5262

102I/9E & 92L/12W

EXPO GROUPS

HUSHAMU LAKE AREA

DIAMOND DRILL HOLE LOGS

EC-100 TO EC-116 AND EC-119

Geological, Geophysical, and Drilling Report on the Expo Groups 4,8,9,10,11,12,13 and 14; Hep-Expo Group 2,3,5,6,7 and A; and Moe-Expo Group 1 located twenty-one miles west and south-west of Port Hardy, B.C.

50° 127°NW

By

B. Bowen

Utah Mines Ltd.

22nd November, 1974.

EXPO 12

5262-A

GEOLOGICAL, GEOPHYSICAL, AND DRILLING REPORT

ON THE

EXPO GROUPS 4, 8, 9, 10, 11, 12, 13 and 14
HEP-EXPO GROUPS 2, 3, 5, 6, 7 and A
MOE-EXPO GROUP 1

1974

102I/9E
& 92L/12W

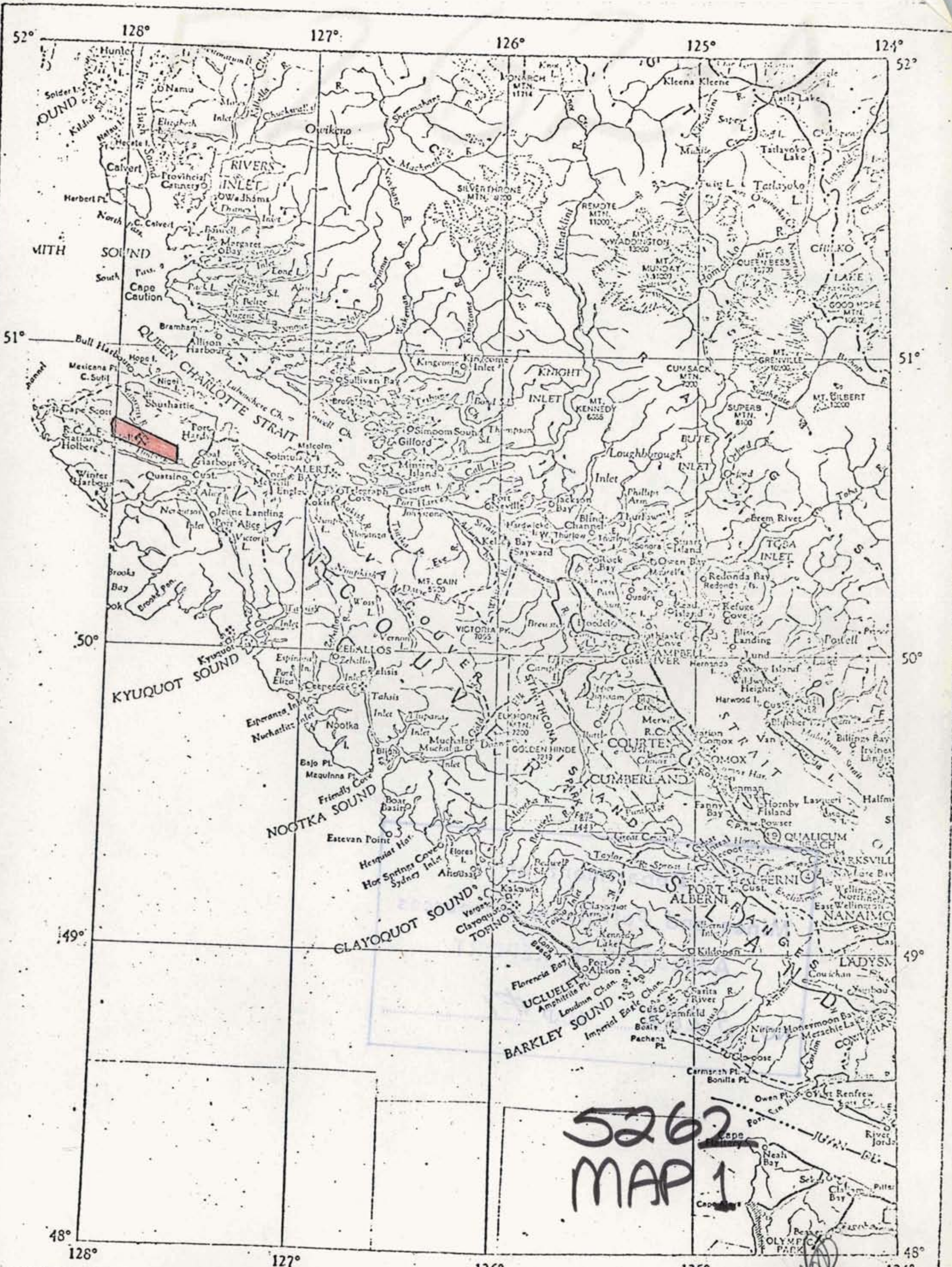
LOCATED

FIFTEEN TO TWENTY-ONE MILES, WEST AND SOUTHWEST,
OF PORT HARDY, B.C.
50° 127° NW

BY

B. BOWEN, GEOLOGIST

UTAH MINES LTD.



SCALE: 1 INCH = 30 MILES

INDEX MAP

HEP - EXPO GROUPS

Nanaimo Mining Division

TABLE OF CONTENTS

#1 Index Map

	PLATE
- EXPO GROUPS TOPOGRAPHIC MAPS #59-68 Scale 1"=200 feet	58-67
- HEP-EXPO CLAIM MAP #69 Scale 1"=2,000 feet	68
- DIAMOND DRILLING COLLAR LOCATION PLAN #70&71 Scale 1"=200 feet	69-70

	PHOTOGRAPHS
- EXPO GROUP SEISMIC REFRACTION RECORDS	101-110

SUMMARY

Utah Mines Ltd. examined the Hep-Expo claims from 7th May to 17th September, 1974, with a crew of fourteen (14) men. Geological mapping, as well as magnetic, topographic, induced polarization (both road and grid) and seismic surveys were carried out over a portion of the Hep-Expo claim block, located along the north side of Holberg Inlet on northern Vancouver Island.

The Hep-Expo claims studied are underlain by volcanic and sedimentary rocks of the Vancouver Group, which consists of Karmutsen basic volcanic rocks of Triassic age overlain successively by Quatsino limestone, of Triassic age, Parson's Bay sediments of Upper Triassic age and Bonanza volcanics of Upper Triassic-Lower Jurassic age. The above rocks are intruded by several isolated stocks which are part of a belt of intrusive stocks extending from Rupert Inlet northwesterly to the mouth of the Stranby River. In proximity to the northwesterly trend of acid intrusive stocks are zones of silicified ($\pm$ pyrophyllite) breccia bodies, apparently crosscutting Bonanza rocks.

Pyrite is the most widespread and abundant sulphide and occurs as disseminations and in veinlets in the Bonanza volcanics. Pyrite content increases towards the silicified breccia volcanic contact. Copper mineralization is scarce and, in the areas mapped, occurs as trace amounts of chalcopyrite associated with large quartz veins.

Dominant fault and shear trends in Bonanza rocks are northwest and northeast, with subordinate east-west and north-south trends. Most major faults have a northwest trend. No fold structures were observed and visible bedding attitudes in outcrop were rare.

The IP survey conducted on both roads and gridline located four (4) zones of anomalous chargeability. Metallic sulphides,

chiefly pyrite, are attributed as being the chief source of the anomalies.

In Hushamu Lake area, during the period 11th June to 17th September, 1974, sixteen (16) diamond drill holes were drilled for a total footage of 10,948 feet. Outside of Hushamu Lake area, on Hep #98, one drill hole, with total depth of 516 feet was completed.

GEOLOGICAL AND GEOPHYSICAL REPORT ON THE EXPO GROUPS 4, 8, 9, AND 10 AND HEP-EXPO GROUPS 2, 3, 5, 6, 7 AND A AND MOE-EXPO GROUP 1.

INTRODUCTION

From 7th May to 17th September, 1974, geological and geophysical work was done on the Expo Groups 4, 8, 9 and 10, Hep-Expo Groups 2, 3, 5, 6, 7 and A and Moe-Expo Group 1. The claims specifically covered in this work include Expo No's 1 to 4, 6 to 9, 10 Fraction, 22, 23, 25, 31 to 35, 37, 38, 44, 52, 54, 56, 75, 76, 81, 157, 181 to 184, 205, 207, 209, 211, 225 to 230, 247 to 250, 862, 863, Hep No's 49, 90, 93, 98 to 101. The work also included portions of Expo No's 5, 11, to 15, 17, 18, 24, 26, 27, 29, 36, 42, 45 to 47, 49, 52, 53, 58, 77, 78, 83, 84, 93 to 98, 101 to 103, 105, 107, 109 to 112, 116, 155, 156, 158 to 160, 178, 180, 200, 202 to 204, 206, 208, 210, 212, 223, 224, 231, 232, 244 to 246, 251, 252, 284, 852, 854, 855, 857 to 860, 864, 868, Hep No's 9, 11, 46 to 48, 50, 51, 61, 70, 86, 89, 94 to 97, Moe No's 3 and 4, Don Fractions 10, 12 and 15, Moe Fractions 1 and 3 and T Fractions 2 and 4.

The field work was undertaken by B. Bowen and A. Ascencios, geologists, K. Witherly, geophysicist and M. Rymell, T. Leung, K. Roxburgh, G. Clouthier, R. Willson, D. Oldfield and J. Opre, field assistants.

The above claims are part of a larger block of 847 claims located by Utah Mines Ltd. between 1963 and 1973, along the north side of Holberg Inlet about fifteen to twenty-one miles west and southwest of Port Hardy, near the north end of Vancouver Island.

The Expo, Hep-Expo and Moe-Expo Groups affected by this report cover an area roughly nine (9) miles long by three and one-half (3 1/2) miles wide trending west-northwest. Within the study area, which lies within the timber licences of Rayonier Logging Company, unlogged areas support mature stands of hemlock, spruce, cedar and balsam. Relief is moderate, ranging from 400 feet to 2,200 feet, but the topography is generally rugged and irregular. The drainage system is highly active, accommodating a high runoff resulting from an approximate 200 inch annual rainfall. Swamps are common and there are some small lakes.

Access to the claims is via the Port Hardy-Holberg road, which leaves the Port Hardy-Port McNeil highway about two (2) miles south of Port Hardy and passes along the south side of Kains and Nahwitti Lakes. Additional access within the claim group is provided by a well developed network of logging roads, most of which belong to Rayonier, and a lesser number to O'Connor Logging Company.

The base camp for the above surveys was located on an old Rayonier haul road (Branch NE 63), in Expo #108, and was serviced exclusively by road.

FIELD WORK

The 1974 field work by Utah Mines Ltd. on the Expo claims consisted of geological mapping, and magnetic, topographic, induced polarization (both road and grid) and seismic surveys. For control, three (3) surveyed (Wild Model C-16 Theodolite) baselines were used: (1) Base line 2600 N, a 0.3 mile extension of a previously cut baseline extending from Expo #77 on a due west bearing to a point 2,300 feet beyond the Expo claim block boundary; (2) Baseline 2425 N, a 10,000 foot (approximately 1.9 mile) extension to an existing baseline extending from Expo #223, on a due west bearing to Expo #160 and (3) Baseline 2620 N, an existing baseline reported previously, located immediately north of Red Dog area. In addition, a tie control line consisting of 5,000 feet of road survey from Expo #206 to Expo #228 and 5,000 feet of cut base line survey from Expo #229 to Expo #251, transects the largest survey area ("D" Grid) at an approximate bearing of South 53° East.

Geologic mapping, magnetic and topographic surveys were carried out over four (4) new grid areas, whereas the remaining geophysical surveys were conducted on previously existing grids. The four (4) new grid areas can be summarized as follows:

GRID	BASELINE CONTROL	NUMBER OF PICKET LINES	LINE MILES	AREA SURVEYED (IN SQUARE MILES)
A	2620 N	9	6.8	0.70
B	2600 N	5	3.7	0.36
C	2425 N	13	7.4	0.60
D	2425 N	17	18.5	1.83
		TOTAL	36.4	3.49

All picket lines run north to south, and were surveyed using a compass and chain with slope corrections made where necessary. Picket line spacing is 500 feet and station interval along the picket lines is 200 feet. All lines were tied at each end with a Brunton com-

pass and chain survey.

The surveyed grids, as described above, were employed as a base for the geological mapping which was done on a scale of one inch to 200 feet. Magnetometer readings were taken at 200 feet stations along each picket line and at about 500 feet intervals along baselines.

Altimeter readings were taken at all stations and tied into base-line transit hubs. The elevations of surveyed transit hubs along the baselines were used as datum for the areas surveyed.

An IP road survey, run along logging roads for a total lenght of approximately thirteen (13) miles, traversed the following claims: Expo #1, #4, #10 Fr., #11, #13, #14, #17, #18, #24, #27, #29, #34, #45, #47, #48, #51 to #53, #93, #94, #96, #101 to #103, #104, #107, #116, #852, #854, #855, #857 to #859, #868, Hep #9, #11, #50 to #53, #61, #70, #110, #112, Moe #2 Fraction, #3, 4.

In additon, approximately twenty-four (24) line miles of IP grid survey was carried out and covered completely or in part the following claims: Expo #1 to #9, #10 Fraction, #22 to #26, #35 to #38, #42, #44, #46 to #48, #75, #76, #81, #83, #84, #93, #97, #98, #863, #864, Hep #47 to #51, #53, #86, #87, #89, #90, #93, #94, #96 to #101, Moe #3 Fraction, T2 Fraction. Siesmic work was limited to 0.3 line miles on Hep #93 and Hep #100.

FIELD PROCEDURE - GEOPHYSICAL SURVEYS

The magnetics survey conducted over the picket lines was run using the McPhar Gp-70 Proton Precession magnetometer. This instrument measures the total earth magnetic field to an accuracy of one (1) gamma and expresses the value on a digital display panel. The unit consists of two (2) components; a sensor head and an instrument package. The sensor head can be mounted on a collapsable staff or worn on a backpack harness by the operator. The total system weighs approximately eleven (11) pounds with recharge-

able lead cells as the power supply. Magnetic baselines were established by making short period loops down the surveyed baselines. These loops were then corrected for diurnal variation by interpolating in a linear fashion the observed drift in the magnetic field. Loops were then run over the picket lines between magnetic baseline stations and corrected for observed diurnal variation. From the total field value, which is in the region of 56,600 gammas on the north end of Vancouver Island, a constant was subtracted to bring the new data down to a base level comparable to previous ground magnetics work.

The constant was arrived at by surveying in with the GP-70 stations previously surveyed with a Jalander vertical field fluxgate. Although total field and vertical field values cannot be said to be equivalent, at this northern magnetic latitude, there is not much difference.

The topography survey on the picket lines was carried out at the same time as the magnetics survey by the same operator. The instrument used was a Thommens Model 3B5 Barometic altimiter. Readings were taken at 200 foot stations and read to an accuracy of five (5) feet, which is about twice the unit's inherit capability. Control for the survey was the known elevations of transit hubs every 100 feet or so along the control baseline for the picket grid. These transit hub stations were known to an elevation of 0.1 feet.

The changes in barometric pressure while a loop was surveyed were corrected for in the same fashion as was done for the magnetics survey.

The IP survey was carried out using a Scintrex IPR-7 receiver and a 1.5 KW transmitter made by Elliot Geophysics in Tuscon, Arizona. The readings were taken in what is referred to as the time domain. The Elliot transmitter puts out a square pulse wavetrain alternating two (2) seconds positive, two (2) seconds off, two (2) seconds negative. For the survey along the road, the transmitter

was carried and operated out of the back of a panel truck while the IPR-7 was carried along the road by the operator. For the work on the picket lines, the transmitter was left in a semi-fixed position and moved only when necessary. The dipole-dipole array with a dipole of a=500 feet and a dipole separation of 500 feet (n=1) was used for the majority of the road survey. On one road, however, an a=200 foot dipole was used in a n=1 configuration. All of the work on the picket lines employed the use of the pole-dipole array with a dipole of a=200 feet and n=1 and n=3 separations being taken on most lines.

The IP readings were taken using the convention that a reading is the sum of one integrated positive pulse and one integrated negative pulse or normalized multiples thereof. The IP response is termed apparent chargeability and is measured in units of millivolts. The apparent resistivity of the earth between the potential electrodes is also obtained in the course of the survey and is measured in ohm-feet.

In order to gain more information in certain areas about overburden depths, a seismic refraction survey was conducted over selected targets on the Expo claim Groups. The equipment used was a Geospace GT-2B Portable Refraction System. This is a twelve (12) channel man-carried system which can record seismic events down to 0.5 milliseconds. The system is composed of three (3) different subsystems; the recorder-amplifier, the power supply, the geophones and cable. Generalized field procedure is to lay out the geophone cable with the geophones attached at fixed intervals. The basic cable length is 330 feet with geophone takeouts every thirty (30) feet. However, any geophone separation might be used, the only restriction being that the input of only twelve (12) geophones can be recorded at one time. Once the geophones are set out, a source of seismic energy is needed to send a signal into the earth. In our case, small charges of dynamite were used. A charge is placed at a known distance from the geophone spread and then detonated. The seismic energy then travels through the earth governed by the laws of

reflection and refraction for elastic media. Different earth materials conduct seismic energy at different velocities. By knowing the position and the shot in relation to the geophones, the time of the shot and the time the shot energy reaches the geophones, it is often possible to estimate the thicknesses of near surface materials of different seismic velocities. The recorder produces a record of the shot time and the geophone arrivals on Polaroid Type 57 high speed film. The significant times are the first arrivals, that is, the time from when the recorder fires the blasting cap until the first energy arrives at each of the various geophones. With these times, a travel-time graph can be plotted for the shot. There are various ways in which the data can be treated, depending on the requirements of the job.

GENERAL GEOLOGY

The Holberg Inlet-Nahwitti Lake area is underlain by volcanic and sedimentary rocks of the Vancouver Group, which consists of Karmutsen basic volcanic rocks of Triassic age overlain successively by Quatsino limestone and Bonanza volcanics of Upper Triassic-Lower Jurassic age. Periods of intrusive activity accompanied the later stages of Karmutsen and Bonanza volcanic rocks.

Karmutsen volcanic rocks consist of pillow lavas, pillow breccias, amygdaloidal and massive flows, and some interbedded tuffaceous sediments. Compositional range is restricted to basalt, based on refractive indices and silica analyses of representative rock types. Dikes and sills of similar composition, but of coarser texture, are related to plutonic activity accompanying the Karmutsen volcanic rocks. Thickness of the Karmutsen Formation in the Holberg-Nahwitti Lake area exceeds 10,000 feet.

The Quatsino Formation overlying the Karmutsen consists almost entirely of limestone with a few thin andesite and basalt flows. Its thickness ranges from 200 to 3,500 feet.

The Parson Bay sediments, lying between the Quatsino and Bonanza Formations, consist of argillite, minor limestone, agglomeratic and tuffaceous limestone, tuff, quartzite and minor conglomerate. At both its base and top, the unit exhibits gradational contacts with the Quatsino and Bonanza Formations, respectively.

Bonanza rocks consist mainly of flows and pyroclastics, resulting from a period of explosive volcanism. The lower portion of the formation consists mainly of massive tuff, lapilli tuff, and tuff breccia, in the compositional range andesite to basalt. In the upper part of the Bonanza, rhyodacite flows and breccias become more numerous and are interbedded with andesite and basalt flows, tuffs and tuff breccias. Thickness of the formation is 6,000 to 8,000 feet.

Intrusive rocks in the Holberg-Nahwitti Lake area occur as isolated stocks, part of a belt of intrusive stocks extending from Rupert Inlet northwesterly to the mouth of the Stranby River. The rocks are generally granodiorite in composition, but compositional range varies from granite, quartz monzonite, monzonite, through to diorite. Also intruding the Bonanza volcanic rocks are several bodies of syenite porphyry and quartz feldspar porphyry. In proximity to the northwesterly trend of acid intrusive stocks are zones of silicified ($\pm$ pyrophyllite) breccia bodies, apparently cutting Bonanza rocks.

Regionally, the area of study lies in a block faulted structural environment with post-lower Cretaceous northwesterly trending faults, apparently being the major system. This system causes both repetition and loss of parts of the stratigraphic section, with aggregate movement in a vertical sense in the order of hundreds to thousands of feet. The most significant of these fault systems follows the Holberg Inlet, with one branch passing through the west side of the Stranby Valley and another branch continuing westerly toward San Jose Bay. Another northwesterly to westerly system passes through Williams Lake and still another smaller system passes through Nahwitti Lake.

Northeasterly trending faults comprise a subordinate fault system. In some cases, apparent lateral displacement, in the order of a few hundred feet, can be measured on certain horizons. Movement, however, could be entirely vertical with the apparent offset resulting from the regional dip of the beds.

Generally, regional dip of the bedding is gentle to moderate, southwesterly. Locally, in the area west of Holberg, dips are much steeper, but these are in close proximity to major faults. There is little folding or flexuring of bedding visible, except along loci of major faults where it is particularly conspicuous in thinly bedded sediments of Lower Bonanza. Bedding is generally inconspicuous in massive beds of Karmutsen, Quatsino and Bonanza rocks, particularly inland where outcrops are widely scattered.

and covered by vegetation.

DETAILED GEOLOGY

Four (4) separate areas were geologically mapped in detail at a scale of 200 feet to the inch. These four (4) zones are considered separately below.

AREA A (Plates 2, 3, 5 and 6)

Most of Map Area A is underlain by a moderately thick overburden cover (ten (10) feet to greater than thirty (30) feet). Upper reaches of larger creeks on the north slope of Red Dog Hill, in the vicinity of the Expo-Red Dog claim boundary, have exposed thinly bedded (1/2 inch to two (2) inch) hornfelsed and silicified tuffs of the Parson Bay Formation in contact with silicified tuffs and lapilli tuffs of the overlying Bonanza volcanic rocks. Bedding attitudes in the Parson Bay sediments in the vicinity of 262050N and 208400E are N34°W, dipping 50° southwest, and N82°W, dipping 42° south.

The above rocks are intruded by a number of large (30 to 40 feet wide) diorite dikes in the vicinity of 262050N and 208400E. The dikes strike approximately north-south and dip vertically. Also intruding the above rocks is a larger monzonite mass further to the south (on Red Dog property).

The main alteration type is intense silicification (pervasive) of both massive and banded tuffs, and is restricted to contact zones of the intrusives described above.

Pyrite and trace amounts of pyrrhotite occur as disseminations and fracture coatings in silicified tuffs and lapilli tuffs. Pyrite-magnetite replacement bands up to one-half (1/2) inch thick were observed in the banded tuffs in the vicinity of crosscutting diorite dikes.

AREA B (Plates 1 and 4)

Detailed mapping in Area B (west of Red Dog) has delineated a siliceous (± pyrophyllite) breccia and/or silicified and pyrophyllitized tuff and lapilli tuff complex from 263,000 N and 197,700 E to 263,000 N and 195,500 E, then deflecting southwest to 262,100 N and 195,300 E, at which point, it appears to terminate at a major northwest trending fault. These rocks are intruded by a silicified quartz-feldspar porphyry dike at 262,900 N and 195,200 E. The dike is about 80.0 feet wide, strikes N50°W, and dips vertically. Southwest of the fault, the area is underlain by coarse lapilli tuff and volcanic breccia.

No extension of the quartz feldspar porphyry body in the vicinity of 263,500N and 197,400E was observed west of 197,000E, as the area covering its projected west extension is completely overburden covered.

The area to the southeast of the siliceous breccia complex is underlain mainly by tuff, lapilli tuff and andesite, with minor feldspar porphyry flows and coarse volcanic breccia. Well developed flow banding, with attitude N60°W, dipping 83° south west, was observed at 258,800N and 196,900E.

Alteration types include strong pervasive silicification observed in the siliceous (± pyrophyllite) breccia complex; silicification (pervasive and veinlets), sericitization and pyrophyllitization of volcanic rocks, generally restricted to the siliceous breccia-volcanic contact zone. Weak to moderate chloritic alteration of the volcanics is also common.

Pyrite, in the range of two (2) to three (3) per cent, and up to ten (10) per cent locally, occurs in the siliceous breccia, accounting for some very conspicuous, resistant gossan cliffs. Pyrite content in the siliceous breccia-volcanic contact zone is approximately five (5) per cent, and up to ten (10) to fifteen

(15) per cent locally. Away from the contact zone to the southwest and southeast, pyrite is scarce. Magnetite content in both the siliceous breccia and the volcanic rocks is low.

The main structural feature is the strong northwest trending fault which marks the break between the altered volcanic-siliceous breccia complex and barren pyroclastic terrain. The fault strikes N50°W, dips 40° to the southwest, and has ten (10) to fifteen (15) feet of fault gouge present. Subparallel, subsidiary shearing occurs in the footwall block.

AREA C (Plates 7 and 8)

The western portion of Map Area C is underlain by tuff, lapilli tuff and volcanic breccia, occassionally crosscut by fine to medium grained andesite dikes. In the eastern portion, andesite and diorite flows predominate, with minor tuff and coarse pyroclastics present. An elongate diorite plug, with approximate dimensions 260 feet by 1,300 feet, and axis bearing N65°W, outcrops from 243,500N and 221,800E to 243,100N and 223,000E. The diorite is medium grained, fresh, moderately to strongly magnetic and contains only very minor pyrite.

Propylitic alteration of the volcanic rocks is most common, but most outcrops are relatively fresh. Some sericitization and clay alteration is localized in the vicinity of faults and shears.

Pyrite occurs as disseminations, in fractures and in shears, locally up to five (5) per cent, but is generally absent in most outcrops. At 243,260N and 223,860E, a quartz-minor calcite vein, with true width exceeding six (6) feet, carries trace amounts of pyrite, chalcopyrite, magnetite and specular hematite. Possible attitude of the vein is N25°W, dipping 35° northeast. The wall rock is a sericite-quartz-pyrite assemblage, with pyrite content approximately two (2) per cent.

Dominant fault or shear trend is N20-50°W, with moderate to steep

(30° to 80°) dips to the northeast or southwest. Subsidiary trends are N25° to 80°E, with moderate to steep dips (30° to 85°) northwest and southeast, and N2° to 4°E, with moderate dips (55°) east and west. No bedding attitudes were observed in the mapped area.

Magnetite is widespread in the Bonanza sequence, but not abundant. Hematite is present and is usually associated with some fresh breccia flows and lapilli tuffs. Zeolites, and less commonly, calcite, occur as fracture fillings throughout the Bonanza sequence.

AREA D (Plates 8 to 10)

Area D, for the most part, other than that specified below, is underlain by rocks of very similar lithology to that of Map Area C. Sulphide content is low and alteration is restricted to sericite and clays associated with strong northwesterly trending faults.

Altered volcanic rocks within Area D are restricted to a 1,000 foot wide band from 242,500N and 229,300E to 239,900N and 233,800E and also to outcrops exposed in a large creek running approximately north-south between grid lines 233,300E and 233,800E. Alteration types are sericitization (strong, pervasive) argillization (strong locally, associated with strong faulting), and moderate to strong silicification locally. Siliceous breccia outcrops in close proximity to these altered rocks at 239,050N and 233,850E and also 238,110N and 234,200E.

Pyrite content in the above altered volcanic rocks (mainly andesites and tuffs) is two (2) to three (3) per cent, and up to five (5) per cent in the vicinity of strong faults. Siliceous breccia carries only trace amounts of pyrite. At 240,400N and 226,100E trace amounts of pyrite and chalcopyrite occur in a quartz vein (true width approximately seven (7) to eight (8)

feet) bearing N55°E and dipping 41° southeast.

Northeast trending faults predominate over northwest trending faults in terms of number of observations, but the latter contains those of stronger intensity. Northeast trends are N30° to 70° E, dipping generally 40° to 60° SE; northwest trends, N25° to 65°W, dipping generally 30 to 60° northeast. Subsidiary trends observed are east to west and north to south. No bedding attitudes were observed in the map-area.

GEOPHYSICAL DISCUSSION

MAGNETICS

The results of the ground magnetics survey revealed only one major zone of magnetic high and one other smaller zone in the total area surveyed. A small intrusive diorite body, mapped at 222,300E, 243,500N, did not produce a significant magnetic anomaly.

The major magnetic feature revealed was the uniformly strong high on sheets A-2 and A-3, between L2092E to L2062E and from approximately 2650N up to the ends of all the lines. The area covered is on the gently sloping north side of Red Dog Mountain, with no outcrop exposed. The closest outcrop is about 1,600 feet away to the south and is a bedded tuff of the Parson's Bay Formation. The above magnetic feature appears to be on the fringe of a large regional magnetic high trending west-northwest through Nahwitti Lake and Red Dog Mountain. The regional magnetic trend superimposes approximately on the projected trend of the Parson's Bay Formation.

The second zone of magnetic high is centered on L2265E, 2365N. This anomaly is saddle shaped, is about 1,500 feet across (east to west) and is about 500 to 700 feet wide, although it is not closed off in the south. Andesite tuffs outcrop in the area and are noted to be strongly magnetic. The anomaly appears draped on top of a small hill, with the anomaly center at the peak's approximate top. Other more spotty magnetic highs occur east of this feature and they appear to be in the same andesite tuff and lapilli tuff rock type.

IP

In the course of the IP survey carried out this year, four (4) anomalous zones were detected and defined. The first anomaly is located immediately north of the NE60-65 road junction

between 219,200E to 215,700E and 255,600N to 256,500N, on Hep Mineral Claims 49, 87 and 89. The second anomaly lies between 213,700 to 208,700E and 256,400N to 259,000N over Expo Mineral Claims 23, 25, 22, 863, 864 and Hep 93, 90, 100 and 98. The third anomaly is centered at 203,700E, 260,500N and covers parts of Expo Mineral Claims 1, 2, 3 and 4. The fourth anomaly runs from 199,200E to 196,200E and from about 262,500N in the south, while it remains substantially open in the north. This anomaly is situated on Expo Mineral Claims 96, 98, 36 and 38.

The first anomaly was detected initially by the road IP survey on NE65 and NE62. Follow-up grid work outlined a large zone of anomalous chargeability centered at approximately 217,200E, 256,100N. Anomalous chargeability is taken as readings sixty (60) milliseconds or over, while background values range from less than twenty (20) milliseconds to forty (40) milliseconds. The peak anomalous value reached was 116 milliseconds at 218,000E, 216,500N for n=1.

The n=1 chargeability picture shows elliptically shaped anomaly with a major and minor axis of 4,000 feet and 1,500 feet, respectively, with the major axis striking N70°W.

The n=3 anomaly, although showing the same gross dimensions as the N=1 pattern, has several distinguishing features. Firstly, the n=3 plan shows a marked indentation cutting obliquely through the upper portion of the anomaly. Secondly, the lower edge of the n=3 plan is about 1,000 feet further to the southwest than the n=1 anomaly. Both the n=1 and n=3 anomalies are cut off to the northeast and northwest along the same boundary. The term cutoff is used since both plans show greater than usual anomaly amplitude drop offs in these directions.

The resistivity results do not appear very diagnostic in this area. Values ranged mostly in the several thousand ohm-feet range. No marked correlation could be seen between the resistivity and chargeability results or with the resistivity

and any other parameter.

The geology in the vicinity of the anomaly shows a complex intermingling of intrusive and volcanic rocks. The n=1 anomly appears to be chiefly over diorite, which is in contact with volcanics to the southwest and a monzonite porphyry to the northwest and north. The n=3 anomaly covers more of the volcanics, but the central highs are still over the diorite. Sulfides observed in outcrops is lower than what would be expected to produce the observed anomalies.

The second zone of anomalous chargeability was located as a result of follow-up to some interesting geochemical and geological results found in the area. This zone is centered at approximately 211,200E, 257,700N and is about 4,000 feet long (east to west) and 2,000 feet wide (north to south). The n=1 anomaly is somewhat smaller than the n=3, but they both sit over about the same center and both have the same long axis strike, N70°W. Anomalous readings are again considered as sixty (60) milliseconds or over with the background values in the twenty (20) to thirty (30) millisecond range. The peak reading for this anomaly was 91 milliseconds at n=1 on L2112E, station 2580N.

Both the n=1 and n=3 plans share almost the same forty (40) millisecond contour along the northerly edge of the anomaly, though the n=3 anomaly extends considerably more to the south and the southeast. An overall feel for the anomaly, after looking at n=1 and n=3, is that the chargeability zone could be said to dip to the south and the east and is substantially cut off to the north.

The resistivity results are observed to show an inverse correlation with the chargeability. Resistivity values in the background areas around the anomaly are of the order of two thousand five hundred (2,500) to four thousand (4,000) ohm feet. In the anomalous zone, however, resistivity values drop by a factor of three (3) to five (5) with respect to background values. This

correlation between the chargeability and resistivity would produce metal factor response over this anomaly.

Although there is no outcrop within the chargeability anomaly itself, there are indications of increased sulfides observed in the rocks moving towards the anomaly. A small body of quartz monzonite intrusive is mapped off the northeast edge of the anomaly and, although it is barren of sulfides itself, its intrusion is probably connected to the strong pyritization of the surrounding volcanics. Other volcanics to the north of the anomaly shows pyrite disseminated and along fractures accompanied by varying degrees of argillic and chloritic alteration.

The third chargeability anomaly was also located as a result of follow up to surface geological mapping in the area. This zone is centered approximately 203,700E, 260,500N and is basically elliptical in shape with the major axis running north to south. The major and minor axes are about 2,000 feet and 1,200 feet in length, respectively. The background chargeability is lower in this region, being around fifteen (15) milliseconds. As a result, anomalous readings are considered as being in the thirty-five (35) to forty (40) milliseconds range. Although the n=1 and n=3 anomalies show the same basic exterior shape, the n=1 has a double peaked center, while the n=3 is more a bull's eye in appearance. The n=3 anomaly is also displayed slightly to the southeast with respect to the n=1 anomaly.

There does not appear to be a marked correlation between resistivity and chargeability for this anomaly. The resistivity values for n=1 are generally all lower than for n=3, but this is interpreted to be due to the lower resistivity swamp and boggy material which covers much of the ground over the anomaly.

The fourth anomaly was, as were the last two (2) described, located as a result of follow up to previous geological mapp-

ing. Unlike the other three (3), it was not possible to close off this anomaly with the available grid. The shape of this anomaly appears to be rather irregular. The chargeability increases moving northward across a line running roughly east to west across 2627N. This linear is about 3,500 feet long and extends from 1995E to 1962E. Anomalous values in this region are considered above fifty (50) milliseconds or so. However, the actual break between the anomalous and non-anomalous zones is best shown by about the forty (40) millisecond contour.

The resistivity results do not appear to have any marked correlation with the chargeability results. Values were in the order of 1,000 to 3,000 ohm-feet with some above and below these figures.

The geology in the area of the anomaly indicates that moderate to strong pyritization has occured, probably as an accompaniment to the intrusion of the Quartz Feldspar Porphyry mapped on top of the cliff on L1977E at station 2636N.

ROAD IP

The results of the road IP survey (plotted on the applicable chargeability n=3 sheets) revealed only one significant anomaly which was described on page 18 of this report.

SEISMIC SURVEY - RESULTS

The location and orientation of the seismic lines are given on Plate 57. Each line has beside it the identifying number of the photographs which were taken on the particular spread. Appendix F gives two (2) of the most commonly used formulae employed in seismic interpretation. As well, the various points of record identification are illustrated with several diagrams on the seismic refraction method.

CONCLUSIONS

In Map Areas A to D, two (2) geological features contrast the predominant lithology of pyroclastics and flows of the Bonanza sequence: the occurrence of two (2) siliceous breccia bodies, one each in Map Areas B and D; and the intrusion of a small elongate diorite plug with axis bearing N66°W, in Area C.

Pyrite is the most widespread and abundant sulphide. Chalcopyrite occurs in trace amounts, associated with pyrite in large quartz veins.

The IP survey conducted on both roads and gridline located four (4) zones of anomalous chargeability. All four (4) anomalies show close association with intrusive-volcanic contacts. Metallic sulfides, chiefly pyrite, are seen in above background amounts either over or near all the anomalous zones and are attributed as being the chief source of the anomalies.

Ground magnetics helped to delineate several zones of magnetite rich volcanic rock within the Bonanza sequence.

B. BOWEN, GEOLOGIST

K. WITHERLY, GEOPHYSICIST

BB/mw

REFERENCES

NORTHCOTE, K.E. — Geology, Exploration, and Mining in British Columbia, pp. 254 to 269, 1970.

MULLER, J.E. — Chemistry and Petrology of Some Mesozoic Volcanic Rocks of Vancouver Island, British Columbia, G.S.C. Paper 71-1B, p. 5., 1971.

NORTHCOTE, K.E.
MULLER, J.E. — Volcanism, Plutonism and Mineralization, Vancouver Island, C.I.M. Bulletin Vol. 65, No. 726, pp. 49-57, 1972.

DRILLING REPORT ON EXPO GROUPS 4, 11, 12, 13 AND 14, AND HEP-EXPO GROUPS 2, 5, 5 AND 7

From 11th June to 17th September, 1974, diamond drilling was done on Expo Groups 4, 11, 12, 13 and 14 and Hep-Expo Groups 2, 5, 6 and 7. The claims upon which diamond drilling was specifically done include Expo No.'s 217, 237, 238, 258 to 261 and 504 Fraction, Hep No. 59 and Don 14 Fraction.

Geology and supervision by Utah Mines Ltd. included the following personell: U. Malachowski, B. Bowen, geologists, S. Butler, K. Orleski, D. Fehr, M. Rymell, field assistants.

Drilling was performed by Connor's Drilling Ltd. The Connors crew consisted of four (4) two (2) man drilling crews, one foreman and one cook.

The Expo and Hep-Expo Groups affected by this report cover an area roughly twelve (12) miles long by 3.5 miles wide trending west to northwest. Drilling was confined to the Hushamu Lake valley where local relief is considerable and topography rugged. Hills bordering the valley rise from approximately 1,000 feet at lake level to over 2,000 feet, over a distance of 1,000 horizontal feet. Slopes are heavily forested with mature stands of hemlock, spruce, cedar and balsam and undergrowth is heavy. Drainage from Little and Hushamu Lakes is to the southeast via Hushamu Creek which drains into Holberg Inlet.

Access to the Hushamu drill area is via seven (7) miles of Rayonier Branch Road NE Main, which leaves the Port Hardy-Holberg road approximately five (5) miles northeast of Holberg. The drill camp was located on Expo 242, and was serviced exclusively by road.

DIAMOND DRILLING PROGRAM

Two (2) machines were on the property at all times and were run by four (4) two (2) man crews. Each crew worked a ten (10) hour shift, seven (7) days per week.

A summary of diamond drill holes drilled during the period 11th June to 17th September, 1974 is given below.

HOLE NO.	LOCATED ON CLAIM	ANGLE	BEARING	DEPTH (FEET)
EC-100	EXPO 258	-45°	180°	850
EC-101	EXPO 260	-90°	----	198
EC-102	EXPO 260	-45°	180°	411
EC-103	EXPO 237	-65°	180°	1103
EC-104	EXPO 504 FR	-45°	0°	500
EC-105	EXPO 258	-90°	----	641
EC-106	EXPO 261	-90°	----	651
EC-107	EXPO 217	-90°	----	706
EC-108	DON 14 FR.	-45°	180°	522
EC-109	EXPO 238	-90°	----	588
EC-110	EXPO 237	-65°	180°	1004
EC-111	EXPO 237	-45°	180°	832
EC-112	EXPO 259	-90°	----	536
EC-113	EXPO 238	-90°	----	756
EC-114	EXPO 259	-45°	180°	500
EC-115	HEP 59	-90°	----	500
EC-116	HEP 59	-90°	----	200
	TOTAL FOOTAGE			10,498

Five (5) drill holes were drilled on the Hushamu Lake access road. The remainder were helicopter supported. The helicopter supported holes required the services of a professional faller to clear sites. The sites were kept as small as possible, but large enough to allow the helicopter to manoeuvre with safety. Generally, sites measured approximately one hundred (100) feet by one hundred and fifty (150)

feet. Every site was further prepared by construction of a platform on which the drill machine was placed and anchored.

Drilling, generally, encountered failry good ground conditions, with average core recovery in the 80 to 90 per cent range. Two (2) holes, EC-101 and EC-102, were abandoned before the required depth was reached due to very bad ground conditions and other subsequent problems. Core size was dominantly NQ, although BQ and some HQ were also cored.

Core was logged by a Utah geologist, then split in half, with half of the core sent for analyses via Pacific Western Airlines air freight to Chemex Labs Ltd., Vancouver. The remaining half of the split core was placed in storage in the newly constructed core storage and logging facility located on Expo No. 258. Every box of core was labelled with the diamond drill hole number and the footage contained in the box.

Data accompanying the drilling report consists of complete diamond drill logs for diamond drill holes EC-100 to EC-116, and EC-119, in Appendix E; and also a diamond drill hole collar location plan (Plates 69 and 70). Statement of cost, diamond dilling contractor's invoices, and a copy of the drilling contract are given in Appendices B, C and D, respectively.

Diamond drill core logs submitted in Appendix F were done by U. Malachowski and B. Bowen. Their respective signatures below are to cover all log sheets comprising Appendix F.

U. Malachowski
U. MALACHOWSKI, GEOLOGIST

B. K. Bowen
B. BOWEN GEOLOGIST

APPENDIX A

STATEMENT OF QUALIFICATIONS

STATEMENT OF QUALIFICATIONS

The field work for this report was done by the following persons whose qualifications are outlined below.

1. A. ASCENCIOS, P. Eng., Senior Geologist for Utah Mines Ltd., Vancouver, British Columbia.
   Completed geological engineering at San Marcos National University of Lima, Peru in 1959 and M.Sc. (Geology) at the University of Arizona, Tuscon, U.S.A. in 1966; employed by Cerro de Pasco Corporation, La Oroya, Peru from January, 1956 to March, 1956, and from January, 1957 to March, 1957 as student-trainee; employed by Cerro de Pasco Corporation, La Oroya, Peru from May, 1960 to August, 1961 as assistant mine geologist under the supervision of U. Peterson, Chief Geologist; employed by Asarco in Casagrande, Arizona, U.S.A. from June, 1962 to September, 1962 as student-trainee under the supervision of K. Richard, Chief Geologist; employed by Cerro de Pasco Corporation, La Oroya, Peru from February, 1963 to June, 1970 as pit geologist, division geologist and project geologist at Cerro de Pasco Mine (February, 1963 to November, 1963) at Yauriococha Mine (November, 1963 to March, 1967), and at the Exploration Department, Lima (April, 1967 to June, 1970) under the supervision of G.E. Walker, J.S. Molloy and C.R. Petersen respectively; employed by Utah Mines Ltd. from July, 1970 to date as a Senior Geologist under E.S. Rugg, P. Eng., and M.J. Young, P. Eng.

2. B. BOWEN, Geologist for Utah Mines Ltd., Vancouver, British Columbia.
   Completed B.A.Sc. at the University of British Columbia in 1970; worked as a student during the summer field seasons with Cominco Ltd. in 1967 and 1968, and with Wayland S. Read, Consulting Geologist, Vancouver, British Columbia in 1969; employed as a field geologist, Gibralter property, May 1970 to October, 1970 by Placer Development Ltd.; employed as a field geologist, Alice Springs, N.T., Australia, from March,

1971 to December, 1971 by Central Pacific Minerals, N.L.; employed as mine geologist, Tungsten, Northwest Territories, Canada from May, 1972 to March, 1974 by Canada Tungsten Mining Corporation; employed by Utah Mines Ltd. from March, 1974 to date as a geologist under the supervision of M.J. Young, P. Eng.

3. U. MALACHOWSKI, Geologist for Utah Mines Ltd., Vancouver, British Columbia.
   Completed B.Sc. 1969; employed by Texaco Explorations, Calgary, Alberta, from 1969 yo 1970; by Kennco Explorations, Vancouver, British Columbia, from 1970 to 1971; and by Utah Mines Ltd., Vancouver, British Columbia, from 1971 to date as a geologist under the supervision of E.S. Rugg, P. Eng., and M.J. Young, P. Eng.

4. K. WITHERLY, Geophysicist for Utah Mines Ltd., Vancouver, British Columbia.
   Completed B.Sc., (Geophysics) at the University of British Columbia in 1971; employed by Utah Mines Ltd., and Tri-Con Exploration Surveys during 1969 and 1970 summer field seasons respectively as a geophysicist's assistant; employed by Utah Mines Ltd. from May, 1971 to date as a geophysicist under the supervision of E.S. Rugg, P. Eng., and M.J Young, P. Eng.

APPENDIX B

STATEMENT OF COST

STATEMENT OF COST
GEOLOGICAL AND GEOPHYSICAL SURVEYS

SALARIES

A. Ascencios	25 days @ $63.50 per day	$ 1,587.50	
B. Bowen	84 days @ $40.50 per day	$ 3,402.00	
K. Witherly	52 days @ $37.50 per day	$ 1,950.00	
M. Rymell	84 days @ $28.00 per day	$ 2,352.00	
T. Leung	15 days @ $25.00 per day	$ 575.00	
K. Roxburgh	58 days @ $35.00 per day	$ 2,030.00	
G. Clouthier	72 days @ $21.00 per day	$ 1,512.00	
R. Willson	15 days @ $29.00 per day	$ 455.00	
D. Oldfield	36 days @ $20.00 per day	$ 720.00	
J. Opre	19 days @ $19.00 per day	$ 361.00	
K. Orleski	11 days @ $28.50 per day	$ 423.50	
J. Proven	43 days @ $26.00 per day	$ 1,548.00	
J. Bazzlo	37 days @ $33.00 per day	$ 1,221.00	
J. Pratt	4 days @ $21.00 per day	$ 84.00	
	TOTAL SALARIES	$18,221.00	$18,221.00

VEHICLE RENTAL

One 1974 3/4 Ton Pick-Up, GMC 2 X 4			
	107 days @ $14.73 per day =	$ 1,576.39	
One 1970 Suburban, GMC 4 X 4			
	50 days @ $12.26 per day =	$ 613.00	
One 1970 Jeep Wagoneer 4 X 4			
	28 days @ $ 8.92 per day =	$ 249.79	
One 1972 3/4 Ton Pick-Up Chevrolet 4 X 4			
	10 days @ $15.75 per day =	$ 157.50	
Miscellaneous Car Rentals	=	$ 308.50	
	TOTAL =	$ 2,905.18	$ 2,905.18

LIGHT PLANT RENTAL

One VM-Markon 3.5 KW Diesel 110 V-AC			
	90 days @ $ 7.70 per day =	$ 692.50	
		$ 692.50	$ 692.50

RADIO EQUIPMENT

SSB

	90 days @ $1.91 per day	$ 171.84	
Mobile Radio Telephone			
	90 days @ $4.00 per day	$ 360.00	
	TOTAL	$ 531.84	$ 531.84

IP EQUIPMENT

Generator			
	35 days @ $2.67 per day	$ 93.45	
Transmitter, receiver and two radios			
	35 days @ $50.60 per day	$ 1,771.00	
	TOTAL	$ 1,864.45	$ 1,864.45

MAGNETIC EQUIPMENT

One McPhar GP-70 Proton Precission Magnetometer			
	28 days @ $14.60 per day	$ 408.80	
	TOTAL	$ 408.80	$ 408.80

SEISMIC EQUIPMENT

Geospace 6T-2B Seismic Refraction Recorder			
	1.5 days @ $38.68 per day	$ 58.00	
Explosives		$ 62.97	
Film		$ 2.00	
	TOTAL	$ 140.97	$ 140.97

ALTIMETER

One Thommens Altimeter			
	28 days @ $1.57 per day	$ 44.00	
	TOTAL	$ 44.00	$ 44.00

GRID PREPARATION			
Baseline Cutting Cost (Underhill & Underhill)		$ 4,178.52	
Picket Lines Cutting Cost (Manex)		$10,363.62	
	TOTAL	$14,542.14	$14,542.14

CAMP COST

728 man days @ $13.09 per day	$ 9,531.32	
TOTAL	$ 9,531.32	$ 9,531.32

REPORT AND MAP PREPARATION

Total Cost	$ 8,000.00	
TOTAL	$ 8,000.00	$ 8,000.00
GRAND TOTAL		$56,792.20

A. ASCENCIOS, P. ENG.

STATEMENT OF COST - DIAMOND DRILLING

SALARIES - CORE LOGGING			
U. Malachowski	94 days @ $36.50 per day	$ 3,337.00	
B. Bowen	5 days @ $40.50 per day	$ 202.50	
	TOTAL	$ 3,539.50	$ 3,539.50
SALARIES - CORE SPLITTING			
Miscellaneous Labour	99 days @ $19.00 per day	$ 1,881.00	
		$ 1,881.00	$ 1,881.00
CORE STORAGE AND LOGGING STRUCTURE			
Total Cost		$ 1,815.92	
		$ 1,815.92	$ 1,815.92
GENERATOR			
Three (3) months @ $20.00 per month		$ 60.00	
		$ 60.00	$ 60.00
VEHICLE RENTAL			
One 1974 3/4 Ton Pick-Up, Ford 2 X 4	99 days @ $15.00 per day	$ 1,485.00	
		$ 1,485.00	$ 1,485.00
CORE BOXES			
Total Cost		$ 1,211.07	
		$ 1,217.07	$ 1,211.07
DIAMOND DRILL HOLE SITE PREPARATION			
Total Cost		$ 2,743.23	
		$ 2,743.23	$ 2,743.23
RADIO EQUIPMENT			
SSB	99 days @ $1.91 per day	$ 189.09	
		$ 189.09	$ 189.09

CONTRACT DIAMOND DRILLING (CONNORS DRILLING LTD.)		
For period 11th June to 15th September, 1974 inclusive (includes complete costs for DDH EC 100 to 114, and partial costs for DDH EC 115 and 116)	$212,006.98	
For period 29th September to 4th October, 1974 inclusive (includes complete cost for DDH EC 119 - 516 feet @ $22.75* per foot)	$ 11,739.00	
TOTAL	$223,745.98	$223,745.98
HELICOPTER SUPPORT (VANCOUVER ISLAND HELICOPTER)		
Total cost (11th June to 15th September, 1974 inclusive)	$ 14,289.76	
TOTAL	$ 14,289.76	$ 14,289.76
GRAND TOTAL		$250,960.55

* The average cost per foot of $22.75 was determined by taking the sum of all costs (diamond drilling, geological supervision and helicopter support) incurred during the period 11th June to 15th September, 1974, inclusive and dividing by the total footage drilled during the same period. For cost distribution purposes, this average cost per foot figure was applied to all diamond drill holes by multiplying total depth by $22.75 per foot to obtain total cost per individual drill hole.

A. ASCENCIOS, P. ENG.

APPENDIX E

SEISMIC RECORD IDENTIFICATION

APPENDIX E

RECORD INTERPRETATION FORMULAE

There are two (2) formulae used to interpret the information obtained with the GT-2B. These are the Critical Distance Formula and Time Intercept Formula.

(a) Critical Distance Formula

$$D = \frac{Xc}{2} \quad X \quad \frac{V2 - V1}{V2 + V1}$$

C = Depth of first layer
Xc = The distance at which velocity change occurs.
V1 = Velocity in first layer
V2 = Velocity in second layer

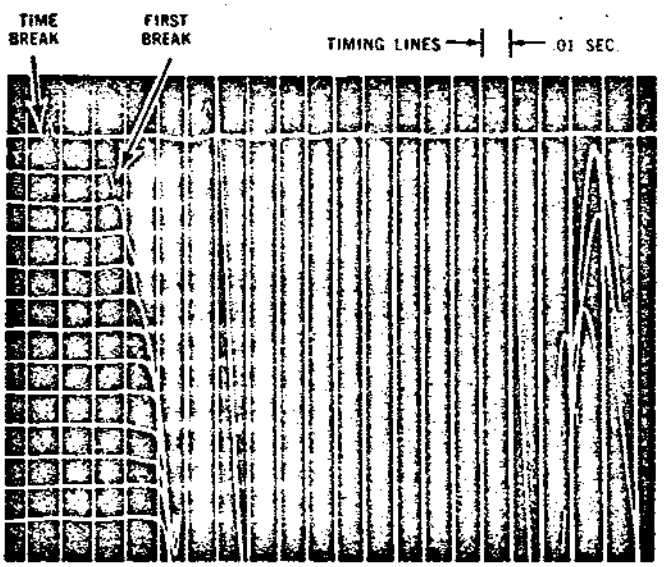
(b) The Time-Depth Intercept Formula

$$D = \frac{ti}{2} \quad X \quad \frac{V1 \times V2}{V2^2 - V1^2}$$

RECORD INTERPRETATION

RECORD IDENTIFICATION

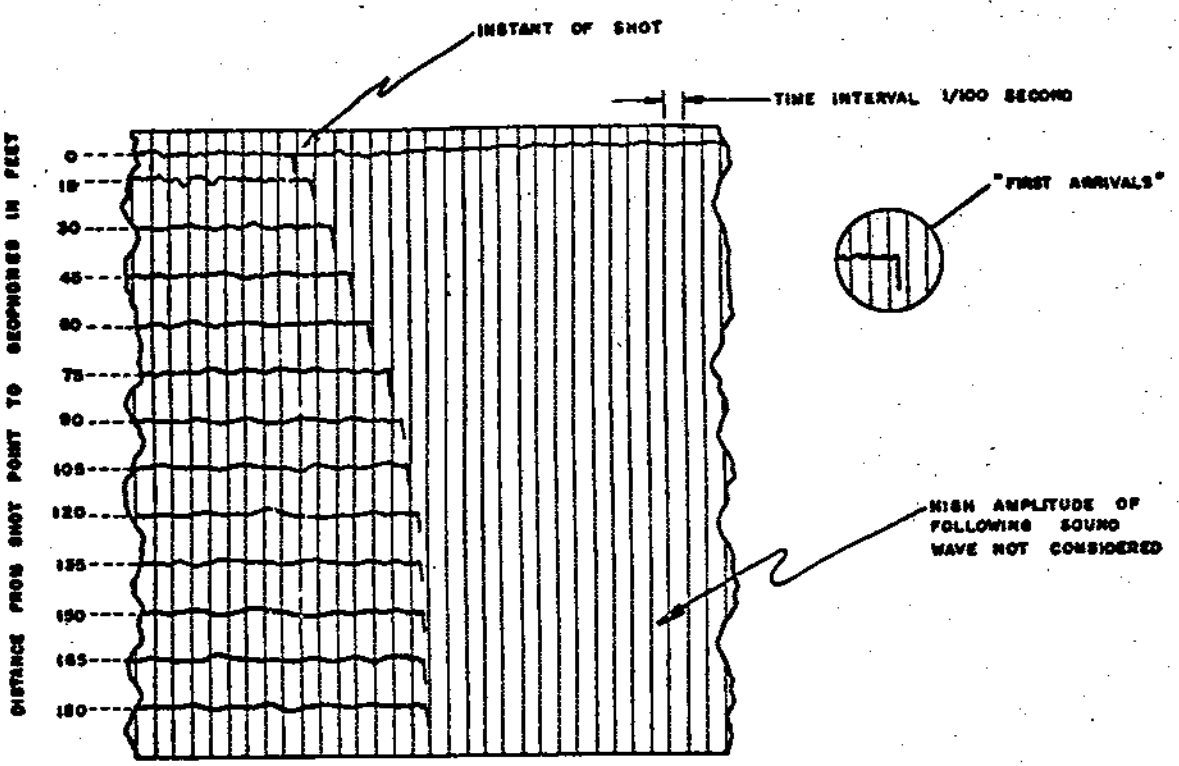
1. Cross record timing lines (10 milliseconds between timing lines).
2. Time break, or zero time, when shot occurs.
3. Time break trace.
4. Information traces one through twelve consecutively.
5. First arrival of shock wave, one through twelve information traces.



Typical Record

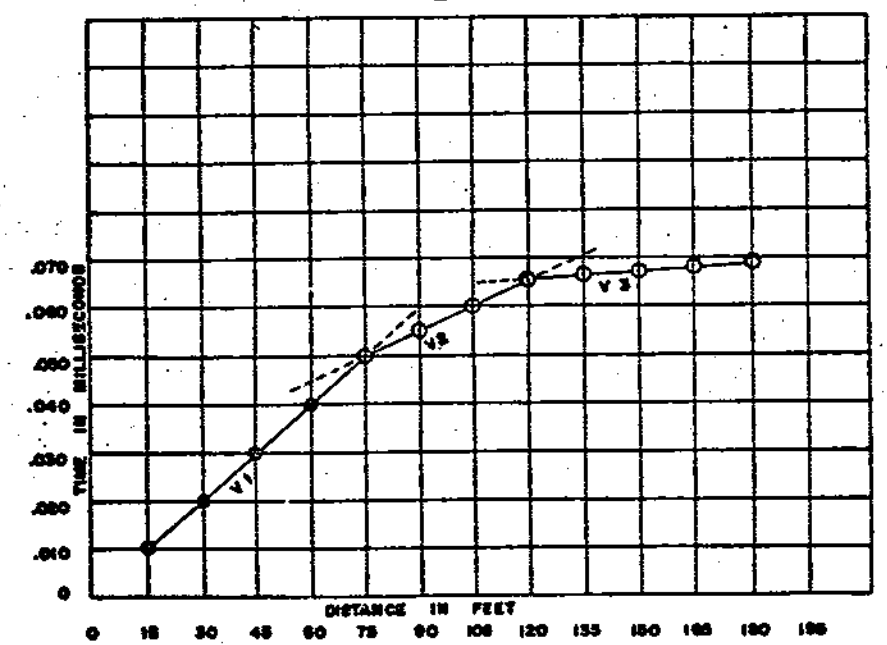
TYPICAL RECORD

FIG 1



TYPICAL SEISMIC RECORD

FIG 2



TIME DISTANCE GRAPH PLOTTED FROM ABOVE RECORD SHOWING THREE LAYER PROBLEM

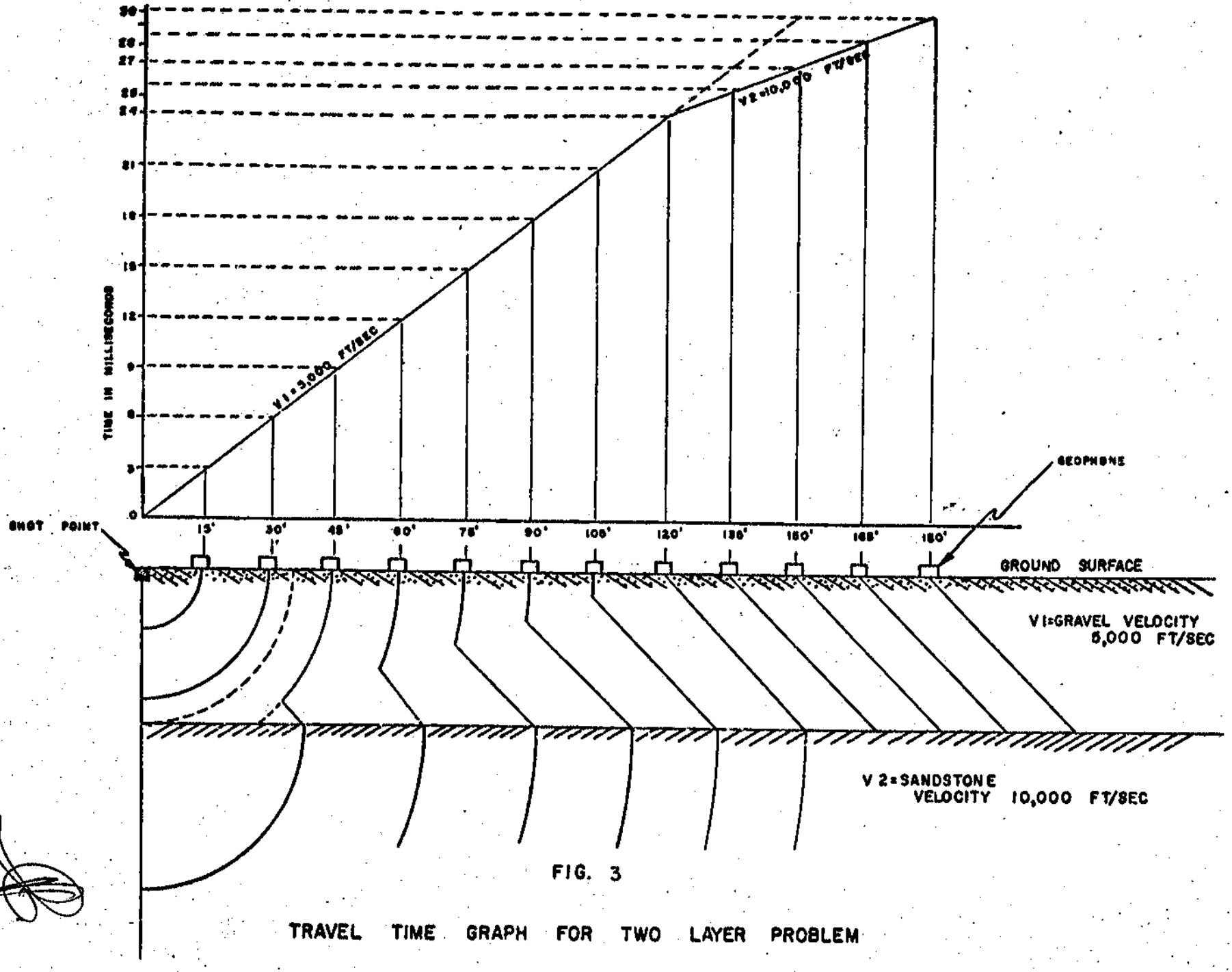


FIG. 3

TRAVEL TIME GRAPH FOR TWO LAYER PROBLEM

APPENDIX C

DIAMOND DRILLING INVOICES

Drilling Ltd.
155 WEST 3rd. AVENUE, VANCOUVER, B.C. CANADA V5Y 1E8
AREA CODE 604 872-1675

271

JOB: 1-437
INVOICE NO: 5-008
DATE: June 19, 1974

Utah Mines Ltd.,
412 - 510 West Hastings Street,
Vancouver, B. C. V6B 1L9.

271

SURFACE DIAMOND DRILLING
HOLBERG, B. C.
June 11 - 15, 1974

MOBILIZATION & DEMOBILIZATION - Lump Sum $5,000.00

FOOTAGE FEE

D.D. Hole # 100	0' - 15'	15'	@$12.50	$ 187.50	✓
	15' - 431'	416'	13.75	5,720.00	✓
101	0' - 84'	84'	12.50	1,050.00	✓
	84' - 128'	44'	12.50	550.00	✓
		559'			7,507.50

FIELD COST WORK

Date	Shift	Drill #	Man Hours	Drill Hours	Remarks
June 11/74	Day	1	54	13	4 men move & set up.
June 12/74	Day	1	40	10	4 men move & set up.
June 13/74	Day	1	4	2	Ream casing Hole #101.
June 14/74	Day	1	4	2	Ream casing Hole #101.
June 14/74	Night	1	6	3	Ream casing Hole #101.
June 11/74	Day	2	(1) ?	Ø	Tractor Driver
June 12/74	Day	2	32	10	4 men move & set up.
June 14/74	Day	1	(5) ?	(2½) ?	Lost circulation.
June 12/74	Night	2	(2) ?	(1) ?	Lost circulation.
June 13/74	Day	2	2	1	Clean mud tanks.
June 13/74	Night	2	2	1	Mixing mud
			152	45½	
Credit 2 Moves ~~@$X6XX~~ @16			-32		
			120		

Total Man Hours	120	@$11.00	$1,320.00
Total Drill Hours	45½	9.00	408.50
[illegible]	[illegible]	[illegible]	[illegible]

JUN 20 1974

JUL 2 - 1974

UTAH MINES LTD. -- EXPLORATION DEPT.

DISTRIBUTION

Location	Major	Minor	Act.	Exp.	Amount
30 00	4000	097 0	4 0	3 0	17,440.95
00		0	0	0	
00		0	0	0	
00		0	0	0	
00		0	0	0	

Date Received		Invoice Amount	17,440.95
Ext. & Prices		Discount	
Approved by		Amount Payable	

...nors Drilling Ltd.
... a division of
... Valley Industries Ltd.

155 WEST 3rd. AVENUE, VANCOUVER, B.C. CANADA V5Y 1E8
AREA CODE 604/872 - 1675

JOB: 1-437

Utah Mines Limited,

#412 - 510 West Hastings Street,

Vancouver, B. C. V6B 1L9.

INVOICE NO: 5019
DATE: July 4, 1974

271

SURFACE DIAMOND DRILLING
HOLBERG, B. C.
June 16 - 30, 1974

FOOTAGE FEE					
D.D. Hole #	EC-100	431' - 500' - 69'	@$13.75	$ 948.75	
		500' - 850' - 350'	15.15	5,302.50	
	EC-103	0' - 100' - 100'	12.50	1,250.00	
		100' - 233' - 133'	15.00	1,995.00	
		233' - 500' - 267'	13.75	3,671.25	
		500' - 735' - 235'	15.15	3,560.25	
	EC-101	123' - 137' - 9'	12.50	112.50	
		137' - 198' - 61'	Field Cost		
	EC-102	0' - 100' - 100'	12.50	1,250.00	
		100' - 107' - 7'	15.00	105.00	
		107' - 411' - 304'	13.75	4,180.00	
	EC-104	0' - 20' - 20'	12.50	250.00	
		20' - 42' - 22'	13.75	302.50	$22,927.75
		1677'			

MEALS SERVED YOUR PERSONNEL
June 16-30/74 (Copy attached) 89 Meals @$3.00 267.00

TRACTOR RENTAL June 10-30/74
20 Days 20/30 x $1,600.00 $1,066.67
5% Tax 53.34 1,120.01

— 2

Connors Drilling Ltd.
Subsidiary of
Bow Valley Industries Ltd.

155 West 3rd Avenue Vancouver 10, B.C., Canada
Area Code 604/872-1675

To Utah Mines Limited,

DATE July 4, 1974

INVOICE NO. 5019
JOB: 1-437

FIELD COST WORK

Date	Shift	Drill #	Man Hrs.	Drill Hrs.	Remarks
June 16/74	Day	1	14	7	Ream & cement hole
June 16/74	Night	1	16	8	Drill cement & wash hole
June 17/74	Day	1	20	10	Casing to 144'
June 17/74	Night	1	20	10	Casing to 170'
June 18/74	Day	1	12 ~~20~~	6 ~~10~~	Drilled 170'-184'
June 18/74	Night	1	16 ~~23~~	8 ~~10~~	Drilled 184'-198'
June 19/74	Day	1	36	10	4 men reset drill
June 20/74	Day	1	16	4	Complete setup
June 20/74	Night	1	8	4	Ream H. Casing to 26'
June 20/74	Night	1	6	3	Mixing Mud
June 21/74	Night	1	9	4½	Ream Casing 59'-107'
June 22/74	Day	1	4	2	Hole squeezing reamed 60' to bottom.
June 22/74	Night	1	6	3	Reamed 60' to bottom
June 23/74	Night	1	8	4	Reamed 118'-277'
June 24/74	Night	1	20	10	Reaming 110'-410'
June 25/74	Day	1	18	9	Reduced to BQ
June 25/74	Night	1	8	4	Pull casing
June 26/74	Day	1	~~40~~	~~10~~	Moving to Hole # 104
June 27/74	Day	1	40	10	Building setup
June 28/74	Day	1	40	10	Moving to Hole # 104
June 29/74	Day	1	~~40~~	~~10~~	Setting up hole
June 30/74	Day	1	6	3	Casing hole to 20'
June 21/74	Day	2	16	4	Install plug in hole
June 21/74	Day	2	16	6	Tear down & move to 103
June 22/74	Day	2	28	7	Move & set up
June 23/74	Day	2	4	2	Mixing mud
June 23/74	Night	2	3	1½	Quick seal hole
June 24/74	Day	2	10	5	Quick Seal hole
June 25/74	Day	2	14	7	HW casing to 80'
June 25/74	Night	2	14	7	NW casing to 233'
June 25/74	Night	2	2	1	Mixing Mud
June 26/74	Day	2	2	1	Mixing Mud
June 27/74	Day	2	2	1	Mixing Mud
June 28/74	Day	2	2	1	Mixing Mud
			516 ~~528~~	~~199~~	
CREDIT 3 Moves			-48	193	
			~~480~~ 468		

468

Total Man Hours	~~480~~	@$11.00	~~$5,280.00~~ 5148	6885.00
Total Drill Hours	~~199~~ 193	9.00	1,791.00 1737	~~7,071.00~~
			6885	— 3

Connors Drilling Ltd.
Subsidiary of
Bow Valley Industries Ltd.

155 West 3rd Avenue Vancouver 10, B.C., Canada
Area Code 604/872-1675

Utah Mines Limited,

DATE July 4, 1974

INVOICE NO. 5019
JOB: 1-437

FUEL FOR UTAH CAMP

June 9 - 30/74	142 Gallons Fuel Oil @ 41.2		58.50

MUD SUPPLIES & FREIGHT CHARGES

Thiessen Equipment - Inv.# 14423 (Copy attached)	$ 92.93	
Thiessen Equipment - Inv.# 14447 (Copy attached)	587.48	
Thiessen Equipment - Inv.# 14465 (Copy attached)	7.35	
Route of The Haida - Pro.# 151004 (Copy attached)	49.20	
Route of The Haida - Pro.# 151473 (Copy attached)	3.02	739.98

DIP TEST - Hole # EC-100

June 20/74	1 Test @ 500'	$41.25	
	1 Test @ 850'	45.45	86.70

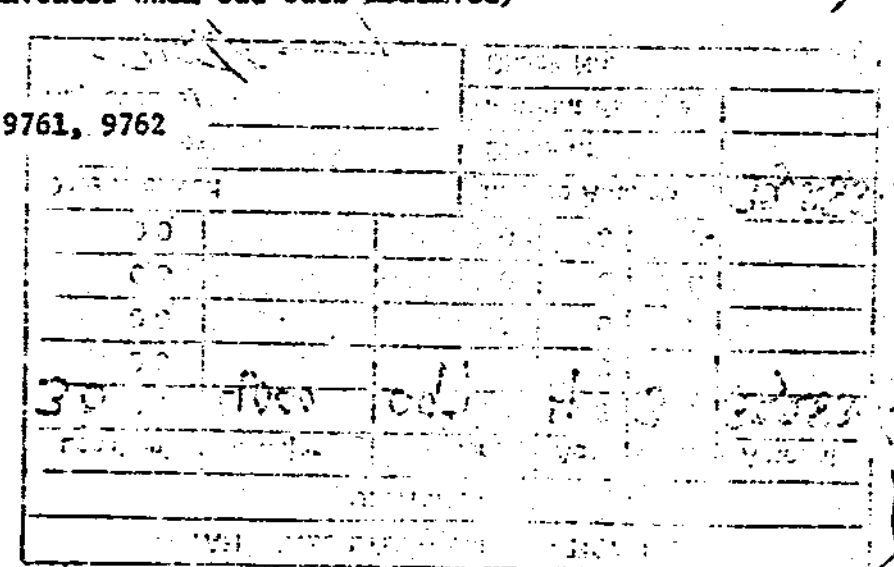
SUPPLIES LEFT IN HOLE # EC-102

1 - Only Sub BW Casing Pin NQWL Rod Box		$35.25	
4 - Only NQ - 10' Drill Rods	@$38.50	154.00	
		189.25	
	5% Tax	9.46	198.71

~~$32,469.05~~
32,283.65

FIELD COST DIAMONDS (To Be Invoices When Cut-Outs Received)

Drill # 1 - Hole # 101
BQ Shell - M7YA-101
BQ Core - M6L-9763, 9793, 9761, 9762
Hole # 102
NQ Core # 1081
BW Shoe # 14ZW-669
Hole # 103
HW Shoe # K4ZW-189



Connors Drilling Ltd.

155 WEST 3rd. AVENUE, VANCOUVER, B.C. CANADA V5Y 1E8
AREA CODE 604/872 - 1675

JOB: 1-437
INVOICE NO: 5039
DATE: July 19, 1974

Utah Mines Limited,
#412-1111 West Hastings Street,
Vancouver, B. C. V6B 1L9.

271

SURFACE DIAMOND DRILLING
HOLBERG, B. C.
July 1 - 15, 1974.

FOOTAGE FOR D.D. Holes #	#H-104	42' - 500' - 458'	@$13.75	$6,297.50	
	#H-106	0' - 100' - 100'	12.50	1,250.00	
		100' - 157' - 57'	15.00	855.00	
		157' - 339' - 182'	13.75	2,502.50	
	#H-103	735' - 1000' - 265'	15.15	4,014.75	
		1000' - 1103' - 103'	18.20	1,874.60	
	#H-105	0' - 14' - 14'	12.50	175.00	
		14' - 500' - 486'	13.75	6,682.50	
		500' - 641' - 141'	15.15	2,136.15	
	#H-107	0' - 20' - 20'	12.50	250.00	
		20' - 182' - 162'	13.75	2,227.50	
		1988'			$28,265.50
MEALS SERVED YOUR PERSONNEL (Copy Attached)		July 1-15/74 82 Meals	@$3.00		246.00
TRACTOR RENTAL 1/2 Month		July 1-15/74 1/2 x $1,600.00		$800.00	
		5% Tax		40.00	840.00

— 2

Connors Drilling Ltd.
Subsidiary of
Bow Valley Industries Ltd.

155 West 3rd Avenue Vancouver 10, B.C., Canada
Area Code 604/872-1675

Utah Mines Limited,

DATE July 19, 1974

INVOICE NO. 5039
JOB: 1-437

FIELD COST WORK

Date	Shift	Drill #	Man Hrs.	Drill Hrs.	Remarks
July 3/74	Day	1	9	0	Help logger build new site for Hole EC-106.
July 7/74	Day	1	30	10	Tear down & ready to move
July 8/74	Day	1	35	10	Move to EC-106
July 9/74	Day	1	34	9	Ready for helicopter
July 10/74	Day	1	40	10	Flying equipment
July 13/74	Night	1	4	2.	Quick Seal Hole
July 14/74	Day	1	2	1	Quick Seal Hole
July 3/74	Night	2	16	8	Ream & clean hole
July 4/74	Day	2	4	2	Ream hole
July 5/74	Day	2	3	1 ½	Mixing mud
July 6/74	Night	2	5	2 ½	Cemented hole
July 7/74	Day	2	32	10	Tear down & move
July 8/74	Day	2	28	10	Move & Setup Hole EC-105
July 9/74	Night	2	2	1	Mixing Mud
July 10/74	Day	2	4	0	Help sling for helicopter Hole EC-106
July 12/74	Day	2	30	9	Tear down ready for move
July 13/74	Day	2	40	10	Moving to Hole #EC 107
July 14/74	Day	2	18	5	Complete setting up
July 14/74	Day	2	2	1	Mixing mud
July 14/74	Night	2	2	1	Mixing mud
July 15/74	Day	2	3	1 ½	Change & mix mud
July 15/74	Night	2	3	1 ½	Change & mix mud
			346	106	

Total Man Hours	346	@$11.00	$3,806.00
Total Drill Hours	106	9.00	954.00

4,760.00

DIP TESTING

Date	Shift	Drill #	Test		
July 6/74	Day	1	1	@ 500'	$41.25
July 6/74	Night	2	1	@550'	45.45
July 6/74	Night	2	1	@1100'	54.60

141.30

MUD SUPPLIES SHIPPED
Thiessen Equipment - Inv.# 14402 (Copy attahced)

1,411.14

—3

Connors Drilling Ltd.
Subsidiary of
Bow Valley Industries Ltd.

155 West 3rd Avenue Vancouver 10, B.C., Canada
Area Code 604/872-1675

Utah Mines Limited

DATE July 19, 1974

INVOICE NO. 5039
JOB: 1-437

WALKING TIME

Date	Shift	Man Hrs.
July 11/74	Night	4
July 12/74	Day	4
July 12/74	Night	4
July 13/74	Day	4
July 13/74	Night	4
July 14/74	Day	4
July 14/74	Night	4
July 15/74	Day	4
		32 Man Hours @$10.00

320.00

~~$35,668.58~~
35,136.38

UTAH MINES LTD. -- EXPLORATION DEPT.
DISTRIBUTION

Location	Major	Minor	Act.	Exp.	Amount
30 00	4660	097	40	30	35,136.38
00		0	0	0	
00		0	0	0	
00		0	0	0	

Date received	Invoice Amount	35,136.38
Ext. & Prices	Discount	
Approved by	Amount Payable	
	Check No.	

Conliors Drilling Ltd.
Subsidiary of
Bow Valley Industries Ltd.

155 WEST 3rd. AVENUE, VANCOUVER, B.C. CANADA V5Y 1E8
AREA CODE 604/872 - 1675

271

Utah Mines Limited,
#412-510 West Hastings Street,
Vancouver, B. C. V6B 1L9.

JOB: 1-437
INVOICE NO: 5054
DATE: August 9, 1974

SURFACE DIAMOND DRILLING
HOLBERG, B. C.
July 16 - 31, 1974

FOOTAGE FEE

D.D. Hole # EC-106	339' - 500' - 161'	@$13.75	$2,213.75	
	500' - 522' - 22'	15.15	333.30	
	522' - 651' - 129½'	13.75	1,773.75	
EC-107	182' - 500' - 318' 317	13.75	~~4,372.50~~	4358.75
	500' - 706' - 206'	15.15	3,120.90	
Ec-108	0' - 31' - 31'	12.50	387.50	
	31' - 500' - 469'	13.75	6,448.75	
	500' - 522' - 22'	15.15	~~330.30~~ 333.30	
EC-109	0' - 38' - 38'	12.50	475.00	
	38' - 500' - 462'	13.75	6,352.50	
	500' - 588' - 88'	15.15	1,333.20	
	~~1946'~~ 1945			~~$27,144.45~~ 27,130.70

MEALS SERVED YOUR PERSONNEL

July 16-31/74 (Copy attached) 96 @$3.00 — 288.00

TRACTOR RENTAL - July 16-31/74

1/2 Month 1/2 x $1.600.00 $800.00
5% Tax 40.00 — 840.00

GM

nnors Drilling Ltd.
Subsidiary of
Bow Valley Industries Ltd.

155 West 3rd Avenue Vancouver 10, B.C., Canada
Area Code 604/872-1675

Utah Mines Limited,

DATE August 9, 1974

INVOICE NO. 5054

JOB: 1-437

FIELD COST WORK (Drill # 1)

Date	Shift	Man Hrs.	Drill Hrs.	Remarks
July 17/74	Night	4	2	Pull NQ rods to reduce to BQ
July 18/74	Day	4	4	Install NQ rods for casing
July 18/74	Day	4	4	Help fallers for next set-up
July 18/74	NIght	6	3	Reduce hole to BQ drilling
July 19/74	Day	2	1	Mixing mud
July 19/74	Night	6 8	3 4	Hole finished pull rods & casing
July 20/74	Day	40	10	4 men tear down for chopper move
July 21/74	Day	40	10	4 men move with chopper
July 22/74	Day	40	10	4 men move with chopper on drill #2 & set-up. Drill #1.
July 24/74	Day	5	2½	Lost circulation & mixing mud.
July 24/74	Night	5	2½	Ream hole & mix mud
July 25/74	Day	4	2	Ream hole & mix mud
July 25/74	Night	6	3	Lost circulation & mix mud
July 26/74	Day	6	3	Lost circulation & mix mud
July 26/74	Night	5	2½	Lost circulation & mix mud
July 27/74	Day	6	3	Lost circulation & mix mud
July 27/74	Night	6	3	Lost circulation & mix mud
July 28/74	Day	6	3	Lost circulation & mix mud
July 29/74	Day	4	2	Lost circulation & mix mud
July 29/74	Day	4	2	Hole finished, pull rods
July 30/74	Day	40	10	Tear down & moving
July 31/74	Day	40	10	Building set-up
		(Drill # 2)		
July 16/74	Day	3	1½	Mixing mud
July 16/74	Night	3	1½	Mixing mud
July 17/74	Day	2	1	Mixing mud
July 17/74	Day	7	3½	Help fallers with next set-up
July 17/74	Night	3	1½	Mixing mud
July 18/74	Day	2	1	Mixing mud
July 18/74	Day	6	3	Building next set-up
July 18/74	Night	3	1½	Mixing Mud
July 19/74	Day	32	10	Tear down for chopper move
July 20/74	Day	40	10	Tear down & build next set-up
July 21/74	Day	30	10	Flying equipment with chopper
July 22/74	Day	30	10	Flying equipment with chopper
July 23/74	Day	25½	8	Setting up drill
July 26/74	Day	2	1	Mixing mud
July 24/74	Day	9	3	Complete setting up
July 25/74	Day	10	5	Lost circulation & mixing mud
July 25/74	Night	2	1	Ream casing 36'-38'
July 25/74	Night	3	1½	Lost circulation

— 3

Majors Drilling Ltd.
Subsidiary of Dow Valley Industries Ltd.

155 West 3rd Avenue Vancouver 10, B.C., Canada
Area Code 604/872-1675

Utah Mines Limited,

DATE August 9, 1974

INVOICE NO. 5054
JOB: 1-437

FIELD COST WORK CON'T: (Drill #2)

Date	Shift	Man Hrs.	Drill Hrs.	Remarks
July 26/74	Day	1	½	Lost circulation
July 26/74	Night	4	2	Lost xx circulation
July 27/74	Day	2	1	Mixing mud
July 27/74	Night	2	1	Mixing mud
July 28/74	Day	3	1½	Mixing mud
July 28/74	Night	2	1	Mixing mud
July 29/74	Day	32	10	Tearing down & ready to move
July 30/74	Day	40	10	Moving with chopper
July 31/74	Day	40	10	Setting up
		623½	207½	
CREDIT 2 Moves		32		
		591½		

Total Man Hours	591½	@$11.00	$6,506.50	
Total Drill Hours	207½	9.00	1,867.50	8,374.00

DIP TESTING

Date	Drill #	Test	
July 29/74	1	1 @ 500'	41.25

MUD SUPPLIES AND FREIGHT

Thiessen Equipment - Inv.# 14587 (Copy attached)	$2,334.15	
Thiessen Equipment - Inv.# 14578 (Copy attached)	26.25	
Route of Haidas - Frt. A/C (Copy attached)	536.68	2,897.08

WALKING TIME

Date	Shift	Man Hrs.		
July 16/74	Day	4		
July 17/74	Day	4		
July 17/74	Night	4		
July 18/74	Day	4		
July 18/74	Night	4		
July 19/74	Day	4		
July 19/74	Night	4		
		28 Man Hours	@$10.00	280.00

$39,864.78

39,851.03

Connors Drilling Ltd.
Subsidiary of
Bow Valley Industries Ltd.

155 WEST 3rd. AVENUE, VANCOUVER, B.C. CANADA V5Y 1E8
AREA CODE 604/872 - 1675

Job : 1-437
INVOICE NO: 5106
DATE: August 23, 1974

Utah Mines Ltd.,
#412 - 510 West Hastings,
Vancouver, B.C. V6B 1L9

SURFACE DIAMOND DRILLING
Holberg, B.C.
August 1 - 15, 1974

Footage Fee				
D.D. Hole EC 110	0 - 81	81 @ 12.50	1012.50	
	81 - 292	211 @ 17.45	3681.95	
	292 - 500	208 @ 13.75	2860.00	
	500 - 772	272 @ 15.15	4120.80	
EC 111	0 - 46	46 @ 12.50	575.00	
	46 - 500	454 @ 13.75	6242.50	
	500 - 832	332 @ 15.15	5029.80	23,522.55
		1604		
Meals Served Utah Personnel				
	92 @ 3.00			276.00
Tractor Rental (Aug 1-15/74)				
	½ month @ 1600.00		800.00	
		5% TAX	40.00	840.00

RECEIVED
AUG 26 1974

..... 2

Connors Drilling Ltd.
Subsidiary of
Bow Valley Industries Ltd.

155 West 3rd Avenue Vancouver 10, B.C., Canada
Area Code 604/872-1675

To: Utah Mines Ltd.

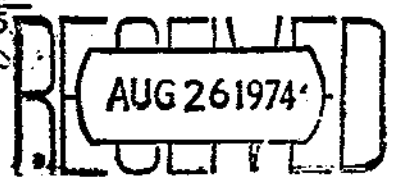
DATE: August 23, 1974

INVOICE NO. 5106

Job: 1-437

Field Cost Work

Date	Shift	Drill #	Man Hrs	Drill Hrs	Remarks
Aug 1	Day	1	40	10	Moving on hole EC 111
2	"		6	3	"
3	"		2	1	Mixing mud
3	Nite		6	3	Ream casing 52-62'
3	"		4	2	Quik-Seal hole
3	"		2	1	Mixing mud
4	Day		8	4	Quik-Seal hole
4	"		2	1	Mixing mud
4	Nite		4	2	Reaming rods to bottom
14	Day		9	4½	Flying rods to drill
15	"	1	20	5	Tear down for move
Aug 1	Day	2	28	10	Finished moving
1	Nite		4	2	Mixing mud
6	Day		4	0	Clearing road with cat
6	Nite		4	2	Quik-Seal hole
6	"		2	1	Mixing mud
7	Day		6	3	Quik-Seal & cementing hole
7	Nite		8	4	Drilling out cement
7	"		4	2	Mixing mud
8	Day		2	1	Reaming rods to bottom
8	"	2	4	2	Mixing mud
8	Nite		6	3	Reaming rods to bottom
8	"		4	2	Mixing mud
9	Day		8	4	Reaming rods to bottom, twice
9	"		2	1	Mixing mud
9	Nite	2	4	2	Mixing mud
10	Day		13	6½	Reduce hole HQ to NQ @ 292'
10	Nite		10	5	Reaming hole
11	Day		20	10	Reaming casing 292 - 235'
12	"		2	1	Mixing mud
13	Nite		4	2	Mixing mud
13	Day		4	2	Mixing mud, flush hole
14	Day		4	2	Mixing mud
14	Nite		4	2	Mixing mud
15	Day		4	2	"
15	Nite		4	2	"
			~~272~~	~~115~~	
	Credit Moves	2	262	110	
			~~+32~~		
			~~240~~		
			230		



..... 3

Connors Drilling Ltd.
Subsidiary of
Bow Valley Industries Ltd.

155 West 3rd Avenue Vancouver 10, B.C., Canada
Area Code 604/872-1675

To: Utah Mines Ltd.

DATE August 23, 1974

INVOICE NO. 5106

Job: 1-437

Field Cost Work con't...

Total Man Hours	~~240~~ 230 @ 11.00	~~2640.00~~ 2530.00		
Total Drill Hrs.	~~115~~ 110 @ 9.00	~~1035.00~~ 990.00		~~3,675.00~~ 3520.00

Dip Test (HOle Ec 111)

1 @ 500'	3 x 13.75	41.25	
1 @ 832'	3 x 15.15	45.45	86.70

Mud Supplies Shipped

Thiessen Equipment - Inv. #14618 (copy attached) 86.94

Field Cost Diamonds Consumed

June 16 - 31, 1974
D.D. Hole #101

1 BQ Shel # M7yA101

Original Cost	155.38	
Recovery	7.47	
Loss	147.91*	

4 BQ Core Bits #'s M6L9761, 9762, 63, M4L9793,

Rx Original Cost 4/5 of 1245.94 =	996.75	
Recovery 4/5 of 146.89 =	117.51	
Loss	879.24*	

D.D. Hole #102

1 BW Impregnated Shoe

Total Loss	102.00*	
	1129.15*	- 28,332.19
5% P.S.T.	56.46	1,185.61
		~~29,672.80~~ 29,517.80

RECEIVED
AUG 26 1974

81-0700

Connors Drilling Ltd.
Subsidiary of
Bow Valley Industries Ltd.

155 WEST 3rd. AVENUE, VANCOUVER, B.C. CANADA V5Y 1E8
AREA CODE 604/872 - 1675

Job: 1-437
INVOICE NO: 5141
DATE: Sept. 6, 1974

Utah Mines Ltd.
#412 - 510 W. Hastings St.,
Vancouver, B.C. V6B 1L9

SURFACE DIAMOND DRILLING
Holberg, B.C.
August 16-31, 1974

Footage Fee

D.D. Hole EC 110:	772 - 1000	228	@ 15.15	3454.20	
	1000 - 1004	4	@ 18.20	72.80	
112:	0 - 100	100	@ 12.50	1250.00	
	100 - 103	3	@ 15.00	45.00	
	103 - 220	117	@ 13.75	1608.75	
	220 - 500	280	@ 12.50	3500.00	
	500 - 536	36	@ 13.75	495.00	
113:	0 - 30	30	@ 12.50	375.00	
	30 - 310	280	@ 13.75	3850.00	
114:	0 - 75	75	@ 12.50	937.50	
	75 - 196	121	@ 13.75	1663.75	
	196 - 485	289	@ 12.50	3612.50	20,864.50
		1563			

Meals Served Your Personnel

Aug 16-31/74 (copy attached) 95 @ 3.00 — 285.00

Tractor Rental

Aug 16-31/74	½ month @ 1600.00	800.00	
	5% TAX	40.00	840.00

Connors Drilling Ltd.
Subsidiary of
Bow Valley Industries Ltd.

155 West 3rd Avenue Vancouver 10, B.C., Canada
Area Code 604/872-1675

To: Utah Mines Ltd.

DATE Sept. 6/74

INVOICE NO. 5141

Job : 1-437

Field Cost Work

Date	Shift	Drill	Walking Time	Man Hrs	Drill Hrs	Remarks
Aug 16	Day	1		48	10	Tear down & ready for move
17	"			40	10	Building set up
18	"			40	10	Move to Hole Ec 112
19	"			16	4	Complete setting up
19	"			4	2	Mixing mud
19	Night		2			
20	Day		2	4	2	Mixing mud
20	Night		2	4	2	" "
21	Day		2	2	1	" "
21	"			2	1	Reduce hole to BQ
21	"			8	4	Ream hole for casing
21	Night		2	4	2	Install casing for BQ
21	"			4	2	Mixing mud
22	Day		2	2	1	" "
22	Night		2	2	1	" "
23	Day		2	2	1	" "
23	Night		2			
24	Day		2	2	1	Mixing Mud
24	Night		2			
25	Day		2	2	1	Mixing Mud
25	"			16	8	Moving to Hole EC 114
25	Night		2	4	2	Mixing Mud
26	Day		2	4	2	" "
26	Night		2	8	4	xgx Lost circulation
27	Day		2	4	2	Mixing mud
27	"			2	1	Ream hole 80'-142'
28	"		2	2	1	Mixing mud
28	"			6	3	Reaming 105'-191'
28	"			4	2	Casing 191'
28	Night		2	2	1	Mixing mud
28	"			6	3	Ream casing 191'-211'
29	Day		2	2	1	Mixing mud
29	"			2	1	Ream casing 211'-221'
29	Night		2	2	1	Mixing mud
30	Day		2	2	1	" "
30	xxggxNight		2			
31	Day	1	2	3	1½	Mixing mud

Connors Drilling Ltd.
Subsidiary of
Bow Valley Industries Ltd.

155 West 3rd Avenue Vancouver 10, B.C., Canada
Area Code 604/872-1675

DATE Sept. 6/74

To: Utah Mines Ltd.

INVOICE NO. 5141

Job : 1-437

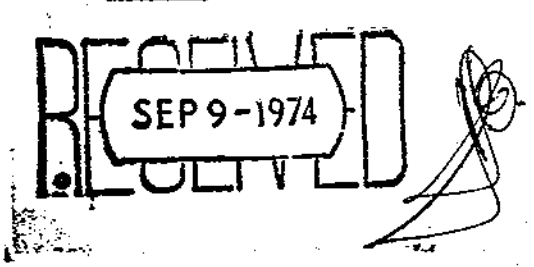
Field Cost Work - con't

Date	Shift	Drill	Walking Time	Man Hrs	Drill Hrs	Remarks
Aug 16	Day	2		4	2	Mixing mud
17	"			7	3½	Cleaning out hole
17	"			2	1	Mixing mud
17	Night			4	2	" "
18	Day			8	2	4 men tearing down
19	"			26	6½	Pulling casing
19	"			14	3½	Prepare for move
20	"			40	10	4 men prepare for move
21	"			38	10	4 men build set up
22	"			40	10	Hauling rods to heliport
23	"			40	10	4 men moving
24	"			40	10	4 men moving
25	"			14	7	Complete setting up
28	"			4	2	Mixing mud
28	Night			12	6	Ream casing 30'-60'
28	"			4	2	Mixing mud
29	Day			2	1	Cleaning out hole
29	"			4	2	Mixing mud
29	Night			4	2	" "
30	Day			2	1	" "
30	Night			2	1	" "
31	Day	2		4	2	Mixing mud
			46	570	186	
Credit 3 moves				-48		
			46	522	186	

Total Walking Time	46 @ 10.00	460.00	
Total Drill Hours	186 @ 9.00	1674.00	
Total Man Hours	522 @ 11.00	5742.00	7,876.00

Dip Test (Hole EC 110)

1 test @ 500'	3 @ 13.75	41.25	
1 test @ 1000'	3 x 15.15	45.45	86.70



81-0700

Connors Drilling Ltd.
Subsidiary of
Bow Valley Industries Ltd.

155 West 3rd Avenue Vancouver 10, B.C., Canada
Area Code 604/872-1675

DATE Sept. 6/74

To: Utah Mines Ltd.

INVOICE NO. 5141

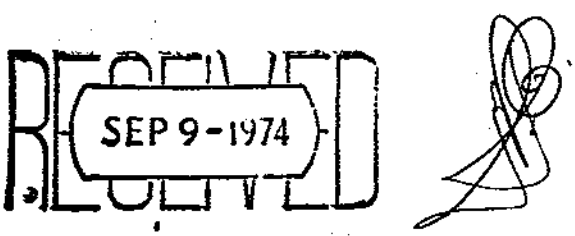
Job: 1-437

Mud Supplies Shipped

Thiessen Equipment Inv.	14741	(copy attached)	1121.40	
	14835	(copy attached)	3180.19	
	14846	(copy attached)	934.50	
Route of The Haidas	157937	(copy attached)	30.18	5,266.27

Field Cost Diamonds Consumed

June 16-30/74 (Hole 102)			
1 - NQ core #1081		187.58	
(Hole 103)			
1 - HW shoe #K42W-189		155.80	
		343.38	
	5% TAX	17.17	360.55
			35,579.02



Connors Drilling Ltd.
Subsidiary of
Bow Valley Industries Ltd.

155 WEST 3rd. AVENUE, VANCOUVER, B.C. CANADA V5Y 1E8
AREA CODE 604/872 - 1675

Tax is included in

JOB: 1-437

Utah Mines Ltd.,
#412-510 W. Hastings Street,
Vancouver, B. C. V6B 1L9.

INVOICE NO: 5199
DATE: September 24, 1974

included in Total

SURFACE DIAMOND DRILLING
HOLBERG, B. C.
September 1 - 15, 1974

RECEIVED SEP 25 1974

FOOTAGE FEE

D. D. Hole #	EC-113	310' - 500' - 190'	@$13.75	$2,612.50	
		500' - 756' - 256'	15.15	3,878.40	
	EC-114	485' - 500' - 15'	12.50	187.50	
	EC-115	0' - 14' - 14'	12.50	175.00	
		14' - 405' - 391'	13.75	5,376.25	
	EC-116	0' - 32' - 32'	12.50	400.00	
		32' - 178' - 146'	13.75	2,007.50	$14,637.15
		1044'			

MEALS SERVED YOUR PERSONNEL

Sept. 1-15/74 (Copy attached)	79 Meals	@$3.00	237.00

TRACTOR RENTAL Sept. 1-15/74

1/2 Month	$800.00	
5% Tax	40.00	840.00

FIELD COST WORK

Date	Shift	Drill #	Walking Time	Man Hrs.	Drill Hrs.	Remarks
Sept. 1/74	Day	X 1	2	2	1	Mixing Mud
Sept. 1/74	Day	1	-	10	5	Start tear down
Sept. 3/74	Day	1	3	30	10	Tearing down
Sept. 6/74	Day	1	-	30	10	Start new setup
Sept. 7/74	Day	1	-	40	10	Complete setup
Sept. 8/74	Day	1	-	40	10	Moving to Hole EC115

— 2

Connors Drilling Ltd.
Subsidiary of
Bow Valley Industries Ltd.

155 West 3rd Avenue Vancouver 10, B.C., Canada
Area Code 604/872-1675

To: Utah Mines Ltd.,

DATE September 24, 1974

INVOICE NO. 5199

JOB: 1-437

FIELD COST WORK CON'T:

Date	Shift	Drill #	Walking Time	Man Hrs.	Drill Hrs.	Remarks
Sept. 9/74	Day	1	-	40	10	Moving to Hole EC115
Sept. 10/74	Day	1	-	10 MR	5	Ream NW Casing 14'-20'
Sept. 10/74	Night	1	-	12	6	" " 20'-25'
Sept. 11/74	Day	1	-	10	5	" " 25'-40'
Sept. 11/74	Night	1	-	17	8½	" " 10'-40'
Sept. 12/74	Day	1	-	4	2	Move supply pump
Sept. 12/74	Day	1	-	14	7	Ream casing 0'-58'
Sept. 13/74	Day	1	-	4	2	" " 58'-66'
Sept. 13/74	Day	1	-	2	1	Mixing Mud
Sept. 14/74	Day	1	-	2	1	" "
Sept. 15/74	Day	1	-	2	1	" "
Sept. 1/74	Day	2	-	2	1	" "
Sept. 4/74	Day	2	-	2	1	" "
Sept. 5/74	Day	2	-	2	1	" "
Sept. 6/74	Day	2	-	4	2	" "
Sept. 7/74	Day	2	-	4	2	" "
Sept. 8/74	Day	2	-	4	2	" "
Sept. 9/74	Day	2	-	8	4	Pull casing tear down
Sept. 10/74	Day	2	-	40	10	Tearing down
Sept. 11/74	Day	2	-	40	10	Building set up
Sept. 12/74	Day	2	-	32	8	Wait on ehlicopter
Sept. 13/74	Day	2	-	40	10	Moving
Sept. 14/74	Day	2	-	20	6	Moving
Sept. 14/74	Day	2	-	4	2	Mixing mud
Sept. 14/74	Night	2	-	2	1	Mixing mud
Sept. 15/74	Day	2	-	4	2	Mixing mud
Sept. 15/74	Day	2	-	4	2	Ream casing 32'-43'
Sept. 15/74	Night	2	-	2	1	Mixing mud
			5	483	159½	
	CREDIT 2 MOVES			- 32		
				451		

TOTAL WALKING TIME	5	@$10.00	$ 50.00
TOTAL DRILL HOURS	159½	9.00	1,435.50
TOTAL MAN HOURS	451	11.00	4,961.00
			6,446.50

DIP TEST Hole # EC-114
1 Test @500' 3 x $12.50 37.50

$22,198.15

81-0700

APPENDIX D

DIAMOND DRILLING CONTRACT

DRILLING AGREEMENT

THIS AGREEMENT, entered into this 24th day of MAY, 19 74 by and between

UTAH MINES LTD., a corporation, hereinafter referred to as "Owner", and

CONNORS DRILLING LTD.,
155 WEST 3RD AVENUE,
VANCOUVER, B.C., V5Y 1E8

hereinafter referred to as "Contractor",

WITNESSETH:

WHEREAS, Owner desires to have Contractor carry out a drilling program on certain lands controlled by Owner and located in

; and

WHEREAS, Contractor is desirous of performing such drilling program for Owner and is fully equipped and capable to perform such work;

NOW THEREFORE, in consideration of the covenants and conditions hereinafter set forth, Owner and Contractor mutually agree as follows:

1. WORK TO BE PERFORMED: Contractor agrees to perform fully and completely all drilling and/or coring work requested by Owner to be done by Contractor on the abovementioned lands, such performance by Contractor to be in strict conformance with the terms and provisions of this agreement and specifically in conformance with those provisions set forth on Schedule I attached hereto and by this reference incorporated herein.

All work to be performed by Contractor hereunder shall be done at such times, such locations and in such manner as requested by Owner, subject, however, to the specific provisions set forth in Schedule I hereto.

701007

It is understood that Owner may employ other contractors to perform work, including drilling, upon the subject property and Contractor shall conduct its operations so as to best cooperate with such other contractors, if so requested by Owner.

2. WORKMEN AND EQUIPMENT: Contractor agrees to furnish and maintain in first class operating condition the equipment, machinery, tools, and supplies specified in Schedule I hereto, or necessary to perform the work as set forth in said Schedule I hereto, and all labor, including superintendence, and all other things whatsoever required or convenient to properly perform the work specified in this agreement and within the time herein required. Owner may require Contractor to discharge from the performance of this contract any employee deemed to be in any way objectionable by Owner. No equipment furnished by Contractor hereunder for use in the performance of this agreement shall, without the prior consent of Owner, be removed from the site of the work until such time as the performance of this contract shall be completed by Contractor.

3. COMMENCEMENT AND PROGRESS OF WORK: Unless otherwise specified in Schedule I herein, Contractor shall, within TEN days after being notified by Owner to start work, commence work in the field at such locations as Owner may designate and shall thereafter continue diligently in the performance of the work at such rate of progress and at such locations as may be required by Owner and shall fully complete said work to the satisfaction of Owner.

4. NO REPRESENTATIONS TO CONTRACTOR: It is understood that Contractor has satisfied itself as to the nature and location of the work, the character of the soil, rock, or other materials to be encountered, the character, kind and quantity of equipment needed for the prosecution of the work, and the conditions under which the work is to be performed and Owner has made no

representations to Contractor concerning the conditions to be encountered in the performance of the work. No verbal agreement or statement shall affect or modify any of the terms or provisions of this contract and no change, amendment, or modification of the terms or conditions of this contract shall be valid unless reduced to writing and signed by Owner and Contractor.

5. LIENS AND CLAIMS: Contractor shall discharge at once all liens, claims, stop notices, or attachments which may be filed or levied in connection with the work done by Contractor under this agreement and shall pay all taxes levied upon Contractor, its employees, equipment, property, or operations and Contractor shall hold Owner, Owner's property, and the lands upon which the work called for in this contract is being performed harmless therefrom. Contractor shall pay promptly and in full the claims of all persons, firms, or corporations performing labor upon or furnishing equipment, materials, supplies, or power used in the performance of or contributing to the work described in this agreement.

Upon completion of work under this agreement, Contractor, if required by Owner, shall deliver to the Owner a complete release of all claims for taxes, liens, claims, stop notices, or attachments arising out of this agreement or receipts in full in lieu thereof and if required in either case, an affidavit that, to Contractor's knowledge, such releases or receipts include all labor and material for which a lien, claim, stop notice, or attachment could be filed.

6. LIABILITY FOR INJURIES AND PROPERTY DAMAGE: Contractor shall save harmless Owner, Owner's property, and the lands upon which the work called for in this agreement is being performed from all liability for injury to or death of persons and for damage to property in any way arising out of Contractor's performance under this agreement.

7. PATENT RIGHTS: Contractor shall save harmless Owner, Owner's property, and the lands upon which the work called for in this agreement is being performed from any claim, damage or expense arising out of any action or proceeding for the infringement or alleged infringement of any patent arising out of Contractor's performance under this agreement.

8. PAYMENT: In consideration of the covenants of the Contractor herein set forth and the full and prompt performance of this agreement by Contractor, Owner agrees to pay to Contractor and Contractor agrees to receive and accept as full compensation for Contractor's performance of this agreement, and also for any loss or damage to Contractor arising out of this agreement or from action of the elements or from unforeseen difficulties or obstructions which may be encountered in the performance of the contract, and for all risks of every description to Contractor in connection with the work, those sums set forth in Schedule II attached hereto and by this reference incorporated herein.

An estimate will be made by Owner once each calendar month during the term of this agreement of the amount of work completed by Contractor during the preceding calendar month and Owner will, on or before the last day of each calendar month, pay to Contractor the amounts due under the terms of Schedule II hereto for such work completed by Contractor during said preceding month. The estimates and calculations made by Owner as to the amount of work done by Contractor hereunder shall be final and binding upon Contractor and shall conclusively establish the amount of work done by Contractor hereunder.

9. BOND: Contractor shall furnish a surety bond in form satisfactory to Owner, with a surety approved by Owner, in the amount of NOT APPLICABLE ($) guaranteeing the faithful performance of this agreement by Contractor and the payment by Contractor of the claims of all persons, firms or corporations performing labor upon or furnishing materials, equipment, supplies or power used in the performance

of this agreement.

No work shall be commenced under this contract until the required bond is produced and submitted to Owner. Should any surety upon the said bond become unacceptable to Owner for any reason at any time, Contractor will promptly furnish such additional surety, sureties, or security as Owner may request.

10. TERM OF CONTRACT: Unless the provisions of Schedule I shall specify a different length of time during which Contractor shall be bound to perform under the terms of this agreement, Contractor shall be obligated to perform for Owner under the provisions of this contract upon the lands hereinabove described, all drilling work requested by Owner to be performed by Contractor during a period of one (1) year from and after the date of this agreement, provided, however, that Owner may, at any time after the completion of the minimum amount of drilling work guaranteed to Contractor under the provisions set forth in Schedule I, terminate this agreement by giving notice of such termination to Contractor.

11. INSURANCE: Contractor shall obtain and carry during the period of this agreement at Contractor's sole cost the following insurance coverage:

Insurance Coverage	Minimum Limits	
Bodily Injury Liability including Contractual Liability and Completed Operations	Each person	$100,000.00
	Each occurrence	$300,000.00
Property Damage Liability including Contractual and Completed Operations	Each occurrence	$100,000.00
	Aggregate	$100,000.00
Automobile: (Including owned and non-owned automobiles)		
Bodily Injury	Each person	$100,000.00
	Each occurrence	$300,000.00
Property Damage	Each accident	$100,000.00

Workmen's Compensation and Employer's Liability	Full Statutory Compliance Each person Each accident	 $100,000.00 $300,000.00

No work under this contract shall be started until certificates of insurance conforming with the above minimum requirements are obtained and submitted to the Owner. Insurance companies must be satisfactory to Owner, and policies must provide that ten (10) days' written notice be given to Owner prior to cancellation or annulment.

12. COMPLIANCE WITH THE LAW: Contractor and its employees shall at all times observe and comply with all statutes, ordinances, and regulations of any nation, state, province, municipality or other governmental authority or agency having jurisdiction over the place where the work hereunder is being carried on.

13. PERMITS: Contractor shall obtain all permits and licences necessary for the performance of this contract and shall give all necessary notices and pay all fees required by governmental agencies or by other authorities in connection with the performance of this contract.

14. SUPERINTENDENT: The Contractor shall have a competent superintendent, satisfactory to Owner, on the work at all times with authority to act for Contractor. The superintendent shall not be changed except with the consent of Owner unless the superintendent ceases to be in the employ of the Contractor.

15. CONTRACTOR NOT AGENT OF OWNER: In the execution of the work to be performed hereunder, Contractor shall operate as an independent contractor and not as an agent or employee of Owner. Contractor shall hold Owner harmless from any liability which may arise by reason of any action or representation of Contractor, its agents, or employees.

16. NOTICE AND PLACE OF PAYMENT: All notices to be given to Owner by Contractor hereunder shall be delivered to

Owner's office at 510 West Hastings Street, VAncouver, B. C.

. Any notice to be given by Owner to Contractor hereunder may be given by delivering such notice personally to Contractor's superintendent at the job site or, at Owner's option, such notice may be given by depositing said notice in any United States post office in an envelope, postage prepaid, and addressed to Contractor at 155 West 3rd Avenue, Vancouver, B. C. V5Y 1E8. Such notice to Contractor shall be deemed to have been given either upon its delivery to Contractor's superintendent or by deposit in said post office as the case may be.

All moneys payable to Contractor hereunder shall be payable at Owner's office in Vancouver, B. C. or at Owner's option may be mailed to Contractor in the manner hereinabove prescribed for the giving of notice to Contractor.

17. ASSIGNMENT: Contractor will not, without the previous written consent of Owner, assign this agreement nor subcontract any part or portion of the work to be performed hereunder to any other party.

18. PROTECTION OF INFORMATION: No information whatsoever regarding the conduct, records, or results of any work performed by Contractor under this agreement shall be given or discussed by Contractor or any of Contractor's agents or employees in any manner to or with any party other than the Owner without the prior written consent of Owner.

19. SUCCESSORS: This agreement and each and every provision hereof shall inure to the benefit of and be binding upon the parties hereto and their successors and assigns.

IN WITNESS WHEREOF, the parties hereto have executed this agreement as of the date hereinabove set forth.

UTAH MINES LTD.

OWNER

By R. D. Watson
Vice President

CONNORS DRILLING LTD.

CONTRACTOR

By

7.

SCHEDULE I

WORK PROVISIONS

1. The Contractor will provide equipment, supplies, and crews to operate ~~one~~ two drilling rigs two (2) shifts per day, including, but not limited to all necessary drilling machinery, bits, associated tools, motor fuels and oils, repair parts, casing rods, core barrels, drilling muds, cement, and all necessary labor and supervision. Contractor shall, at the commencement of work hereunder, at its own expense, transport all such equipment, supplies and personnel to the job site.

2. Holes will be drilled stand BQ, NQ, or HQ wireline. In all instances, reasonable care shall be exercised to obtain the recovery of as high a percentage of core as the formation being drilled will reasonably permit. All such core shall be properly identified in correct order and placed in core boxes provided by Owner. Contractor shall furnish a log of each hole drilled, showing location and depth drilled and/or a daily record sheet with holes drilled and footage noted. Said record is to be signed by the driller and will be used in computing payment for work done.

3. The location, depth, and angle of each hole to be drilled by Contractor shall be specified by the Owner. Holes shall have a minimum depth of 150 feet and a maximum depth of 1,200 feet. Notwithstanding any other provision of this agreement, Owner guarantees that a minimum of 5,000 lineal feet of drilling will be required of Contractor under this agreement.

4. The Owner shall check the angle and direction of each hole in order to assure that the hole is being started at the required angle and in the required direction. The Contractor assumes no responsibility for any deviation that may occur in a hole beyond the collar. The measurement of all holes shall be taken from the top of casing, or standpipe, as the case may be, which shall be kept as close to the original contour of the ground as circumstances will permit.

5. Should cavitites or loose and caving materials, or other adverse conditions be encountered, so that in the opinion of the Owner and Contractor, further drilling in a hole is not practical, the hole may be abandoned, and the Contractor shall be paid at the rates specified in Schedule II attached hereto for the footage actually drilled, provided, however, that the Contractor shall not be paid when said adverse conditions are a direct result of negligence on the part of the Contractor. The Contractor, at the request of the Owner, will replace any driller not achieving satisfactory core recovery.

6. The Contractor shall provide board and lodging for all Contractor's personnel and two (2) to four (4) of the Company's personnel. The Company shall pay the Contractor at the rate of $ 3.00 per meal for its personnel.

7. The Contractor will, at its own expense, provide transportation for Contractor's equipment, personnel, and supplies to and from the drill sites and any camp established by Contractor.

8. The Owner shall provide, at its own expense, all rights of way that may be required to enable Contractor to move to and from, and to operate on, the drill sites specified by Owner. Contractor shall be permitted to fell and cut such timber as may be required in the course of the work hereunder upon the property controlled by Owner, provided, however, that Contractor shall comply with all the terms of Owner's permits allowing such timber cutting. Owner shall save the Contractor harmless from any assessments for stumpage.

9. This agreement and any disputes arising hereunder shall be interpreted and determined in accordance with the laws of the province of British Columbia.

10. During the course of the work, the Contractor agrees at all times, to keep operations free from accumulation of waste material, rubbish and garbage, and upon completion of the work, shall remove all tools, scaffoldings, surplus materials and rubbish, and leave premises in a clean condition. The Contractor shall observe and comply with all applicable Federal and Provincial laws, regulations and orders relating to prevention of forest fires and sanitation.

SCHEDULE XI

PAYMENT SCHEDULE

The owner shall pay the Contractor in Canadian Funds for work completed according to the following schedule:

1. Surface Drilling

The price per foot for core drilling in bedrock, from the surface shall be as follows:

	HQ	NQ	BQ
0 - 500 feet	$17.45	$13.75	$12.50 per foot
500 - 1,000 feet	$20.74	$15.15	$13.75 per foot
1,000 - 1,500 feet	$24.68	$18.20	$15.80 per foot

2. Overburden drilling

0 - 100 feet	$12.50 a foot.
100 - 250 feet	$15.00 a foot.

Beyond 250 feet, at Field Cost, if the cost of penetration is greater than $15.00 a foot.

3. Field Cost Defined

"Field Cost" is defined for the purpose of this Agreement as all direct labor, including supervision, at $11.00 a man hour, drill and equipment (support) rental at $9.00 per drill rig hour, and the cost of pipe or casing lost, and materials and supplies consumed in the work.

4. Casing, Reaming, Cementing and Mud Circulation operations, in overburden or bedrock, if and when required, shall be at Field Cost.

5. Pipe or Casing Left in Holes

Any Casing, Casing Shoe bits, or pipe left in holes at Owner's request, shall be paid for by owner at the Contractor's Cost, F.O.B. the drill site.

6. Surveying Holes

Any Clinometer survey required by Owner, shall be paid by Owner at a rate equal to the cost of three feet of drilling at the depth where tested.

7. Sludge Samples

The Contractor shall at the Owner's request, collect sludge samples when possible at no cost to Owner. Containers for such samples shall be provided by Owner at no cost to Contractor.

8. Standby Time

Standby time at request of Owner, shall be paid at Field Cost.

9. Travel Time

Should the travel time between drill camp and drill sites exceed one half hour per man, per day, the Company agrees to re-imburse the Contractor for all the travel time at the rate of $10.00 a man hour.

10. Water

If the source of water supply is a distance greater than 1,500 feet from the drilling site or a vertical lift of over 300 feet, owner shall pay Contractor's actual cost for transporting water in excess of 1,500 feet distance or over lifts in excess of 300 feet.

11. Moving

The first 16 man hours incurred in moving between drill sites shall be for the Contractor's Account. Any additional time incurred in moves between drill sites would be for the Company's Account at Field Cost.

12. Mobilization and Demobilization

Contractor, shall at the commencement of operations under this Contract, transport all of its equipment, supplies, and personnel to the truck discharge point, and upon completion of the work under this Contract shall transport all of its equipment, supplies, and personnel from the truck loading point to such other destination as Contractor may choose, for two drilling outfits, associated equipment, operating personnel, a total sum of $5,000.00.

13. Tractor Rental

The Contractor agrees to provide a tractor to assist in moving and servicing operations at a monthly rental of $1,600.00. Operator's time at Field Cost Labor Rates, for the Company's Account.