foundry mouldings, pelletizing iron ore, as an absorbent and for use in the newly emerging environmental technology field for example for liners and slurry trench walls. Most of these uses call for relatively low cost material. Thus the economics of developing the deposit are therefore important in determining whether the claims can be developed into a mine.

For the above reasons, the proximity to ground surface of the mineable clay is therefore important, i.e. the depth of overburden needs to be known. Also the presence of groundwater that could influence digging needs to be determined.

A considerable amount of information has been gathered from examination of surface outcrops of the clay on an axis pending southwest to northeast across the claims BEN 1 and BEN 2.

The current investigation was therefore designed to investigate the feasibility of mining in the northwest and southeast corners of the claims where less was known on the proximity of the clay to the ground surface. The 1990 investigation consisted of shallow auger drilling in these areas to answer the following questions:

- . does the bentonite clay subcrop within about 10M of the ground surface, so that excessive amounts of overburden would not need to be removed in order to mine the clay, and
- . does groundwater occur at shallow depths in the overburden, which could lead to difficulties in digging the clay, particularly since the clay can become very slick when wet. For this purpose standpipe piezometers were installed in the auger drill holes.

Drilling Investigation

Drilling was carried out on September 21 and September 22, 1990 at the locations shown on Figure 3 & 4 & 5. Six auger holes were drilled to depths varying from 3 to 10m below existing ground surface. The work was carried out by Foundex Explorations Ltd. using an HT 1000 drill and 178mm (7 inch) diameter continuous flight auger. Because of the bouldery nature of the ground resulting in the auger flights meeting refusal, several attempts were necessary to achieve the desired depth. Samples were taken off the auger flights at 1.5m (5 feet) intervals. Samples were retained in plastic bags, labelled and returned to the premises of Foundex Explorations Ltd. in Surrey, BC and were identified and classified.

The drilling was conclusive in determining that no bentonite claystone was within the currently considered surface mineable depth of 10m in these two areas of the property.

The drilling program was carried out under the direction of H. Hawson, P. Eng., a director of Pacific Bentonite Ltd. who also prepared the logs and report. A resume for Mr. Hawson is attached.

Costs Claimed

The following costs were claimed in this report of assessment credit:

- a) Drilling costs invoiced by Foundex Explorations Ltd.
- b) Engineering costs invoiced by H. Hawson, P. Eng. for the layout of the drilling program, field direction of the drilling and reporting.

Total costs for this assessment work \$7,815.00. Detailed invoices appended.

LOCATION OF PROPERTY

PACIFIC BENTONITE

HAT CREEK CLAIMS



Roads:	Routes:		
hard surface	revêtement dur	<u> </u> dual highway	<u> </u> more than 2 lanes
hard surface	revêtement dur	<u> </u> double chaussée	<u> </u> plus de 2 voies
loose or stabilized surface, all weather	gravier, aggloméré, toute saison	2 lanes	less than 2 lanes
loose surface, dry weather	de gravier, temps sec	2 voies	moins de 2 voies
cart track	de terre	2 lanes or more	less than 2 lanes
		2 voies ou plus	moins de 2 voies

Scale 1:250 000 Échelle

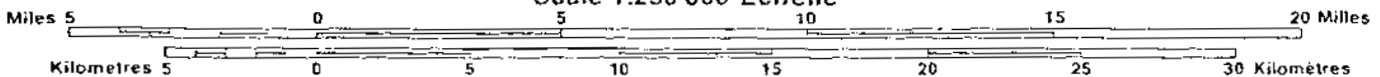
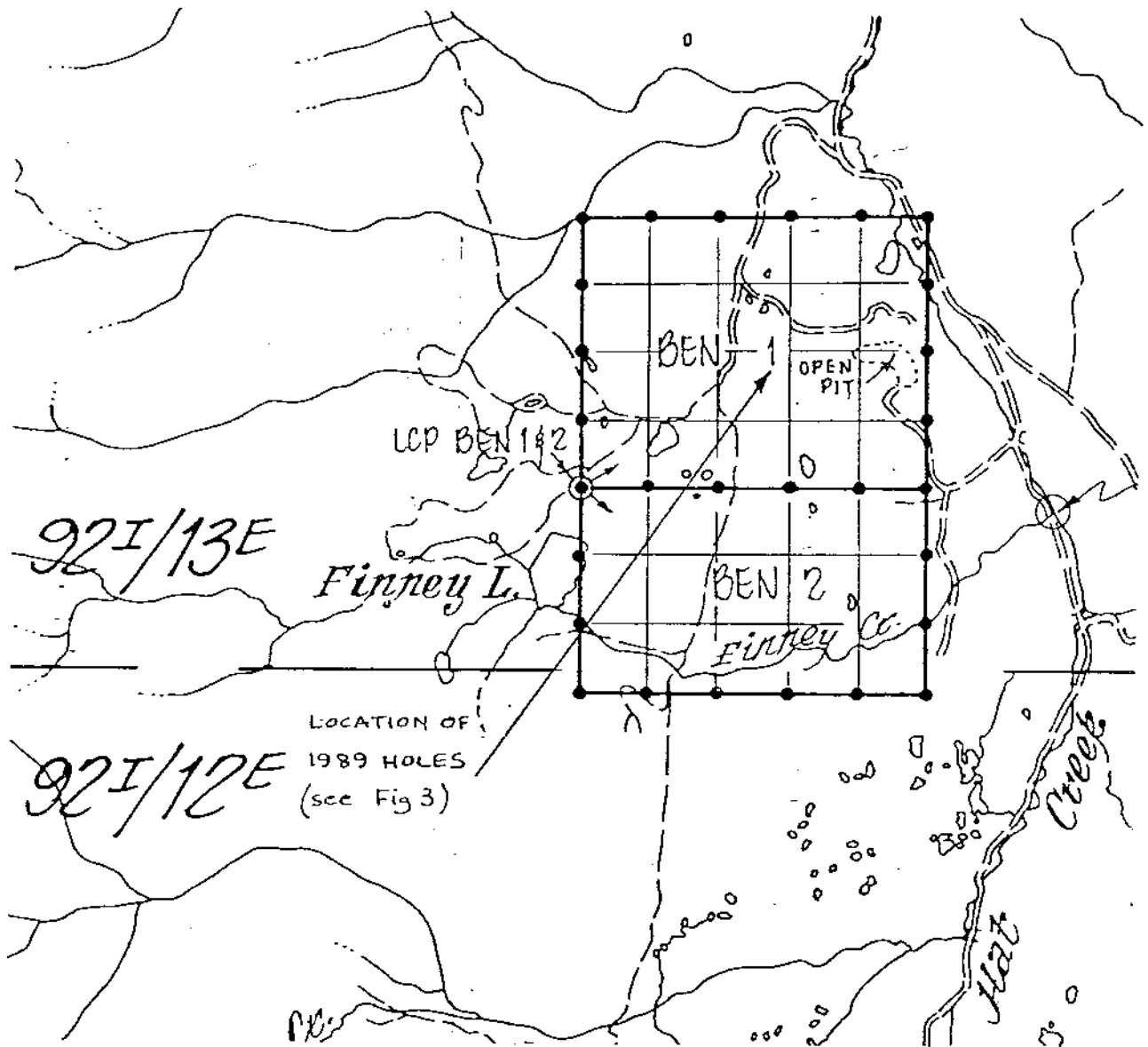


Fig. 1



Pacific Bentonite Ltd: "Ben 1 and Ben 2" mineral claims (35 units, 875 ha)

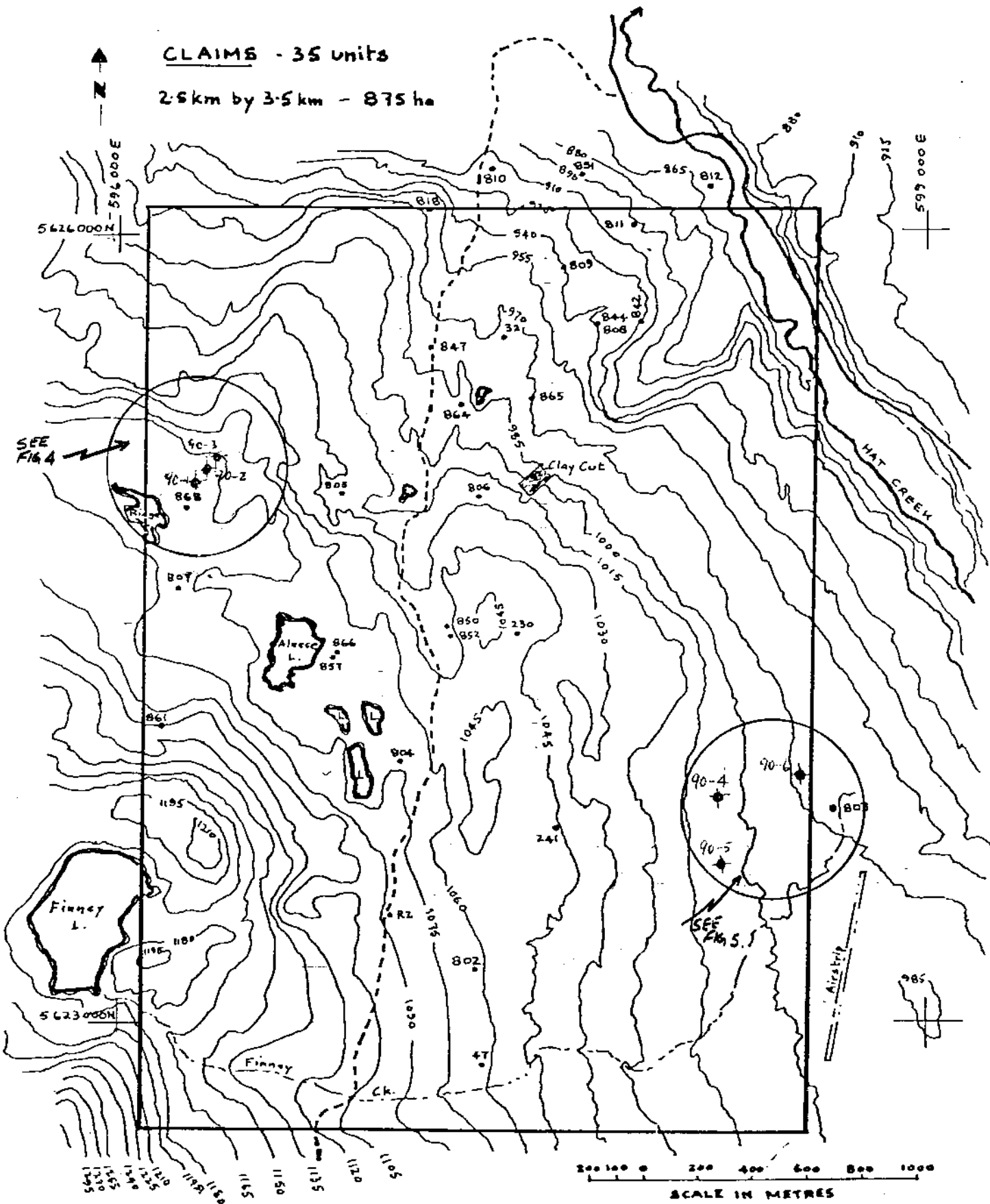
Scale 1:50,000

LOCATION OF CLAIMS

PACIFIC BENTONITE

Fig. 2

CLAIMS - 35 units
2.5 km by 3.5 km - 875 ha

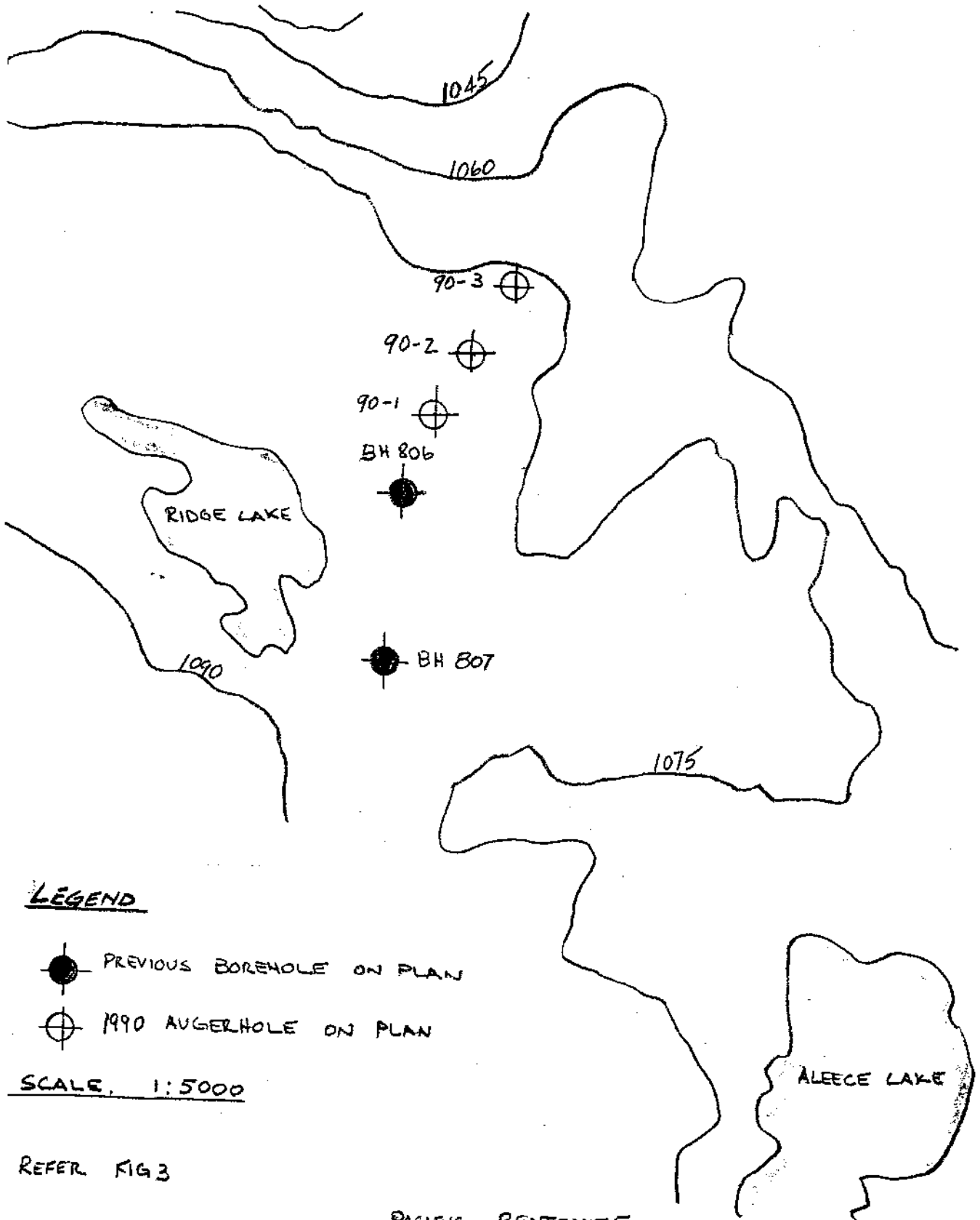


LEGEND:
 ● 90-1 7" DIA AUGER HOLES
 DRILLED IN 1990

SITE PLAN

PACIFIC BENTONITE LTD

Fig. 3



LEGEND

- PREVIOUS BOREHOLE ON PLAN
- ⊕ 1990 AUGERHOLE ON PLAN

SCALE, 1:5000

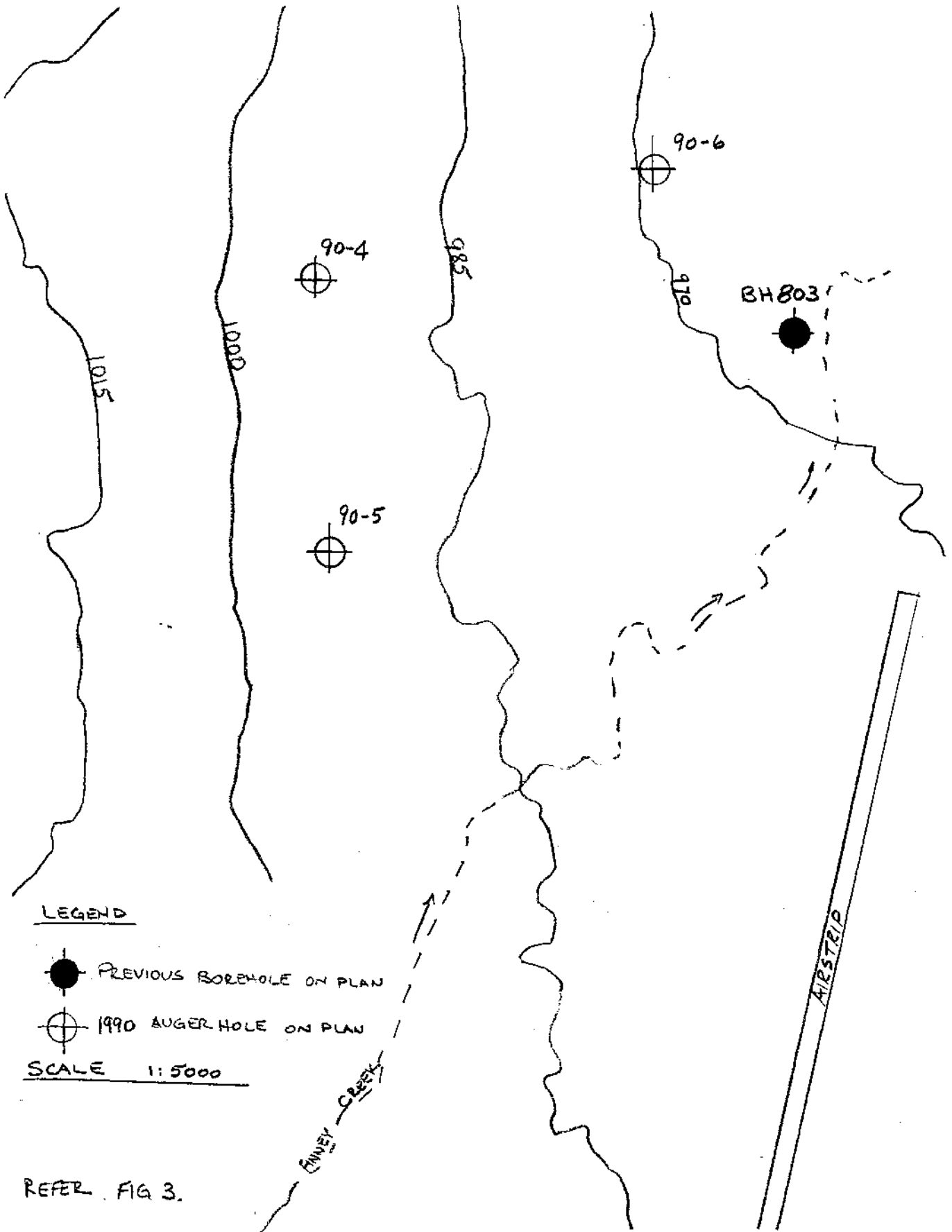
REFER FIG 3

PACIFIC BENTONITE

PROJ. NO. DRAWN BY REVIEWED DATE Dec/90

DRILLHOLE LOCATION PLAN

Figure 5



LEGEND

- PREVIOUS BOREHOLE ON PLAN
- ⊕ 1990 AUGER HOLE ON PLAN

SCALE 1:5000

REFER FIG 3.

PACIFIC BENTONITE

PROJ. NO. DRAWN BY REVIEWED DATE DES/90

Appendix A
Drill Hole Logs

PACIFIC BENTONITE LTD.

HAT CREEK DRILLING

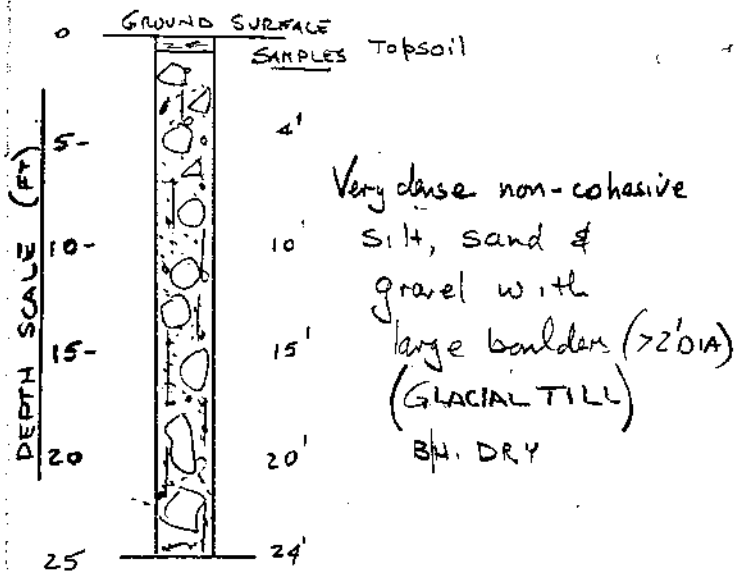
SEPTEMBER 21 & 22, 1990

FOUNDEX HT-1000 TOP DRIVE ROTARY RIG

WITH 7" DIA. AVGER.

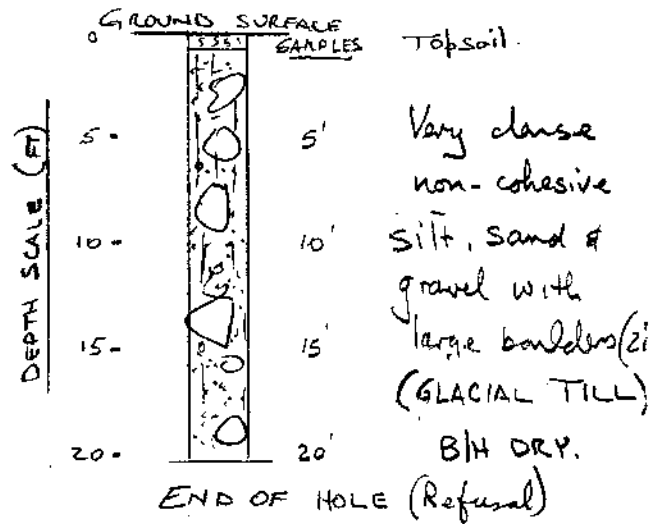
DRILLHOLE 90-1.

DRILLHOLE 90-2



END OF HOLE.

Standpipe piezometer placed in borehole & sealed with bentonite pellets.



END OF HOLE (Refusal)

Standpipe piezometer placed in borehole & sealed with bentonite pellets.

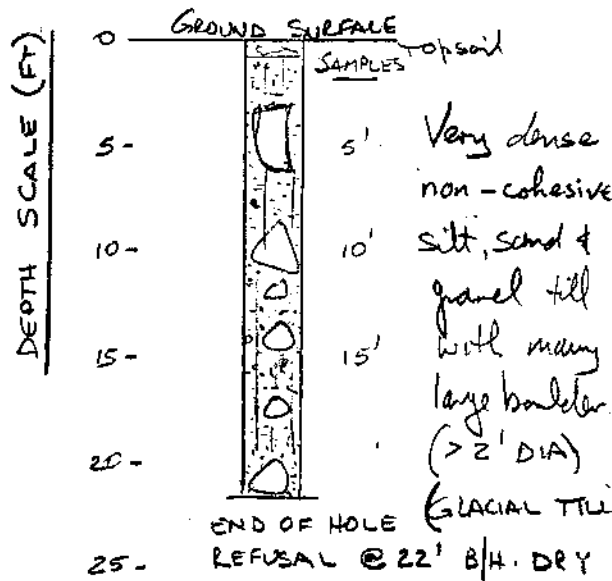
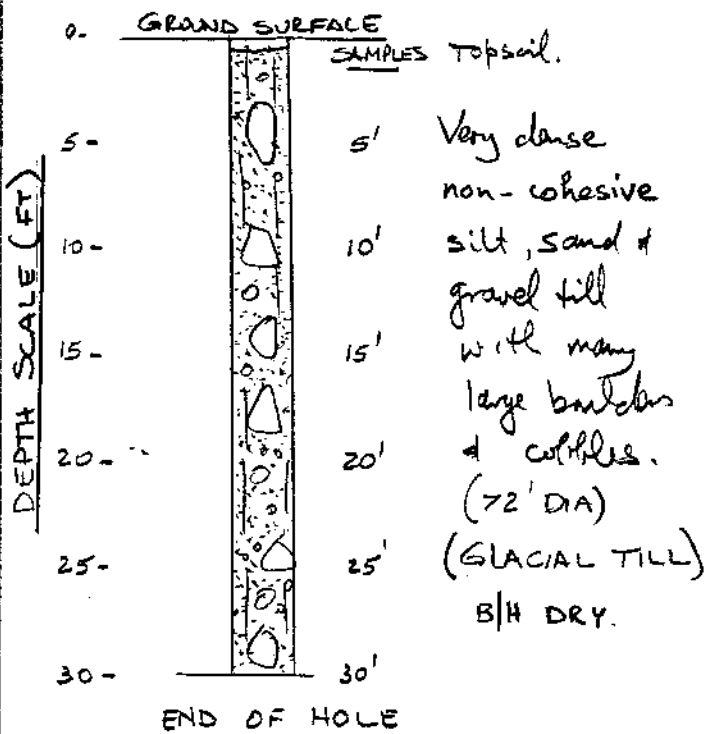
- NOTE:
1. For location of drill holes see Figure 4
 2. Auger samples taken for identification & soil classification purposes only.
 3. No bentonite in samples.

PACIFIC BENTONITE

FOUNDER HT-1000 TOP DRIVE ROTARY RIG.
 WITH 7' DIA AUGER

DRILLHOLE 90-3

DRILLHOLE 90-4



Standpipe piezometer placed in borehole & sealed with bentonite pellets.

Standpipe piezometer placed in borehole & sealed with bentonite pellets

- NOTE: 1. For Location of drillholes see Figure 4&5
 2. Auger samples taken for identification & soil classification purposes only.
 3. No bentonite in samples.

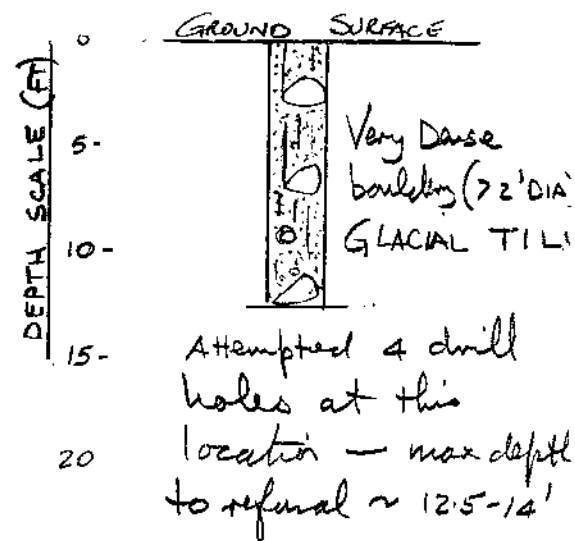
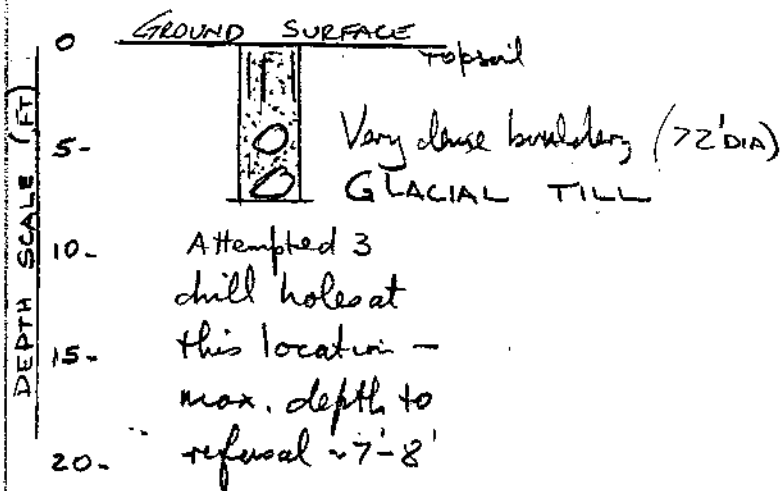
PACIFIC BENTONITE LTD

HAT CREEK DRILLING
SEPTEMBER 21 & 22, 1990

FOUNDER HT-7000 TOP DRIVE ROTARY RIG
WITH 7" DIA AUGER

DRILL HOLE 90-5

DRILLHOLE 90-6



No piezometers placed in these holes due to shallow depth of penetration with drill equipment.

NOTE: For location of drill holes see Figures.

[Signature]

PACIFIC BENTONITE

Appendix B

Costs claimed - Detailed invoices

i. Foundex Explorations

ii. Engineering

960

FOUNDEX

EXPLORATIONS LTD.

FILE COPY

14613 - 84th Avenue
Surrey, B.C. V3S 1X6

Tel. (604) 594-8333
Fax. (604) 594-1815

INVOICE DATE September 28, 1990
OUR PROJECT No. 585
YOUR PROJECT No. --
EQUIPMENT HT1000 4x4

Pacific Bentonite Ltd.
1386 Main Street
North Vancouver, B.C.
V7J 1C6

Attention: Mr. Herb Hawson

Re: Hat Creek, September 21 & 22, 1990

1) Mobilization/Demobilization: Lump Sum		\$3,200.00
2) Accommodations: 1 1/2 days @ \$150 per day		225.00
3) Drilling: 12 hours @ \$155 per hour		1,860.00
4) Overtime Adjustment: 4 hours @ \$40 per hour		160.00
5) Technician: 12 hours @ \$35 per hour		420.00
6) Consumables:		
80' - 3/4" PVC @ \$.50 per foot	\$ 40.00	
6 - 3/4" PVC caps @ \$1.50 each	9.00	
9 - bags forestry sand @ \$10.00 per bag	90.00	
11 - carbide fingers @ \$12.00 each	132.00	
1 - carbide bit rebuild	125.00	
		<u>396.00</u>
TOTAL		<u>\$6,261.00</u>

Herbert H. Hawson
 927 CANYON BOULEVARD • NORTH VANCOUVER, BRITISH COLUMBIA V7R 2J6

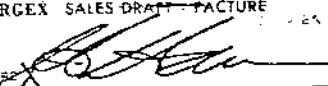

Pacific Bentonite Ltd.,
 1386 Main Street,
 North Vancouver,
 B.C.

Sept 30, 1990

INVOICE

To preparation of drilling
 program for 1990, reporting
 on BEN 1 and BEN 2 claims

a) Field layout and direction	12 hrs @ \$100.00	\$1200.00
b) Report preparation	3 hrs @ \$100.00	300.00
		\$1500.00
Expenses (hotel)		54.00
TOTAL DUE		\$1554.00

4522 060 275 608		1990
07/89	06/92 CV	AUTHORIZATION NO. / NO D'AUTORISATION
HERBERT H. HAWSON		BILL NO. DE NOTE
EXP. DATE CHECKED		DATE 09 22 90
DATE D'EXPIRATION VERIFIEE		CLERK-COMMISS
MONAPARTE HOTEL 210990		5 458
7238272 R602532		50 - AMOUNT MONTANT
9320517510		4 - TAX TAXE
CHARGEX SALES DRAFT - FACTURE		TIPS POURBOIRE
CARDHOLDER'S SIGNATURE 		54 - \$ CDN CAN
SIGNATURE DU TITULAIRE		CUSTOMER COPY COPIE DU CLIENT
PLEASE RETAIN THIS COPY AS A RECORD OF YOUR TRANSACTION	 <p>CONSERVEZ CETTE COPIE DE VOTRE TRANSACTION</p>	
CARDHOLDER WILL PAY TO THE ISSUER OF THE CHARGE CARD PRESENTED HERewith THE AMOUNT STATED HEREIN IN ACCORDANCE WITH THE ISSUER'S AGREEMENT WITH THE CARDHOLDER. LE DETENTEUR DE LA CARTE CHARGEX MENTIONNEE PAIERA A L'EMETTEUR DE LA CARTE LE MONTANT CHIFFRE EN CONFORMITE AVEC LES CONDITIONS DE LA CONVENTION ENTRE L'EMETTEUR ET LE DETENTEUR DE LA CARTE.		

Appendix C

Resume

Mr. Hawson is a professional engineer with over 24 years experience in the provision of engineering design and construction supervision services related to water, wastewater, hydro projects, dam design, slope stability and foundation design. He has been responsible for investigation design, contract preparation and construction supervision of a number of earthfill and rockfill dams for water supply, hydro and mine tailings both at home and abroad. Much of the work involved 'state of the art' techniques.

EXPERIENCE

May, 1984 Consultant, Vancouver, Canada.

- design for renovation of concrete arch dam for mini-hydro supply, Rio Tullaurco, Peru.
- Liner design and construction supervision for a clarification pond, Canamax Ketza River Development, Yukon Territory.
- construction supervisor of a 50 m high rockfill dam, Mira Milpo, Peru.
- seepage analysis, Terzaghi Dam, B.C.
- landslide stabilization, La Quinua, Peru.
- site engineer for the construction of a cement-bentonite slurry wall and jet grout cutoff beneath the John Hart Dam, Campbell River, B.C.
- design and construction supervision for the Canamax Ketza Tailings Dam, Yukon Territory.
- geotechnical design and contract preparation for the rehabilitation of the John Hart Dam, Campbell River, B.C.
- earthdam design and construction, Cantung Mine, Yukon.
- geotechnical investigation and design for the foundations of the ALRT through soft swamp and highly compressible foundations conditions in the Bridgeview area of Surrey, B.C.
- ground water consultant for the Governorate of Giza, water and wastewater study, Egypt.

1981 - 1984 Chief Geotechnical Engineer, Tippetts, Abbett, McCarthy, Stratton, Cairo, Egypt.

Member of multi-disciplinary team attached to the Ministry of Housing, Reconstruction and Land Reclamation.

Projects included:

- old dam inspections and renovation design, Sinai.
- review of ground water availability study for development of Sinai.
- review of ground water model study carried out for New Valley Development (Kharga, Dakhla & Bahariya Oases).
- project monitoring, new water supply system for the three Suez Canal cities of Port Said, Ismailia and Suez.
- geotechnical advice and dam design information on in-house seminar program for water and wastewater management for MOD.
- contract negotiations and construction contract control, Ahmed Hamdi Tunnel beneath the Suez Canal.

1980 - 1981 Associate Partner - Golder Associates, Alberta, Canada.

- responsible for engineering, project development and promotion.
- attached to a design team involved with the design of artificial islands and mobile arctic caisson drill platforms in the Beaufort Sea.

1975 - 1980 Associate Partner & Office Manager, Golder Associates, Kamloops, B.C. Canada.

- consulted in the fields of geotechnical engineering to the agriculture, mining, transportation and forestry industries, municipalities and governmental branches throughout the interior of B.C.
- design and construction supervision of water retention structures, dams, intakes, and associated services for water supply system.
- design and construction of irrigation dams and geotechnical aspects of agricultural projects.
- inspection and review of existing irrigation dams.
- design and construction supervision of tailings dams for mining developments.

1970-1975 Associate (1975) and Senior Soils Engineer, Golder Associates. Involved with the design and construction of tailings and water dams; Fraser River dyke design for flood control, geotechnical design for high rise buildings. Geotechnical consultation for roads, railways, municipal and industrial developments. Preparation of contract documents for earth works.

1968 - 1970 Senior Soils Engineer, Jamaica Engineering and Research Ltd., Kingston, Jamaica, West Indies. Involved with the design of municipal and residential developments in the West Indies. Involved with consultation to the aluminum industry for plant development, dam design, tailings disposal, etc.

1965 - 1968 Soils Engineer, Warnock Hersey Intl. Ltd. Initially attached to the Highway Division and finally with the Soil Investigation Division. Involved with the geotechnical aspects of design for highway embankments, roads, bridges, industrial structures and residential apartments in the provinces of Quebec, Nova Scotia, New Brunswick and Ontario.

EDUCATION B.Sc., University of Strathclyde, Scotland (1964).
M.E.Sc. University of Western Ontario, Canada (1966).

PROFESSIONAL AFFILIATIONS

Member of the Association of Professional Engineers of British Columbia and Alberta.

PUBLICATIONS

Quigley, R.M., M.A.J. Matich, R.G. Horvath & H.H. Hawson, Swelling Clay in Two Slope Failures at Toronto, Canada, Canadian Geotechnical Journal, Vol. 8, 1971.

Wilson, R.M. & H.H. Hawson. The Giant Mascot Tailings Dam. Western Miner, Vol. ?, 1971.

Hawson, H. & R.C. Butler, Concepts in the Reclamation and Development of Muskeg Terrain, 16th Annual Muskeg Conf., Montreal, 1975.

Butler, R.C. & H.H. Hawson. Soils in British Columbia with Reference to Geotechnical Processes for Trench Excavation. Public Works Association of B.C., Kelowna, 1980.

Shenouda, W.K., M.E. Hassouna and H.H. Hawson. Egypt's Aswan High Dam: Dinner Address presented December 17, 1956. Canadian Geotechnical Journal, Vol. 21, 1984.

Hawson, H.H. Cairo, Vancouver River Delta Cities - A Comparison. B.C. Professional Engineer, April, 1985.

Hawson, H.H. Foundation Deterioration in Egypt as a Result of High Ground Water Levels. B.C. Professional Engineer, May, 1986.

Hawson, H.H. & Kilpatrick, B.L. Seepage Cutoffs; Part 1, Slurry Walls; Part 2, Jet Grouted Cutoffs. Accepted for publication, B.C. Professional Engineer.