

B.C. Hydro & Power Authority

SUMMARY REPORT

STAGE 2 HAT CREEK EXPLORATORY DRILLING

- (1) RESULTS OF STAGE 2 PROGRAM
- (2) RECOMMENDED EXTENSION OF STAGE 2

April 28, 1975

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SUMMARY

The Stage 2 exploratory drill program in Upper Hat Creek Valley has essentially been completed with approximately 27,000 feet drilled of the intended 33,000 feet and with about \$60,000.00 remaining in the budgeted funds for the program. The expenditure of the remaining \$60,000.00 in the budget would complete about 3000 feet more drilling.

The overrun of Stage 2 costs was caused principally by higher-than-estimated winter drilling costs in February and March.

The results of the Stage 2 exploratory drilling are considered to be very good, in that: (i) they have indicated that the main coal layer(s) found in No. 1 Deposit underlie the full length of the valley; however, not everywhere close enough to the surface to permit surface mining, and (ii) a major coal layer has been intersected close to surface in DH 75-62, about 3 miles south of No. 1 Deposit. The intersection in DH 75-62 indicates the possible occurrence of a major coal deposit economically comparable to No. 1 Deposit, therefore, further drilling is warranted on this target.

Two drill programs are described and recommended for consideration in this report as a continuation of Stage 2, to be called Stage 2B. One program is designed as a minimum follow-up exploration of the DH 75-62 coal discovery, consisting of six holes for a total of 9000 feet. The other program includes the above drilling, but also includes 15,600 feet designed to complete the reconnaissance exploration of the most promising portions of the rest of the valley.

The estimated total costs of the above two programs are:

- (i) DH 75-62 follow-up - \$ 353,000.00
- (ii) Full program - \$ 804,000.00

The purpose of this report is to provide the basis for consideration of the general options available to continue the coal exploration of the Upper Hat Creek Valley.

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INTRODUCTION

On November 1, 1974 a drill program designed to explore the valley of Upper Hat Creek beyond the general area of the No. 1 Openpit Deposit was begun. This program, designated as Stage 2, nearly 85 percent completed, has been shut down for almost a month (April) due to unfavourable ground conditions in the valley during Spring breakup. At this time it appears that it will be at least early in May before conditions will be favourable to resume the drilling.

Although the analytical and geophysical data from Stage 2 are still being processed, the general results of the program are known and it is therefore considered opportune, during the present interruption of the fieldwork, that the results be reviewed and a decision made as to a possible extension of Stage 2.

Stage 2 included four rotary drill holes that were drilled as a test to determine the comparative cost and usefulness of this type of drilling relative to diamond drilling.

This report first summarizes the general results of Stage 2 to date and then describes a recommended extension to the program.

The holes drilled to date in Stage 2 are listed, with footages, in Table 1.

TABLE 1
HAT CREEK EXPLORATION - STAGE 2 DRILLING

<u>Dates Started</u>	<u>Hole No.</u>	<u>Overburden depth</u>	<u>Total depth drilled in Stage 2</u>
Oct. 24, 1974	<u>DDH*</u> 74 - 42	---	30 (plus 503' in Stage 1)
Oct. 27	43	---	1144 (plus 381' in Stage 1)
Oct. 30	44	---	2142 (plus 176' in Stage 1)
	45	85	1151
	46	38	1813
	47	145	1006
	48	195	1747
	75 - 49	130	1277
	50	70	1002
	51	168	1616
	52	102	1004
	53	74	999
	54	35	1000
	55	93	1000
	56	422	590
	57	369	1548
	58	160	643
	59	40	1488
	60	253	1948
	61	160	1320
	62	150	1678
	63	250	1000
	<u>TOTAL DIAMOND DRILLING</u>	<u>2939</u>	<u>27146</u>
	<u>RH*</u> 74 - 1	54	960
	2	107	1055
	3	55	1168
	4	45	1460
	<u>TOTAL ROTARY</u>	<u>261</u>	<u>4643</u>
	<u>TOTAL DDH & RH</u>	<u>3200 feet</u>	<u>31789 feet</u>

* DDH = Diamond drill hole
 RH = Rotary hole

RESULTS OF STAGE 2

OBJECTIVES OF STAGE 2:

The primary objective of Stage 2 has been to complete a reconnaissance exploration of the length of the Upper Hat Creek Valley, south of Finney Creek, by means of widely-spaced drill holes. This reconnaissance was designed to determine if there may be other areas in the valley that might be underlain, beneath the overburden cover, by one or more coal deposits whose economic potential may possibly be competitive with the No. 1 Deposit.

Unfortunately, because of a delay in obtaining coal licenses south of Finney Creek, it was necessary to drill more of the initial holes than had been planned around the periphery of No. 1 Deposit, thus decreasing the scope of the program planned for the south end of the valley. Also, due to much higher costs for the rotary drilling than originally budgeted, the amount of funds budgeted for diamond drilling had to be decreased, resulting in a further cut-back in the amount of drilling available to the south.

The above-described adjustments to the original Stage 2 program resulted in some diffusion of the primary objective of the program and a less comprehensive coverage than had been originally designed for the valley.

The distribution of the Stage 2 valley holes is shown in Figure 1. The holes are numbered from 75-49 to 75-63, incl., and are shown as both open circles (no coal intersected) and full black circles (coal intersected). Holes numbered 74-42 to 74-48, totalling 6777 feet, are not shown in Figure 1, but they were part of Stage 2 and were drilled in the vicinity of Finney Creek and on the west side of No. 1 Deposit.

As indicated on Figure 1, the Stage 2 holes are distributed along the length of the valley, south from Finney Creek, in a single row with an average spacing of about $1\frac{1}{2}$ miles between holes; no holes are more than two miles apart and none closer than one mile. The specific locations of the holes in Stage 2 were eventually dictated by ranch property boundaries and by the fact that winter conditions made it increasingly impractical to drill off the main road in the valley.

Since the entire surface area of the No. 1 Openpit is approximately one mile square, it is evident that Stage 2 holes are generally too widely spaced to guarantee the intersection of all other such deposits possible in the valley, particularly since the holes are in a single line along the eastern side of a valley 3 to 5 miles in width. However, it was considered that, even with such wide spacing, the holes would pick up enough geological information to determine if the surrounding

strata might be significantly coal-bearing. It was originally hoped that there would be enough budget-footage in the program to allow some fill-in drilling at the end of the program in the vicinity of any encouraging holes; however, due to the number of holes that were drilled near No. 1 Deposit, together with a major increase in the depths of the holes that were drilled, and higher-than-budgeted winter drilling costs, this fill-in drilling has not been possible. It is this follow-up, fill-in drilling that is proposed in this report as an extension to the Stage 2 program. Such an extension is designated here as Stage 2B.

STAGE 2 BUDGET:

The cumulative budget expenditures for the Stage 2 program, as of March 31, 1975, when the fieldwork shut down for breakup, is given in Table 2. As shown in Table 2, the unexpended balance of the total budget is \$ 86,000.00, most of which is in the contingency item of the budget, (\$ 57,500.00). The budget for nearly every item has been essentially expended at this time.

OVERRUNS:

Since it was originally estimated that the original budget would fund 33,000 feet of diamond drilling, as well as the 4643 feet of rotary drilling, and since a total of only about 30,000 feet of diamond drilling could be attained by expending the remainder of the budget, it is evident that the program will be about 10 percent over budget if completed. The principal reason for the budget over-run has been in the cost of diamond drilling, due to the following unanticipated contingencies:

(i) Winter Drilling: Relatively heavy, late, wet snowfall on unfrozen ground resulted in higher-than-anticipated costs for snow clearing. Also, pumping costs during freezing temperatures were higher than estimated.

(ii) Transport of Crews: Because some of the Stage 2 holes were 10 miles or more from the camp, it became necessary to pay the drill crews for travel time, rather than move the camp, and due to difficult driving conditions in February and March, this amounted to a major cost item.

These and related items resulted in an increase in diamond drilling costs of about \$ 3.50 per foot for about one month from mid-February to mid-March. With approximately 6500 feet drilled in this period, an extra cost of \$ 23,000.00 thus was expended in drilling for that one month.

Other major costs still to be paid include: (i) \$ 8000.00 for the construction of permanent core storage racks, (ii) \$ 5100.00 for geophysical logging, (iii) \$ 2000.00 for road and drill site reclamation, and (iv) approximately \$ 7000.00 for

TABLE 2

BUDGET BALANCE TO MARCH 31, 1975

HAT CREEK COAL EXPLORATION

STAGE 2

	Budget Est.	Forward Mar. 1/75	Month of March/75	Period to Mar. 31/75	Unexpended Balance as at March 31/75
<u>DIAMOND DRILLING</u>	495,000.00	356,160.73	145,940.42	502,101.15	(7,101.15)
<u>ROTARY DRILLING</u>	83,000.00	81,445.14		81,445.14	1,554.86
<u>SITE PREPARATION & ROAD BUILDING</u>	3,000.00	4,085.66	76.00	4,161.66	(1,161.66)
<u>COAL ANALYSIS</u>	32,000.00	24,072.80	6,319.00	30,391.80	1,608.20
<u>GEOPHYSICAL LOGGING</u>	63,000.00	37,385.53	13,067.84	50,453.37	12,546.63
<u>GEOPHYSICAL & TOPO SURVEYS</u>					
Map Preparation	11,000.00	9,413.94	720.00	10,133.94	866.06
<u>CAMP MAINTENANCE</u>	8,000.00	6,043.64	1,262.74	7,306.38	693.62
<u>FIELD OFFICE & EQUIP.</u>	7,000.00	4,511.19	816.14	5,327.33	1,672.67
<u>TRANSPORTATION, FREIGHT</u>	7,500.00	3,994.43	311.32	4,305.75	3,194.25
<u>TRAVEL & COMMUNICATION</u>	3,500.00	2,269.48	868.77	3,138.25	361.75
<u>SALARIES FIELD STAFF</u>	26,000.00	21,314.18	4,455.43	25,769.61	230.39
<u>SUNDRIES</u>	1,000.00	360.44	40.65	401.09	598.91
<u>MAPS & REPRODUCTIONS</u>	3,000.00	2,910.36	558.37	3,468.73	(468.73)
	743,000.00	553,967.52	174,436.68	728,404.20	14,595.80
<u>MANAGEMENT 8% approx.</u>	59,000.00	44,317.40	13,954.93	58,272.33	727.67
	802,000.00	598,284.92	188,391.61	786,676.53	15,323.47
<u>CONTINGENCIES 7% approx</u>	57,500.00				57,500.00
	859,500.00	598,284.92	188,391.61	786,676.53	72,823.47
<u>ENGINEERING AND SUPERVISION</u>	21,000.00	9,925.00	2,450.00	12,375.00	8,625.00
<u>CONSULTING & REPORTS</u>	14,000.00	8,525.00	875.00	9,400.00	4,600.00
<u>TOTAL PROJECT COST</u>	894,500.00	616,734.92	191,716.61	808,451.53	86,048.47

field crew, engineering etc. for April. This would leave an unexpended balance in the budget of about \$ 60,000.00, which would fund about 3000 feet of drilling at normal (non-winter) costs. This amount of drilling would be completed in less than two weeks.

A summary tabulation of Stage 2 direct diamond drilling costs is given below, illustrating the increase in costs during the latter part of the winter:

<u>Period</u>	<u>Footage</u>	<u>Direct Cost/Ft.</u>
Nov. 1-15	4114	\$ 16.53
16-30	3746	17.72
Dec. 1-15	1173	16.93
15-31	Nil	---
Jan. 1-15	1792	17.15
15-31	3240	19.32
Feb. 1-15	2971	17.35
16-28	2381	21.08
Mar. 1-15	4162	20.55
16-31	<u>3672</u>	<u>16.51</u>
Total	<u>27,251 ft.</u>	Ave. <u>\$ 18.46 / ft.</u>

GEOLOGY:

The Stage 2 drill holes have revealed several important features of the bedrock geology of the southern three quarters of the 16-mile-long valley of Upper Hat Creek:

(i) The floor of the valley is underlain, beneath a wide range of overburden depths, by Coldwater Formation sedimentary rocks; with a probable capping of volcanic rocks at the extreme south end of the valley near Blue Earth Creek (DDH 75-58).

(ii) Most, if not all, of the Coldwater strata beneath the valley belong to the Coal Measure Member of the formation, and therefore can be expected to be coal bearing, at least to some degree, everywhere in the valley.

(iii) The unusually great thickness of the coal layer(s) found at the north end of the valley, (No. 1 Deposit), persists to the south end.

and (iv) The Coldwater strata are dislocated by block faults throughout the full length of the valley, as they are at the north end. The intensity of the faulting

throughout the valley, relative to that at the north end, is unknown. The principal known and inferred faults in the valley are shown on Figure 1. These have been deduced from air photo lineaments, from geological mapping, and from drill results. (In Stage 2, steeply-dipping major fault zones were intersected in holes 75-58 and 75-56, and are inferred to exist, from stratigraphic discontinuities, between holes 75-60 and 75-62, and possibly others.)

The most critical conclusion that can be drawn from the above basic geological features is that the entire length of Upper Hat Creek Valley is established as underlain by coal measure and is thus a favourable exploration target for potentially economic coal deposits, either surface or underground.

One other, auxillary, geological feature revealed in the Stage 2 drilling is that for a length of 2-3 miles, south from Finney Creek the centre of the valley is underlain by non-coal-bearing Coldwater strata that are, apparently, strati-graphically immediately above or immediately below the coal layers in the Coal Measure. This anomalous absence of the massive coal sequence that occurs both to the north and to the south is probably due to dislocation by faulting; therefore, it follows that the coal layers in this portion of the valley may be displaced laterally toward the eastern or western sides of the valley.

FAULT INFLUENCE:

Although the available evidence is fragmentary, the pattern of known and inferred faults in the valley bedrock that is beginning to be pieced together is a tectonically reasonable one. It is depicted by the faults shown in Figure 1, wherein a regional fault lens bounded by two major faults, the West Boundary and the East Boundary, is traversed by two sets of complementary transverse faults (tension cracks?) that trend obliquely across the main lens; one northeastward and the other north-northwestward. This type of fault pattern is a common one in the earth's crust wherever major regional faults make sharp direction changes, in either strike or dip. At such bends in faults there is a tendency for one or more supplementary faults (crustal failures) to occur across the inside of the bend formed by the main fault, forming an elongate lens of rock that is bounded on both sides by principal faults. Such fault lenses are common both on regional and local scales. Depending on the amount of continuing movement that may have subsequently occurred on the two bounding faults, the lens of rocks within the faults could have either remained undisturbed or have been drastically disrupted by supplementary fracturing.

At Hat Creek it would appear that the main regional fault is the West Boundary Fault, which is a major branch of the Fraser Fault System to the south and west. Near the north end of Upper Hat Creek Valley the West Boundary Fault, which trends north-northwest from the Fraser Fault, makes a sharp turn in strike to the northeast, and it is this bend that has apparently been closed by the East Boundary Fault,

enclosing the Upper Hat Creek lens of Coldwater strata. This inferred fault lens has apparently been further fractured in this crustal nutcracker to produce the internal transverse faults, several of which evidently dislocate the coal measure in No. 1 Deposit.

The relative displacements of the faults within the Upper Hat Creek lens are unknown, but it appears that there is at least a major vertical component, (down on the east side), on the West Boundary Fault.

Neither the stratigraphic position nor the degree of fault dislocation of the Coldwater strata underlying the higher land along the northeastern side of the valley, outside of the main fault lens, is known. There is no reason to assume yet that this area is not underlain by the coal measure.

For comparison, an almost exact duplicate of the Upper Hat Creek hypothetical structural setting described above exists on another main branch of the Fraser Fault System at Bridge River, about 40 miles due west of Hat Creek. At Bridge River the north-northwest-trending Cadwallader Fault makes a sharp change of strike to the northeast and the resulting bend is crossed on the east side by the Fergusson Fault, forming a down-faulted crustal lens one mile in width by four miles in length that is completely flanked by older rocks. The rocks within this lens are further fractured by northeast and northwest striking complementary (tension) faults and fractures, of which the northwest-trending set has been filled with gold-bearing quartz to form the veins that were the basis for the gold mining industry in the district.

COAL:

As shown in Figures 1 and 2, major layers of coal were intersected by Stage 2 drill holes in a length of about $5\frac{1}{2}$ miles of the 9 miles of the valley length that were traversed by the line of holes. Initial analyses indicate that all of the coal intersected in Stage 2 is essentially similar in quality and characteristics to the coal in No. 1 Deposit. A summary of the coal intersections in the Stage 2 holes drilled south of Finney Creek is tabulated below:

Hole No.	Dist. from No. 1 Deposit (ft.)	Coal Intersection (ft.)	Depth to Coal (ft.)
75-54	10,000	Nil	---
75-55	10,000	Nil	---
75-63	15,000	Nil	---
75-62	20,000	1500	150
75-60	27,000	1050	870
75-61	35,000	180 + 400	650
75-56	40,000	100 (in fault)	420
75-57	50,000	650 (+)	900
75-59	50,000	Minor	830
75-58	55,000	Nil	In fault

The strata in all of the previous holes dip generally from 15-45° to the horizontal. The strati-graphy exposed in holes 75-57 and 75-59 suggests that this dip is down to the westward. If this dip is common in the valley then it follows that the coal layers should come closer to the surface to the east; however, this hypothesis will have to be checked by future drilling.

Also, it is inferred from the differences in the depths to the top of the main coal layer in each of the holes that the coal layer is displaced by major faults between holes 75-60 and 75-61 as well as between 75-60 and 75-62, 75-62 and 75-63, and possibly others.

The most important coal intersection obtained in Stage 2 is that of DH 75-62. In this hole a thickness of at least 1500 feet of coal layer is overlain by a depth of only 150 feet of overburden and barren rock. These dimensions indicate the possible existence in this area of a major coal deposit that may be equivalent to No. 1 Deposit to economically mine. It is this area that comprises the principal immediate target for an extension of the Stage 2 drilling.

Because of the possibility of the known major coal layer that underlies the valley either dipping or being faulted closer to the surface in unexplored parts of the valley, a number of other exploratory target areas also warrant reconnaissance probing by drilling. A few such holes have been included in the Stage 2B program suggested in this report. These holes will by no means eliminate all of the possibilities for the occurrence of major near-surface coal deposits; however, they will provide information on the more promising targets.

RECOMMENDED STAGE 2B PROGRAM

The most certain coal exploration of Upper Hat Creek Valley would be accomplished by the drilling of holes on a 2000-foot grid that would blanket the valley. Such a program is impractical at this time because of its high cost and the time required to do it; however, it is almost inevitable that such a drill hole coverage of the valley will eventually be accomplished as the future development of the valley proceeds. In the meantime, such a grid coverage can be started, in specific areas, by Stage 2B.

COAL HOLES:

The primary target area for Stage 2B is the region of DH 75-62, where a major coal layer was intersected at a shallow depth. Six holes are suggested here to test this area. The specific locations of these holes are arbitrary, but their general distribution is designed to determine if this coal target has the same general areal extent as No. 1 Deposit; ie, about one mile square.

The recommended depth of these holes is 1500 feet and at least two angle holes should be drilled at the sites of vertical holes to provide stratigraphic and structural correlation. A total of 9000 feet of drilling is specified for this target. The cost of angle holes, if required, is not included in this budget.

STRUCTURAL HOLES:

In addition to the 75-62 target area, it is most desirable that correlative stratigraphic data be obtained from some other part of the valley in order that more dependable extrapolations can be made of the projections of the coal layer(s) from hole to hole. For this reason one row of fairly closely-spaced holes has been suggested to cross the valley at Section 22,500S. The selection of this particular section has been governed by accessibility, by location of ranch property and by the fact that coal was intersected on it in DH 75-60.

Three holes G, H and Q on Figure 1, are suggested for this target area, each 1200 feet in depth and vertical; for a total of 3600 feet.

RECONNAISSANCE HOLES:

A number of relatively large portions of the Upper Hat Creek Valley have not been probed by drill holes and are beyond the scope of present geological projections. A number of the most promising of these target areas are suggested to

be explored by one or two reconnaissance holes in Stage 2B. The selection of the locations of many of these suggested holes, shown in Figure 1, has been governed in whole or in part by present accessibility, as well as by geology.

Six such reconnaissance holes have been suggested for Stage 2B, each 1200 feet in depth, for a total of 7200 feet of drilling. These holes, shown on Figure 1, as P, M, D, S, X and Y, are designed to explore the following targets:

(i) Section 9000 N, hole Y: The large area of hillside terrace underlain by Coldwater strata that lies east of No. 1 Deposit remains unexplored east of 15,000 E (DH 74-36). It is possible that fault dislocations could bring the coal layer close to surface in this area; therefore, one reconnaissance hole (Y) is shown at 9000 N-19000E. This location was chosen for ease of access; it would be more desirable to move it to the vicinity of Harry Lake, and this should be done if it is found to be reasonably possible.

(ii) Section 00, hole X: This hole is designed to explore the block of the Medicine Creek Fault that may be underlain by the coal layer that is apparently missing west of Hat Creek at this latitude.

(iii) Section 15,000 S, hole S: This hole is designed to explore the large block of ground, on 15,000 S, west of DH 75-62 where near-surface coal was intersected.

(iv) Section 35,000 S, hole D: The west side of the valley has not been explored to the south and, although there is a suggestion that the coal-bearing strata dip down to the west and that the coal layer will be too deep for openpit mining, the possibility still exists that block faulting or folding could have brought the coal back up to the west. Hole D is designed to test this possibility.

(v) Section 40,000 S, hole M: This hole will serve the same purpose as hole D but is also designed to explore the area of Pockock Creek where coal occurrences have been reported by local residents, although not located by our field crew.

(vi) Section 50,000 S, hole P: In Stage 2 hole 75-58 was collared to explore the extreme south end of the valley. This hole intersected badly faulted volcanic rock and could not be completed; therefore, this area was not properly tested. Hole P, has been located north of 75-58, closer to the coal holes 75-57 and 75-59, to determine the potential of the end of the valley.

It is stressed here that the locations of the above six reconnaissance holes is entirely arbitrary and could be changed either by field access conditions and/or information obtained from preceding holes in the program.

FOLLOW-UP HOLES:

It is recommended that, in addition to the holes described above for

specific target areas, a number of holes be included in Stage 2B as spare footage to be used, if warranted, as initial follow-up drilling to further resolve any encouraging results obtained in the specific holes.

This back-up footage is suggested to be 4800 feet, equivalent to four 1200-foot holes. It is emphasized that much of this footage may not be drilled, depending on results of the specified program.

SUMMARY:

The suggested drill program to follow-up the coal discovery at hole 75-62 and to complete the reconnaissance exploration of the valley is:

	<u>No. of Holes</u>	<u>Footage</u>
(1) Coal discovery (DH 75-62)	6	9000
(2) Structural holes (Sect. 22,500)	3	3600
(3) Valley reconnaissance	<u>6</u>	<u>7200</u>
	<u>Sub-Total</u>	<u>19800 feet.</u>
(4) Reserve holes	<u>4</u>	<u>4800</u>
	<u>Total</u>	<u>24600 feet.</u>

The above program is designed to fill in the coal knowledge of the valley, as well as follow-up the encouraging coal discovery made in Stage 2. Reductions to the recommended program can be made on that part of it directed toward reconnaissance exploration, say items (3) and (4), reducing expenditures accordingly. However, at the same time it should be appreciated that some allowance should be made in the program for possible successes, either around 75-62 or elsewhere, which will require follow-up.

ESTIMATED BUDGET OF STAGE 2B(1) DRILLING:

The amount of diamond drilling recommended for Stage 2B in this proposal is 19,800 feet, with a reserve of 4800 feet, for a total of 24,600 feet. The present drill contractor has indicated that he would drill this footage for the Stage 2 contract rates, thus, based on the recent (non-winter) total drilling costs, the total drilling cost is estimated to be \$17.50 per foot. The total drilling costs for the recommended drill program are therefore:

(1) DH 75-62 Discovery	9000 ft. @ \$17.50	\$ 157,500.00
(2) 22500 S Holes	3600 ft. @ 17.50	63,000.00
(3) Reconnaissance holes	7200 ft. @ 17.50	126,000.00
(4) Reserve holes	4800 ft. @ 17.50	84,000.00

Two programs have been budgeted for this proposal, one including all of the above drilling, and one including only the DH 75-62 drilling. Some other cost items are common to both programs; therefore, the differences in total program costs are not directly proportional to differences in the drilling costs.

The cost estimates for other items are:

(2) CORE RACKS:

Three more racks, at about \$3000 each, will be required to house Stage 2B core and/or the start of Stage 3 core, for a total cost of \$9000.00.

(3) SITE PREPARATION & ROAD BUILDING ETC.:

The need to maintain good relations with the ranchers necessitates extra care be taken in repairing culverts and ditches as well as bridging irrigation conduits etc. In addition, a new tote road extension will need to be constructed for about a mile down the west side of the valley to reach the western holes. A total of \$12,000.00 has been allowed to cover all such items.

(4) COAL ANALYSES:

It is evident that the six holes near DH 75-62 have a good chance of intersecting appreciable coal, as will other holes down the valley; therefore, a coal length of 12,000 feet, sampled at 30-foot lengths, has been estimated for analyses in the full program, and 7200 feet in the partial (75-62) program.

Full	\$ 32,000.00
Partial	\$ 20,000.00

To these figures should be added about \$3000.00 for special analyses, processing of results and sample bags.

(5) GEOPHYSICAL LOGGING:

The Roke charge is \$13,000.00 per month. Drill standby charges and related support costs add about \$2000 per month, for a total of \$15,000.00 per month.

The faster the drilling is completed the less money is spent on geophysical logging; therefore, three drills are recommended for the full program and two for a lesser program.

(6) SURVEYS & MAP PREPARATION:

The necessity for accurate and controlled contour maps of the Upper Hat Creek valley is becoming evident in all of the B.C. Hydro activities in the valley, from mine planning to environmental and plant studies. After conferring with the land department of B.C. Hydro we have suggested that it would be most convenient and expeditious for all if the Dolmage Campbell field staff installed targets for photogrammetric control and assisted the ground control surveyors, etc. This mapping program would be designed to produce a 2000 scale map of the entire valley and a 400 scale map of the north end (No. 1 Deposit etc.). Bids have been solicited from two companies; the lowest bid, from McElhanney, is as follows:

Photography	\$ 1,025
Ground control (from Cache Creek)	4,500
Aerial triangulation	1,150
400 scale map	7,190
2000 scale map	<u>2,550</u>
Total	\$ <u>16,415.00</u>

To this is added \$4000.00 for reproductions of maps, drill logs, analyses records etc. Costs of orthophoto map representations, while small would be additional.

(7) ROCK MECHANICS STUDIES

The program of rock testing and soil mechanics directed by Dr. Peck will probably require additional tests and studies. An arbitrary estimate of \$5000.00 has been included for this item.

(8) CAMP MAINTENANCE

Room and board for Dolmage Campbell staff (\$12.60/man/day), heating etc.

Full program	=	5 mons.	=	\$10,000.00
DH 75-62 program	=	2 mons.	=	4,000.00

(9) FIELD OFFICE & EQUIPMENT RENTALS

Trailer rental @ \$550/mon. etc.

5 month program	=	\$ 7,000.00
2 month program	=	3,000.00

(10) TRANSPORTATION & FREIGHT

Vehicle rentals, core shipment etc.

Full program	=	\$ 5,000.00
75-62 program	=	3,000.00

(11) TRAVEL & COMMUNICATION

More traffic in summer

Full Program	=	\$ 6,000.00
75-62 Program	=	4,000.00

(12) SALARIES, FIELD STAFF:

Full program:	6 mons. for 2 geologists	\$ 24,000.00
	5 mons. for 2 assistants	14,000.00
	3 mons. for 1 assistant	<u>3,500.00</u>
		\$ 41,500.00
75-62 program:	3 mons. for 2 geologists	\$ 12,000.00
	2 mons. for 3 assistants	<u>7,200.00</u>
		\$ 19,200.00

(13) SUNDRIES:

Full program:	\$ 2,000.00
75-62 program:	\$ 1,000.00

The estimated complete budgets for the two drill programs are given in Table 4. The total costs are:

Full program:	<u>\$804,000.00</u>
DH 75-62 Discovery program:	<u>\$353,000.00</u>

Any other combinations of the DH 75-62 program with any other parts of the full program will produce total costs approximately proportionally between the above two figures.

TABLE 3

BUDGET ESTIMATESTAGE 2B

Hat Creek Exploration

	<u>FULL PROGRAM</u>	<u>DH 75-62 PROGRAM</u>
(1) DIAMOND DRILLING	\$ 430,000.00	\$ 157,500.00
(2) CORE RACKS	9,000.00	9,000.00
(3) SITE PREPARATION & ROAD BUILDING ETC.	12,000.00	5,000.00
(4) COAL ANALYSES	35,000.00	23,000.00
(5) GEOPHYSICAL LOGGING	75,000.00	30,000.00
(6) SURVEYS	20,500.00	20,500.00
(7) ROCK MECHANICS	5,000.00	5,000.00
(8) CAMP MAINTENANCE	10,000.00	4,000.00
(9) FIELD OFFICE & EQUIPMENT	7,000.00	3,000.00
(10) TRANSPORTATION & FREIGHT	5,000.00	3,000.00
(11) TRAVEL & COMMUNICATION	6,000.00	4,000.00
(12) SALARIES, FIELD STAFF	41,500.00	19,200.00
(13) SUNDRIES	<u>2,000.00</u>	<u>1,000.00</u>
	\$ 658,000.00	\$ 284,200.00
(14) MANAGEMENT, ADMIN, & ACCOUNTING (8%-10%)	<u>54,600.00</u>	<u>24,700.00</u>
	\$ 712,600.00	\$ 308,900.00
(15) CONTINGENCIES (10 %)	<u>71,300.00</u>	<u>30,900.00</u>
	\$ 783,900.00	\$ 339,800.00
(16) ENGINEERING & SUPERVISION	10,000.00	6,000.00
(17) CONSULTING & REPORTS	<u>10,000.00</u>	<u>7,000.00</u>
<u>TOTAL PROJECT ESTIMATED COST</u>	\$ <u>804,000.00</u>	\$ <u>353,000.00</u>

CONCLUSIONS

The purpose of this report has been to provide the data and costs estimates that can form the basis for B.C. Hydro to consider the range of options open to it in the continued drill exploration for coal in the Upper Hat Creek Valley that may be competitive with the No. 1 Deposit as thermal plant feed.

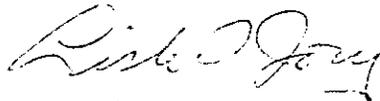
The results from DH 75-62 suggest the possible existence of a surface coal deposit that could be competitive with No. 1 Deposit. The primary portion of the Stage 2B program is designed solely to follow-up the DH 75-62 discovery.

If the DH 75-62 deposit proves to be comparable to No. 1 Deposit, it should be appreciated that much more drilling will be required on it for Stage 3 (Pit development) than on the No. 1 Deposit, which as already been extensively drilled. Hence the cost for the DH 75-62 Deposit would be considerably higher than for No. 1 Deposit. These programs can be costed as required.

It should be appreciated that the Stage 2B program could be curtailed at any time and the funds diverted to Stage 3 if so desired.

Respectfully submitted,

DOLMAGE CAMPBELL & ASSOCIATES LTD.



for Douglas D. Campbell, Vice Pres.