K- SC 71(1)A

K- Sage Creek 71(1)A

SAGE CREEK COAL LTD.

[illegible] VALLEY, B.C.

REPORT ON EXPLORATION

OCTOBER, 1970 - MAY, 197[illegible]

N.T.S.: 82-G-2

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VOLUME I OF II

K-SAGE CREEK 71(1)A

R. C. Hart

Toronto, Ontario. R. A. Benkis

GEOLOGICAL BRANCH
ASSESSMENT REPORT

00 359 (3)

PLATE 1

Sage Creek Coal in winter. Howell Creek and camp in foreground; Dally Hill and Cabin Creek Valley in background. Peaks of MacDonald Range visable in far background. Looking west.

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S U M M A R Y

During the period October, 1970 to May, 1971, Rio Tinto Canadian Exploration Limited carried out a program of drilling and geological mapping on Sage Creek Coal Ltd. coal property in the Flathead Valley of southeastern British Columbia. The drilling consisted of 2,599 feet of diamond drilling and 10,264 feet of reverse circulation rotary drilling. The presence on the property of two major and two or three minor coal seams has been demonstrated and the work has outlined two areas of possible geological coal reserves of 53,563,210 short tons and 28,441,000 short tons, respectively.

The quality of the coal is as yet in doubt, also indications suggest that the coal is coking. Additional work to establish the quality is recommended.

ACKNOWLEDGEMENTS

The exploration at Sage Creek Coal Ltd. was under the able supervision of Mr. O. Cullingham and his dedication to the task is much appreciated; in addition to the field work he is also responsible for major contribution to this report. Mr. L. Larkin of Roke Oil Enterprises Ltd. acted as expeditor on the project with much success; the help of Mr. N. Sunderland, also of Roke Oil Enterprises, is acknowledged. Mr. W. J. Hennessey of Calgary has been our consultant and his contribution is gratefully acknowledged.

INTRODUCTION

General Statement

In an option agreement dated June 30, 1970, between Rio Tinto Canadian Exploration Limited, Mill City Petroleums Limited, Royal Canadian Ventures Ltd. and Sage Creek Coal Limited, Rio Tinto undertook to explore certain coal lands located in the Flathead Valley in southeastern British Columbia.

During the period October, 1970 to May, 1971, the Company carried out diamond and rotary drilling programs and a limited amount of bulldozer trenching and geological mapping. The geological evaluation of the property is incomplete and additional field work is expected to be done during the summer of 1971. Consequently, the current presentation should be considered a Progress Report and as such it will deal specifically with the drilling programs; as a geological report is expected at a later date, only a brief chapter on general geology has been included in this report.

Property

The Sage Creek Coal Limited property consists of a number of surveyed lots and unsurveyed coal claims located in lower Flathead Valley, Kootenay Land District. Most of the acreage was acquired by Mill City Petroleums Limited and Royal Canadian Ventures Ltd. and later transferred to Sage Creek Coal Limited. Certain additional Coal Licences were acquired during 1970 directly on behalf of Sage Creek Coal Limited.

Coal Licences acquired by Mill City Petroleums Limited and Royal Canadian Ventures Ltd.:

Coal Licence No.	Lot No.	Acreage	Date of Licence
374	3506	640	July 25, 1967
375	3508	535	"
376	3509	584	"
377	7130	640	"
378	7133	638	"
379	7134	637	"
380	7135	577	"
381	7136	640	"
382	7841	640	"
383	7842	502	"
384	7843	248	"
385	7844	640	"
386	7846	643	"
387	7847	640	"
388	7848	640	"
389	7850	640	"
390	8588	585	"
391	8726	640	"
392	8727	639	"
393	8728	596	"
394	9381	150	"
395	9382	230	"
396	9385	640	"
397	11712	293	"
398	11948	593	"
399	11949	548	"
400	11950	194	"
401	11952	639	"
402	11953	190	"
403	12118	237	"
404	12121	641	"
405	12122	644	"
406	12392	642	"
407	14605	637	"
409	Unsurveyed	616	August 25, 1967
410	Unsurveyed	586	"
411	Unsurveyed	170	"
986	3510	558	September 4,1970
987	W½ of 9384	320	"
988	10450	254	"
989	9495	346	"
41 Licences		21,072 Acres	

The following Coal Licences were acquired directly on behalf of Sage Creek Coal Limited:

Coal Licence No.	Lot No.	Acreage	Date of Licence
1880	11926	580	March 1, 1971
1881	9379	546	"
1882	Unsurveyed	640	"
1883	"	245	"
1884	"	65	"
1885	"	224	"
1886	"	640	"
7 Licences		2,940 Acres	

The present area held by Sage Creek Coal Limited under 48 Coal Licences totals 24,012 acres.

Location and Access

The Sage Creek Coal property lies in lower Flathead Valley in southeastern British Columbia at the British Columbia-Montana border; the International Boundary also serves as the southern boundary of the property. To date the centre of activity has been some 6 air miles north of the border near the confluence of Howell and Cabin creeks. Geographically this location lies at:

49° 06' north latitude
114° 34' west longitude
N.T.S.: 82-G-1,2

The centre of the property is 35 air miles southeast of the town of Fernie, B.C., which is also the nearest settlement where supplies and services are available. Access to the property from Fernie is via paved Provincial Highway No. 3 to Morrissey and from there via gravel surfaced B.C. Forest Development Roads along Lodgepole and Harvey creeks and Flathead Valley. The last mile of travel to the Cabin Creek - Howell Creek junction is via a

trail over which travel by four wheel drive vehicles only is advisable (Plate 7).

The total driving distance from Fernie is 55 miles. Because the Forest Development Roads carry heavy traffic of logging trucks, travel along these roads has been restricted by B.C. Forest Service to vehicles equipped with two-way radios, or piloted by vehicles equipped in this manner. An alternate route into the property is south from Highway No. 3, east of Michel, B.C. along the Flathead Road. The Flathead Road continues across the International Boundary to Columbia Falls, Montana.

The nearest railway to the property is CP's line in Crows Nest Pass area and in Elk Valley at Morrissey. Electrical power is available in Elk Valley and the Crows Nest Pass area.

Topography

The Sage Creek Coal property is located on the west side of the Flathead Valley. Flathead Valley, which at this point is approximately six miles wide, is a more or less north-south situated depression between the two easternmost ranges of the Rocky Mountains. Along the east side the valley is bordered by Clark Range (Plate 2) whereas the west side is part of the MacDonald Range (Plate 1).

The area is drained by Flathead River which is part of the Columbia River system. Flathead Valley is filled with an accumulation of glacial drift and the river, a swift flowing stream, follows a meandering and braided channel eroded in the

drift. Couldrey, Burnham, Cabin and Howell creeks, eastwards and south-eastwards flowing tributaries of the Flathead River have eroded channels through the western flank of MacDonald Range.

The relief of the area is rugged. Elevations in the Clark Range exceed 8,500 feet above sea level (asl) and those of MacDonald Range are somewhat lower; the floor of the Flathead Valley in the area lies at approximately 4,200 feet asl. The relief of the area of our present exploration activity is somewhat more subdued; Cabin Creek and Howell Creek confluence is at approximately 4,250 feet asl whereas the peak of Dally Hill (Plate 1), south of the creek, is at 6,396 feet asl; Dilly Hill (Plate 9), north of Cabin Creek, is approximately a thousand feet lower than Dally Hill.

In the past, vegetation in the area was destroyed by forest fires. The resulting tangle of fallen trees and the present second growth vegetation make travel in the area difficult.

Rock outcrops on the property are scarce and are found only along certain ridges and in man-made exposures.

History of the Property

The knowledge of coal occurrences on the hills north and south of Cabin Creek dates back to the early years of this century. During the period 1910 to 1915, tunnelling of coal seams was carried out at the north end of Dilly Hill, off Howell Creek, and on the northeast slope of Dally Hill, south of Cabin Creek. J. D. MacKenzie of the Dominion Geological Survey, mapped the area

during the month of September, 1914; his report was published in 1916. Following World War I, the Flathead area saw little active prospecting for coal. Prior to 1914 a survey had been made for a railway line along Flathead Valley to join the Great Northern Railway in Montana with Canadian Pacific Railway in Crows Nest Pass area; however, these plans had been abandoned and adequate supplies of steam coal were available elsewhere close to Canadian Pacific Railway in the Crows Nest Pass area.

The Flathead area has been explored for oil and gas and during the years up to the 1950's small amounts of coal were mined in the area as fuel for steam engines on drilling rigs.

R. A. Price of the Geological Survey of Canada mapped the area during the summer of 1959.

The first coal licences of the present Sage Creek Coal property were obtained by Mill City Petroleums Limited and Royal Canadian Ventures Ltd. in 1967. In august of 1968, the property was optioned to the Steel Company of Canada Ltd.; Stelco engaged Picklands Mather & Co. of Cleveland, Ohio to explore the property on their behalf. During the periods October-November, 1968 and June-August, 1969, seven diamond drill holes for an aggregate total of 3,911 feet were drilled on the property. Stelco terminated the option and negotiations during 1970 lead to the present agreement and the forming of Sage Creek Coal Limited.

GENERAL GEOLOGY

The Sage Creek Coal property is situated in the Lewis Thrust block at the south end of the Fernie Basin. The Fernie Basin is an area where Mesozoic rocks have been preserved above the Lewis Thrust fault in a broad synclinal basin. Subsequent normal and thrust faulting have resulted in a complex structural picture. The Flathead coal area has been protected from erosion in a small block of Mesozoic rocks down faulted into older formations.

The geological succession of the rocks in the area is as follows:

Era	Period or Epoch	Group or Formation
Cenozoic	Quarternary	Sand, gravel etc.
	U N C O N F O R M I T Y	
Tertiary	Eocene (?)	Kishenehn Formation
	U N C O N F O R M I T Y	
Mesozoic	Lower Cretaceous	Blairmore Group Kootenay Formation
	Jurassic	Fernie Group
	D I S C O N F O R M I T Y	
	Triassic	Spray River Formation
	U N C O N F O R M I T Y	
Palaeozoic	Undivided	

The coal seams of economic interest in the area occur in the lower half of the Kootenay formation, within an interval of

400 (122m) feet above the basal sandstone member of the formation. Formerly, it was believed that Kootenay strata in the area had a thickness of 1,100 feet; our drilling to date has demonstrated that the Kootenay, in fact, varies in thickness between 675 feet and 800 feet. The Kootenay formation typically consists of an interbedded series of sandstones, siltstones, shales and coal seams; it is of non-marine origin.

The gross structure of Dally and Dilly Hills is an eastwardly dipping monocline. Normal faulting and minor thrust faulting have disrupted the strata and have maintained the Kootenay strata at a near surface position. The observed and calculated structural dips of the strata vary between 15° and 30° east and southeast and the strike is north to few degrees west of north.

EXPLORATION

General Comments

The field work on the Sage Creek Coal property began on October 1, 1970, with the arrival of a two-man mapping party who were later joined by bulldozer and drilling crews. The initial plans were for all field work to cease in December, but as drilling fell behind schedule, a decision was made to continue working through the winter months. The field work on the property ceased with the departure of the crews on May 27, 1971. All operations were halted between December 20 and January 3 for Christmas and

New Year holidays.

At first a trailer and tent camp were established near the Howell Creek-Cabin Creek junction (Plate 1); in March a second trailer camp was added 1/4 mile west of the initial camp in Cabin Creek Valley to accommodate additional drilling crews.

A major problem with respect to winter exploration for this area was heavy snow falls and difficulty in keeping the access road to Fernie open (Plate 10). As logging operations in the area were halted during December and January, it was necessary to plow 40 miles of road during these months; when these operations were resumed in February, it was still necessary for us to plow 25 miles of the road. The first snow fall in Flathead Valley occurred at the end of September and the last snow was recorded May 20 when 27 inches of snow fell on Dally Hill in a 24-hour period (19 inches at the camp). The total snow fall for the area during the past winter is estimated to be in excess of 15 feet. Cold weather never was a real problem; although temperatures as low as $-30^{\circ}F$ were recorded occasionally, the average temperature in the area was 20° to $25^{\circ}F$ during the day with correspondingly lower temperatures at night.

With a rise in temperature during April and May, road conditions in the area deteriorated to the point (Plates 6 & 7) where travel by four-wheel drive vehicles had to be abandoned in favour of Nodwell Flextrac tracked vehicles. In preparation for the soft ground expected with the arrival of warmer weather,

corduroy was prepared during the winter and stocked along the access roads for use in the spring; it helped to alleviate the problem but did not solve it to any satisfaction. During this period, it was also necessary to have at least two D8H bulldozers on the property as one of them was constantly becoming mired down and a second machine was required to extricate it.

Problems were also experienced in the field of communications. The nearest access to telephone was in Fernie and therefore, to eliminate unnecessary travel a radiotelephone was placed in the camp. Unfortunately, the prevailing atmospheric conditions in the area were such that the equipment was, with an occasional exception, useless. Reasonable communications were established only in the spring with the arrival of rotary drilling crews, who came equipped with a single side band radio which worked reasonably well most of the time.

Topographical Mapping

During the month of October, J. C. Sproule and Associates of Calgary prepared a detailed topographical map to a scale of 1:4,800 (1" = 400') with 25-foot contour intervals for an area of approximately 25 square miles in the western half of the Sage Creek Coal property. The map was prepared using existing B.C. Government air photographs, supplemented by field altimetry.

In order to establish a reference system for the property, the southeastern corner of Lot No. 9384 (C.L. 987) was assigned the following co-ordinates:

350+00 North
700+00 East

Geological Mapping

As the first step in the present exploration program at Sage Creek Coal outcrops exposed in road cuts on Dally and Dilly Hills (Plates 8 & 9), made by previous operators of the property, were mapped. Compass traverses were also run across both hills in search for additional outcrop, but these were largely unsuccessful as both hills lie under a mantle of drift.

Bulldozing

The nature of the work at Sage Creek Coal and the prevailing physical conditions were such that extensive use of Caterpillar D8H bulldozers was required at alltimes (Plate 6). The first machine, supplied by Armsco Exploration Ltd. of Calgary, arrived on the property on October 9 and remained there for the duration of the entire programme. Additional bulldozers (two at certain times) were supplied by Don Mazur Lumber Company Ltd. of Cranbrook, B.C.; Mazure also supplied a Caterpillar D-7 bulldozer, a Caterpillar C-12 grader and a C-6 Tree Farmer wheel tractor (skidder) which were used in snow plowing on the access road. During a seven day period in April, a D8H bulldozer owned by Hollowink Contracting Ltd. of Fernie, B.C., was added to the fleet of machinery at Sage Creek Coal.

The bulldozers were used in repairs to existing roads on the property (Plates 8 & 9), trenching of coal seams (Plates 11, 12, 13), plowing of snow and in the construction of new access

roads and drill site locations. In the spring a major chore of the machines was to assist in moving other equipment around the property (Plate 6).

Diamond Drilling

The first drilling rig in operation at Sage Creek Coal was an HQ Wireline diamond drill (Plate 2), supplied by Boyles Bros. Drilling (Alberta) Ltd., of Edmonton, which arrived on the property on November 4. Although the original plans called for the completion of 3,000 feet of core drilling before Christmas, the progress suffered many delays and the drill remained at Sage Creek Coal until March 30. When the diamond drilling program was halted, three bore holes had been completed for a total drilling of 2,599 lineal feet.

The first hole, SCC #1, was drilled near the north end of Dally Hill. It was inclined at -60°, and difficulties were experienced with caving of the hole and with core recovery. The next two holes were spotted on Dilly Hill. Hole SCC #2 was also started as an inclined hole, but because of caving it was halted at a depth of 105 feet. Hole SCC #2A was drilled from the same set-up as a vertical hole. At the depth of 509 feet the drill pipe was snapped below the 200-foot mark; after spending 15 days in an attempt to retrieve the rods, the contractor had to abandon the hole. The rig was moved to a new location 25 feet away where a new hole, SCC #2B, was drilled, reaching its objective. Drill hole SCC #3 was also a vertical hole.

Core recovery under the broken rock conditions existing at Sage Creek Coal property was difficult; this was especially true with regard to coring in coal seams. Although the contractor experimented with various types of equipment and methods of core retrieval, a satisfactory recovery of coal cores was never achieved. In our estimate the overall core recovery in coal amounted to approximately 60%.

As pumping water from Cabin Creek to the drill sites would have required a vertical lift of almost 1,000 feet and great lengths of pipe exposed to weather, pumping was never attempted. Water was transported in four-wheel drive trucks equipped with large water tanks. This method, although far from being perfect, was found to be most effective under the circumstances.

Rotary Drilling

In the light of the unsatisfactory and slow performance by the diamond drill at Sage Creek Coal, to speed up the pace of exploration, in March a contract for 10,000 feet of reverse circulation rotary drilling was awarded to Kenting Drilling of Calgary. The contractor commenced drilling on March 22 and at the conclusion of the program on May 24, nineteen bore holes had been drilled for an aggregate total of 10,264 lineal feet. During the first three weeks drilling was done on Dilly Hill where 10 bore holes were completed by two "sure-core" rigs. On April 16, one of the rigs was released and the second rig was moved to Dally Hill where it

continued to operate for the remainder of the program.

Although several bore holes on Dally Hill had to be abandoned because of heavy caving, caving had much less adverse effect on the rotary rigs than it had on the diamond drill. The progress of the drilling was satisfactory; however, a big disappointment was severe and serious contamination of coal samples resulting in high ash values in coal analyses.

Chip samples from the bore holes were collected at five intervals and coal seams were sampled for their entier width. Cuttings from the hole above ground water level were passed through a dry cyclone and those mixed with water were separated in a wet cyclone separator (Plate 4) or a shale shaker (Plate 5). During the first month of operation the wet cyclone separator was unavailable because of a shortage of parts and during this period one of the drill rigs used 45 gallon drums as setting tanks.

All bore holes, including diamond drill holes, were logged with gamma ray - neutron probes by Roke Oil Enterprises Ltd., of Calgary. The rotary holes on Dally Hill were also surveyed with sidewall densilogs and, in some cases, with a caliper tool.

Summary of Bore Holes

The locations of the bore holes are shown on the topographical maps (Dwgs. L-4381 & L-3365) accompanying this report. It should be noted that, pending a proper survey, these locations are approximate only. The locations of the three diamond drill

holes, SCC #1 to SCC #3, were surveyed with chain and compass and are believed to be reasonably accurate. However, with the arrival of the rotary drilling rigs at Sage Creek Coal, the rate of drilling accelerated considerably and consequently even a chain and compass survey was impossible during the time available. The locations of holes SCC #4 to SCC #20A, as shown on the maps, are their intended locations; on the ground the holes were spotted by pace and compass on snow shoes and it is to be expected that the true locations of some of these holes will not agree with the intended locations.

Detailed information for each bore hole is appended to this report. Appended also are lithological strip logs and probe logs for the rotary holes; core logs as well are included for the diamond drill holes.

Five rotary holes SCC #16, SCC #16A, SCC #18, SCC #20 and SCC #20A had to be abandoned because of caving. Holes SCC #16A and SCC #20A were attempts to redrill abandoned holes at a new location close to the original hole.

ESTIMATE OF GEOLOGICAL COAL RESERVES

Probable geological coal reserves have been calculated for two areas of the Sage Creek Coal property. The largest of the areas lies on Dilly Hill and is restricted to the south by co-ordinate 344+00 N, to the north by 404+00 N, to the west by the outcrop, or assumed outcrop, of the coal seams, and to the east by

elevation of 4,000 feet above sea level. Calculations were made with the aid of east-west structural sections constructed at 400-foot intervals. When coal seams were projected to their assumed outcrop at ground surface, certain areas outside of Sage Creek Coal boundaries were included in the calculations; coal believed to occur here has been shown separately in the summary table below and the detailed calculations appended to the report.

Only one east-west structural section, 294+00 N, has been constructed for Dally Hill. However, the geology for this particular area is believed to be sufficiently regular to permit an estimate of geological coal reserves for a block approximately 3,000 feet lone along the strike and 2,000 feet downdip to base level of 4,000 feet above sea level.

A factor of 22 cubic feet/ton was used to derive the reserves in short tons.

SUMMARY OF CALCULATIONS

		Probable Geological Reserves in Short Tons		
Location	Section	CNI Property	SCC Property	Total
Dilly Hill	346 + 00N	152,300	1,964,440	2,116,740
" "	350 + 00N	244,370	2,261,600	2,505,970
" "	354 + 00N	620,000	1,925,000	2,545,000
" "	358 + 00N	909,300	3,207,800	4,117,100
" "	362 + 00N	849,060	2,588,200	3,437,260
" "	366 + 00N	1,144,510	2,785,400	3,899,900
" "	370 + 00N	1,159,000	3,244,000	4,403,000
" "	374 + 00N	888,280	3,657,910	4,546,190
" "	378 + 00N	799,000	4,063,100	4,862,100
" "	382 + 00N	910,000	4,046,800	4,956,800
" "	386 + 00N	341,210	3,711,440	4,052,650
" "	390 + 00N	151,000	2,967,000	3,118,000
" "	394 + 00N		2,773,400	2,773,400

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Cont'd. Probable Geological Reserves in short tons

Location	Section	CNI Property	SCC Property	Total
Dilly Hill	398 + 00N	354,000	3,069,000	3,423,000
" "	402 + 00N		2,806,100	2,806,100
		8,491,930	45,071,190	53,563,210
Dally Hill	294 + 00N		28,441,000	28,441,000
Total (Dilly & Dally) Hills			73,512,190	82,004,210

Coal seams are believed to continue outside the area for which the calculations were made but additional exploration is required to establish this as a fact.

COAL ANALYSES

Coal samples recovered from drill holes at Sage Creek Coal Ltd. were analyzed by Cyclone Engineering Sales Ltd. in Edmonton. A total of 114 samples were forwarded to the laboratory, of which 28 samples were from diamond drill cores and 86 samples were cuttings from rotary holes.

The tests performed on each sample from drill cores consisted of proximate analysis, float-sink analysis at 1.40 and 1.50 specific gravity, and size consist. For the samples from rotary drill holes only proximate analysis and single float-sink analysis at 1.50 specific gravity were provided.

The testing program was the biggest disappointment in the current program at Sage Creek Coal. Core recovery from coal

seams intercepted in the diamond drill holes was poor; in fact, it was virtually impossible to core #5 seam. Consequently, all results are suspect and probably do not reflect the true quality of the coal. Samples obtained from rotary bore holes were badly contaminated, which resulted in very high ash content. Here too, the results are suspect and do not represent the true character of the coal. All that really can be said regarding the coal at Sage Creek at the present time is that it is medium volatile, bituminous coal (22% - 26%) and that it shows a promise of being good coking coal. Although detailed results for each sample analyzed are available, because of their problematic nature they have been omitted from this report; instead four tables have been included which present the mean values and standard deviations for all of the 114 samples analyzed.

T A B L E 1.

Mean Value and Standard Deviation for 28 Samples
From Diamond Drill Holes SCC #1 to SCC #3

	Ash %	Sulphur %	F.S.I.
Mean Value	21.89	0.60	3.7
Range	10.53 - 51.45	0.20 - 0.85	1.0 - 7.5
Standard Deviation of Single Value	7.97	0.29	1.8
Standard Deviation of Mean Value	1.51	.055	.034

(after C.E.S. Ltd.)

T A B L E 2.

Mean Values and Standard Deviations of Floats at 1.50 for 28 Samples from Diamond Drill Holes SCC #1 to SCC #3

	Yield %*	Ash %	Sulphur %	F.S.I.
Mean Value	70.06	9.70	0.45	5.0
Range	34.34 - 89.51	5.53 - 15.85	0.13 - 0.83	0.5 - 7.6
Standard Deviation of Single Value	11.84	2.59	0.19	1.9
Standard Deviation of Mean Value	2.24	0.49	.04	.36

* Yield includes floats at 1.50 and all of the - 200 mesh fraction.

(After C.E.S. Ltd.)

T A B L E 3.

Mean Values and Standard Deviations for 86 Samples From Rotary Drill Holes SCC #4 to SCC #19

	Ash %	Sulphur %	F.S.I.
Mean Value	41.98	0.64	1.6
Range	17.77 - 78.15	0.21 - 1.71	N.A. - 4.5
Standard Deviation of Single Value	13.31	0.31	1.2
Standard Deviation of Mean Value	1.43	.03	.01

(After C.E.S. Ltd.)

T A B L E 4.

Mean Values and Standard Deviations of Floats at 1.50
For 86 Samples From Rotary Drill Holes SCC #4 to SCC #19

	Yield %	Ash %	Sulphur %	F.S.I.
Mean Value	42.18	10.56	0.58	4.6
Range	1.91 - 73.26	5.50 - 21.36	0.16 - 1.91	1.0 - 8.5
Standard Deviation of Single Value	16.51	2.61	0.38	1.9
Standard Deviation of Mean Value	1.78	0.28	0.04	0.02

(After C.E.S. Ltd.)

RECOMMENDATIONS

The work at Sage Creek Coal to date indicates that the property holds promise as a potential open-cut coal mine providing the question of quality of the coal can be favourably resolved. Therefore, the following recommendations for future exploration are made:

1. A bulk sampling program of the coal be carried out, with at least one entry beyond the weathered zone made in seams #2 and #3, #4A and #4B and #5.
2. A property survey be made of all bore hole and coal outcrop locations. The survey should also establish the exact location on Dilly Hill of the boundary between Sage Creek Coal Ltd.

property and the Coal Licences belonging to Crows Nest Industries Ltd.

3. Additional geological mapping is recommended, particularly for Dilly Hill. If this is done in conjunction with the bulk sampling program, a bulldozer will be available for some limited trenching and attempts should be made to locate outcrops of coal seams away from Cabin Creek.

4. If bulk sampling results are favourable, additional drilling should be undertaken. A program of pattern drilling is required for Dilly Hill and additional exploratory drilling, as well as pattern drilling, should be planned for Dally Hill.

July 9, 1971
Toronto, Ontario.

Rolands A. Benkis

Robert C. Hart.

Expiry Date: Mar. 3, 1972

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PLATE 2

Diamond Drilling rig on Dilly Hill at Bore Hole SCC #3. Flathead Valley, Sage Creek Valley and Clark Range in the background looking east.

PLATE 3

Rotary Drilling rig on Dilly Hill at Bore Hole SCC #7. Looking north-east.

PLATE 4

Wet cyclone separator on Dilly Hill. Note bore hole probing truck in background.

PLATE 5

Shale shaker in operation at bore hole SCC #6.

PLATE 6

Difficult road conditions during spring break-up period.

PLATE 7

Access road from Flathead Valley to Sage Creek camp in April.

PLATE 8

October snow on Dally Hill; viewed south from Dilly Hill across Cabin Creek Valley.

PLATE 9

Access roads on Dilly Hill viewed north from Dally Hill across Cabin Creek Valley. Flathead Valley and Clark Range in upper right corner.

PLATE 10

Traffic problems on Flathead Road in January.

PLATE 11

No. 4 coal seam exposed in road cut on the north flank of Dally Hill.

PLATE 12

No. 3 coal seam exposed in road cut on south flank of Dilly Hill.

PLATE 13

No. 4A and No. 4B coal seams exposed in road cut on south flank of Dilly Hill.

K SAGE CREEK 71(2)A

SAGE CREEK COAL LTD.
FLATHEAD VALLEY, B.C.
REPORT ON EXPLORATION,
OCTOBER, 1970 - MAY, 1971
N.T.S. 82-G-2

VOLUME 1 OF 1

K-SAGE CREEK 71(2)A

R. C. Hart
R. A. Benkis

Toronto, Ontario.

K - SAGE CREEK 71(2)A

MAP & CROSS SECTIONS

SAGE CREEK COAL LTD

RIO TINTO

DWG: L - 3365

DWG: L -2559

(A) 1-2

DWG: L-3365

SAGE CREEK COAL LIMITED

FLATHEAD VALLY-B.C.

PROPERTY PLAN

"DILLY HILL"

Scale:

400 0 400 800 1200 1600

FEET

M1

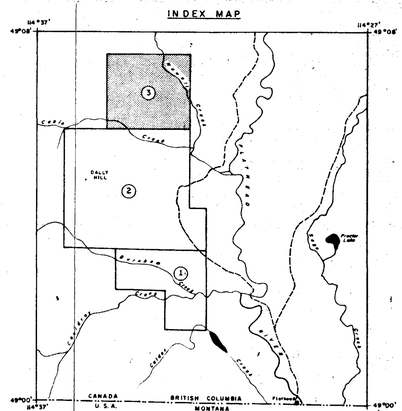
SC 71(2)A.

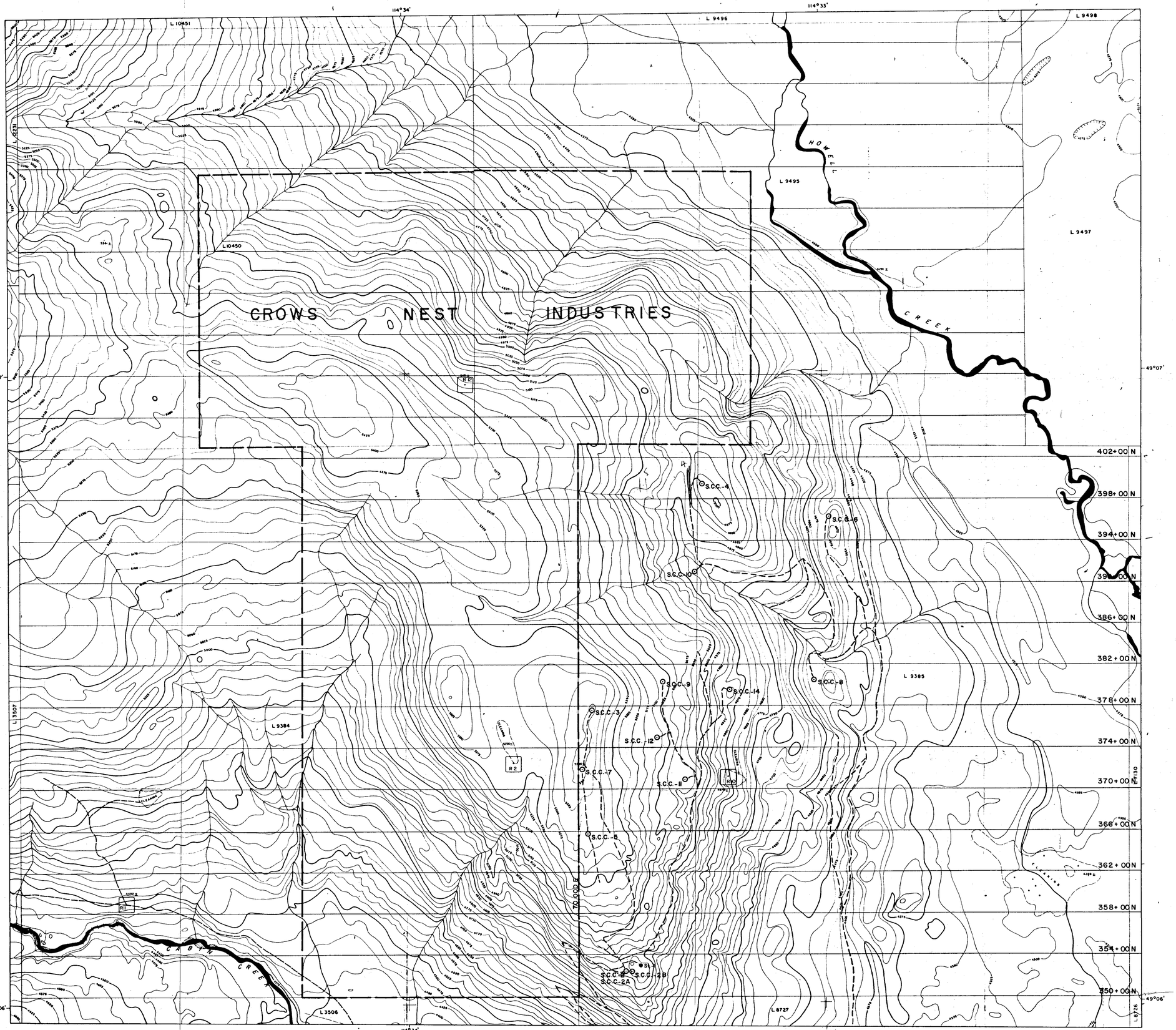
359 (2)

N.T.S.
82-G-1,2

Note: TOPOGRAPHY BY J.C. SPROUGLE & ASSOCIATIES LTD.

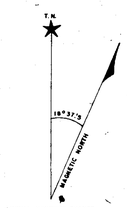
INDEX MAP

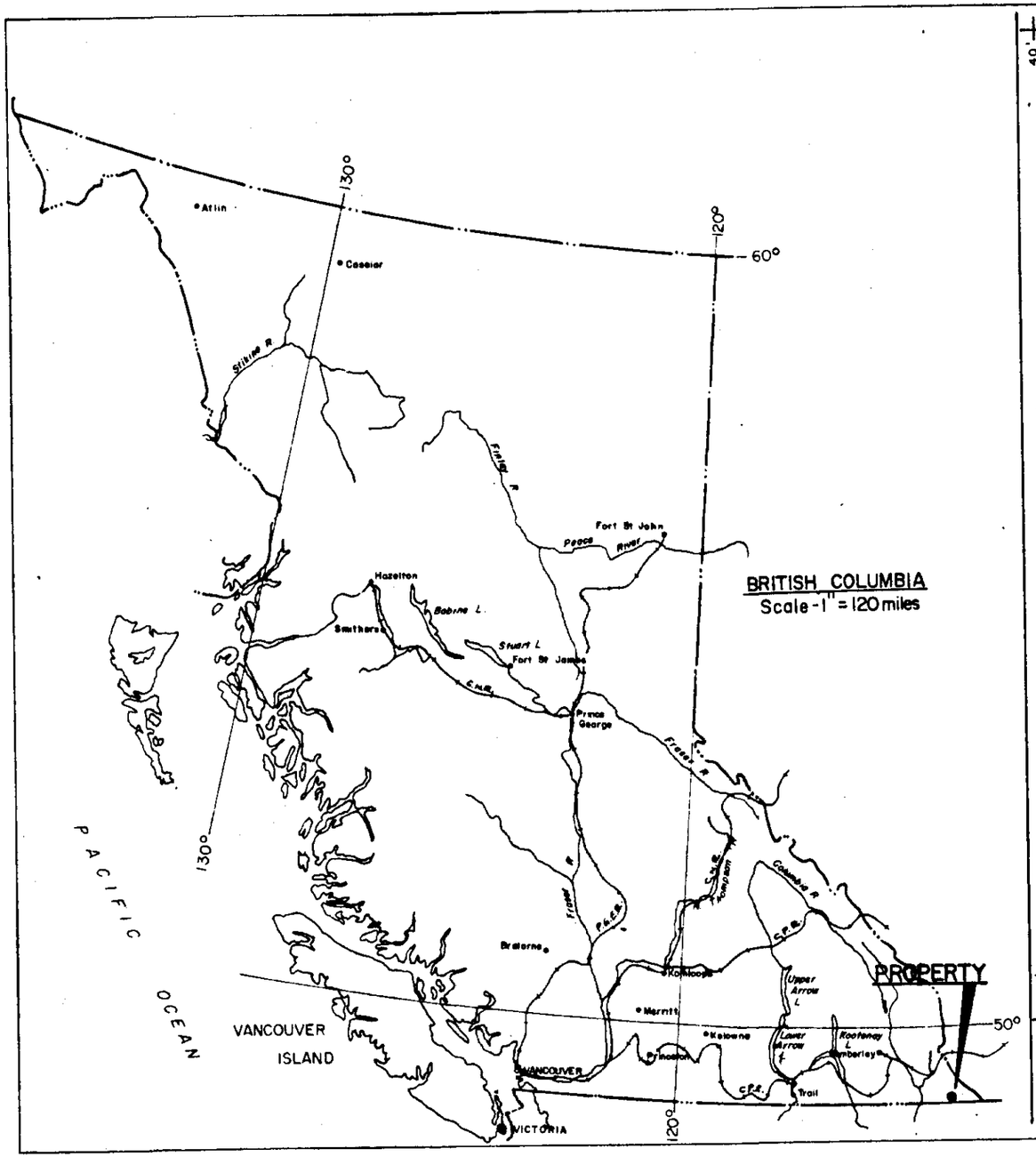




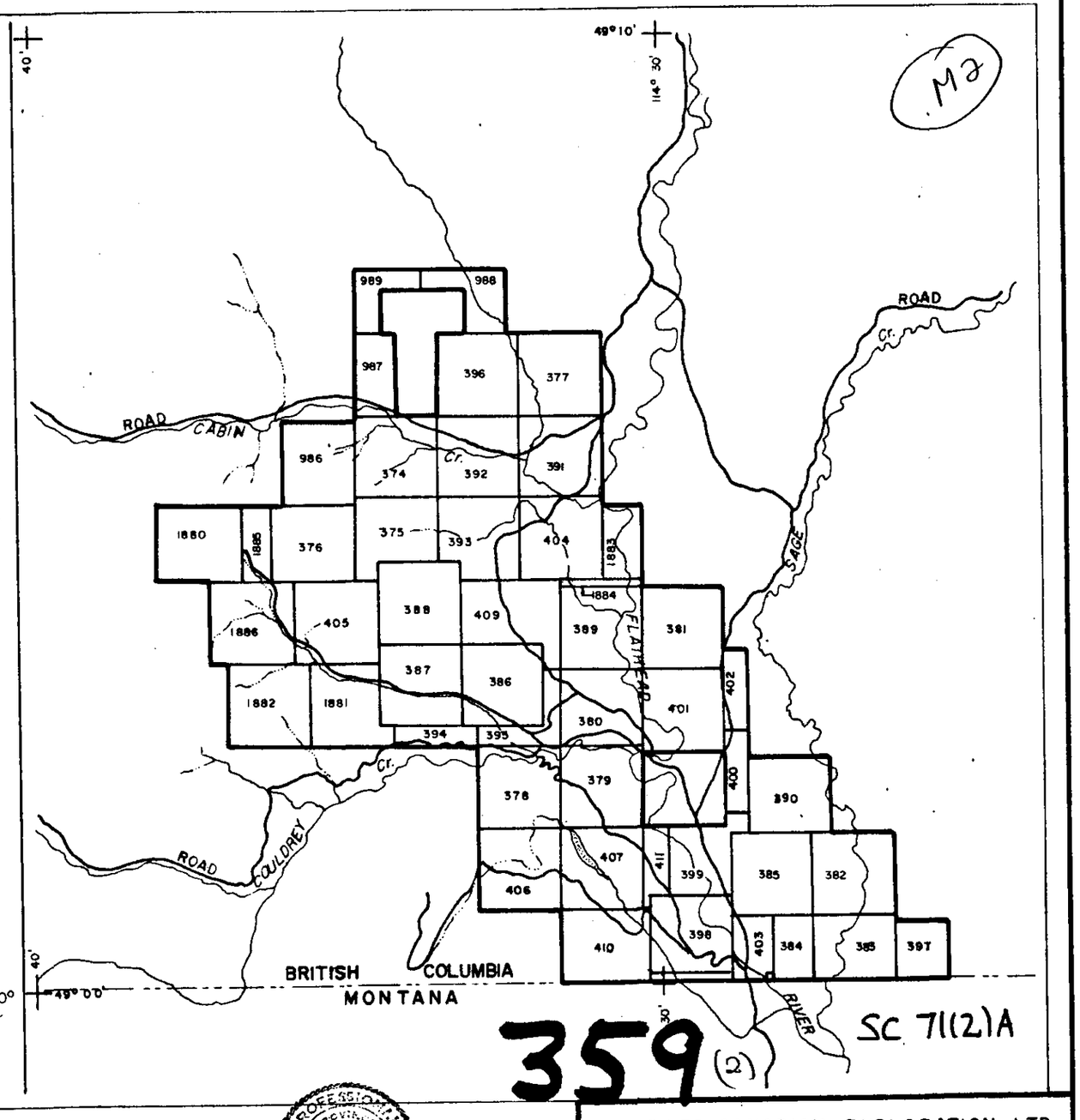
LEGEND

- Road, loose surface
- Trail, cut line
- L 15 — Lot
- Graticule
- Building
- Bridge
- Horizontal Control Point with elevation
- Elevation, approximate
- Drainage pattern
- Lake or river
- Marsh or Swamp
- Marsh or Swamp in water
- Index contour
- Intermediate contour
- Sand or gravel along drainage pattern
- Depression Contour
- Tree, coniferous or deciduous
- R 100 — Ground Control Point, with elevation
- Rapids
- SCC-3 — Drill hole by Sage Creek Coal LTD.
- St-5 — Drill hole by Steico
- Access road
- Property boundary





BRITISH COLUMBIA
Scale - 1" = 120 miles



M2

359 (2)

SC 71(2)A

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. C. HART

Expiry Date: Mar. 3, 1972

0 1 2 3 4 Miles
1:100,000

RIO TINTO CANADIAN EXPLORATION LTD.

SAGE CREEK COAL LIMITED —— B. C.

LOCATION MAP

MAY 1971 | R.A.B. / k.h. | DWG L-2559

DWG: L - 4381

M 2

114°36'

114°35'

114°34'

L 3507

L 3511

L 3510

L 3506

L 3508

L 3509

L 7848

L 12122

L 9379

L 7847

CABIN

DALY HILL

BURNHAM CREEK

CLEARING

70000 E

49°05'

49°04'

S.C.C.-13

S.C.C.-15

S.C.C.-16

S.C.C.-16A

S.C.C.-17

S.C.C.-18

S.C.C.-19

S.C.C.-20

S.C.C.-20A

St.-3

St.-5

St.-6

St.-7

St.-8

SHEET No. 2

DWG: L-4381

SAGE CREEK COAL LIMITED

FLATHEAD VALLY - B.C.

PROPERTY PLAN

"DALLY HILL"

M3

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA R. C. HART Expiry Date: Mar. 31, 1978

Scale:

400 0 400 800 1200 1600

FEET

SC 71(2)A

359

(2)

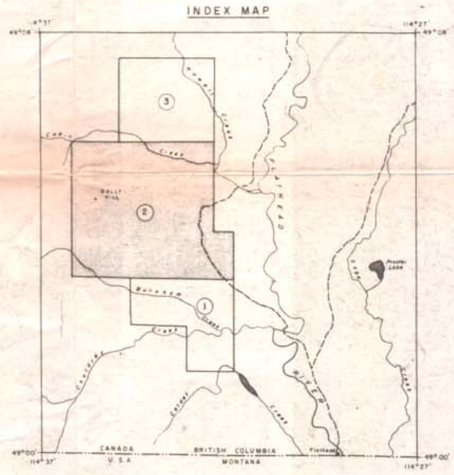
N. T. S.
82 - G - 1, 2

Note: TOPOGRAPHY BY J. C. SPROUGLE & ASSOCIATIES LTD.

LEGEND

- Road, loose surface
- Trail, cut line
- L15 Lot
- Graticule
- Building
- Bridge
- Horizontal Control Point with elevation
- Elevation, approximate
- Drainage pattern
- Lake or river
- Marsh or Swamp
- Marsh or Swamp in water
- Index contour
- Intermediate contour
- Sand or gravel along drainage pattern
- Depression Contour
- Tree, coniferous or deciduous
- R 100 Ground Control Point, with elevation
- Rapids
- SCC-3 Drill hole by Sage Creek Coal LTD.
- St.-5 Drill hole by Steico
- Access road.

INDEX MAP



MAGNETIC NORTH

ANNUAL MAGNETIC CHANGE DECREASING 3.9 ANNUALLY

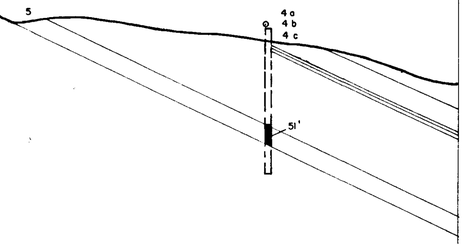
D-3366 - 1,2

(M4-5)

W.

E.

S.C.C. 20 projected
250' 11° E. of N.



4000'

4000'

C.N.I. Boundary
62,600 E.

N.T.S
82-G-2

SCALE

200 0 200 400 600 800

One Inch = 200 Feet

MH

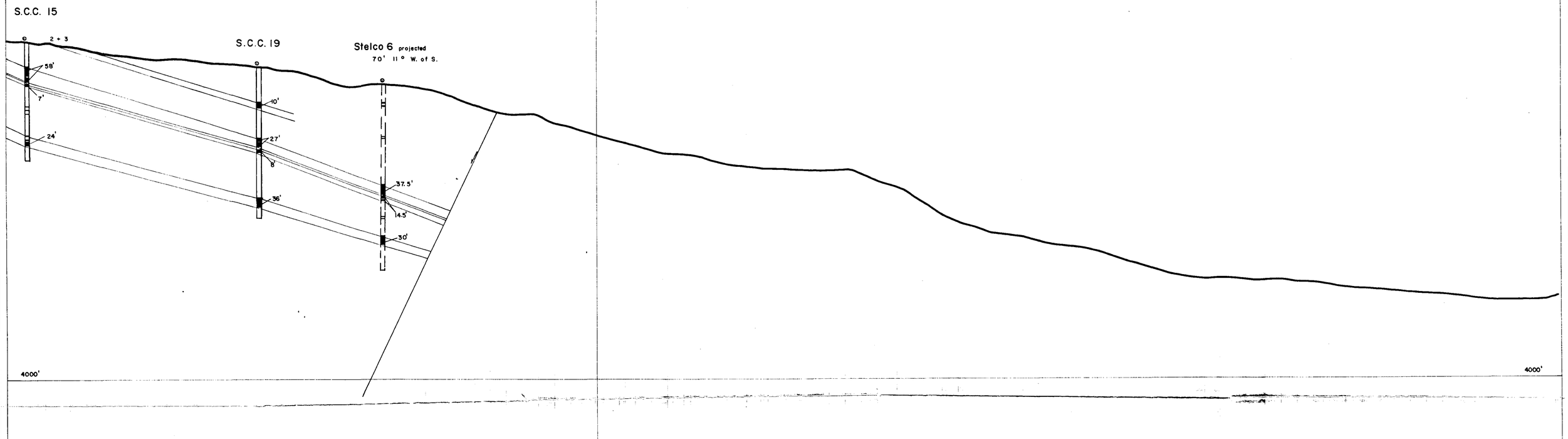
SC 71(2)A

359 (2) (29,400 N-W½)

RIO TINTO CANADIAN EXPLORATION LIMITED
SAGE CREEK COAL LTD. — B.C.
DILLY HILL
SECTION 294+00N (W ½)
May — 1971 | R.A.B. / a.d. | DWG. D-3366-1

W.

E.



C.N.L. Boundary

70,000 E

N.T.S
82-G-2

SCALE

200 0 200 400 600 800

One Inch = 200 Feet

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. C. HART

Expiry Date: Mar. 3, 1972

RIO TINTO CANADIAN EXPLORATION LIMITED

SAGE CREEK COAL LTD. — B.C.

DILLY HILL

SECTION 294+00N (E ½)

May – 1971 | R.A.B. / a d. | DWG. D-3366-2

MS

359 (2)

(29,400N-E ½)

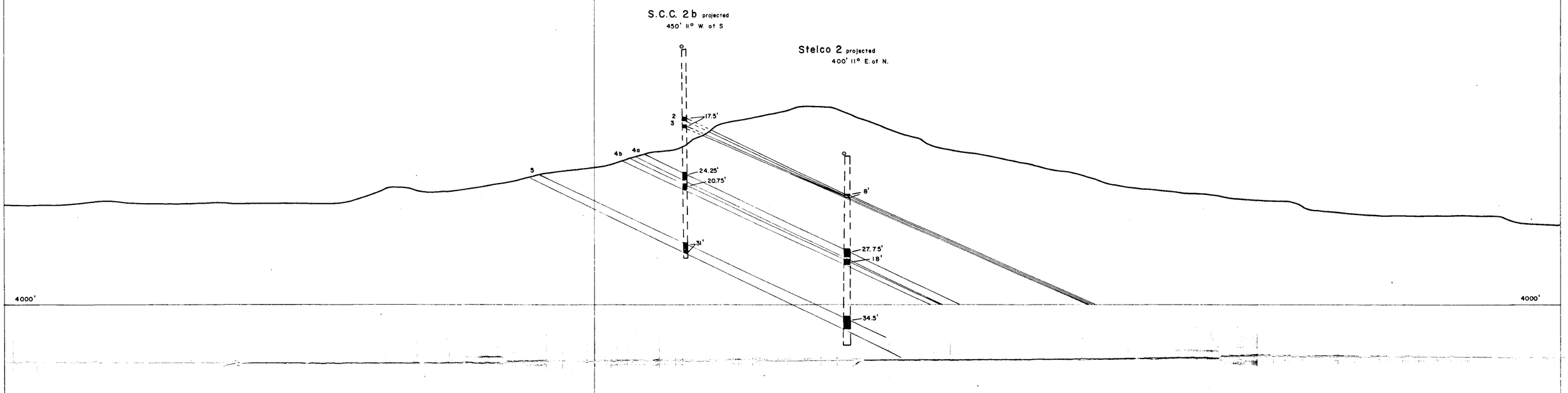
K-SAGE CREEK 71(2)4.

D-3366 -3,4

6-7

W.

E.



C.N.I. Boundary

70,000 E

(M6)

SC 71(2)A

359 (2)

(34,600 N)

N.T.S
82-G-2

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA R. G. HATT

Expiry Date: Mar. 3, 1972

SCALE

200 0 200 400 600 800

One Inch = 200 Feet

RIO TINTO CANADIAN EXPLORATION LIMITED

SAGE CREEK COAL LTD. – B.C.

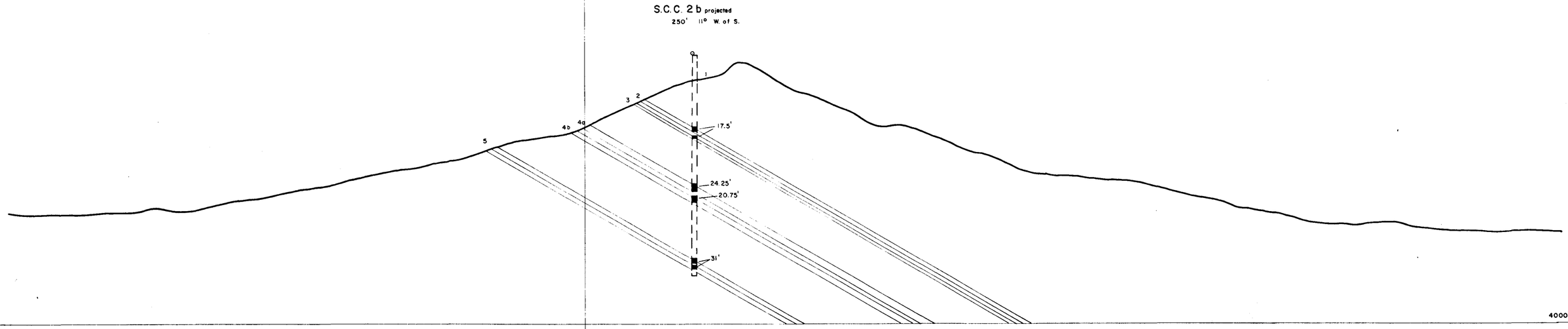
DILLY HILL

SECTION 346+00N

May – 1971 | R.A.B. / a. d. | DWG. D-3366-3

W.

E.



C.N.I. Boundary
70,000 E

(35,000 N)

M7

359(2) SC 71(2)A

N.T.S
82 - G - 2

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. C. ANDERSON
Expiry Date: Mar. 3, 1972

SCALE
200 0 200 400 600 800
One Inch = 200 Feet

RIO TINTO CANADIAN EXPLORATION LIMITED

SAGE CREEK COAL LTD. — B.C.

DILLY HILL

SECTION 350+00 N

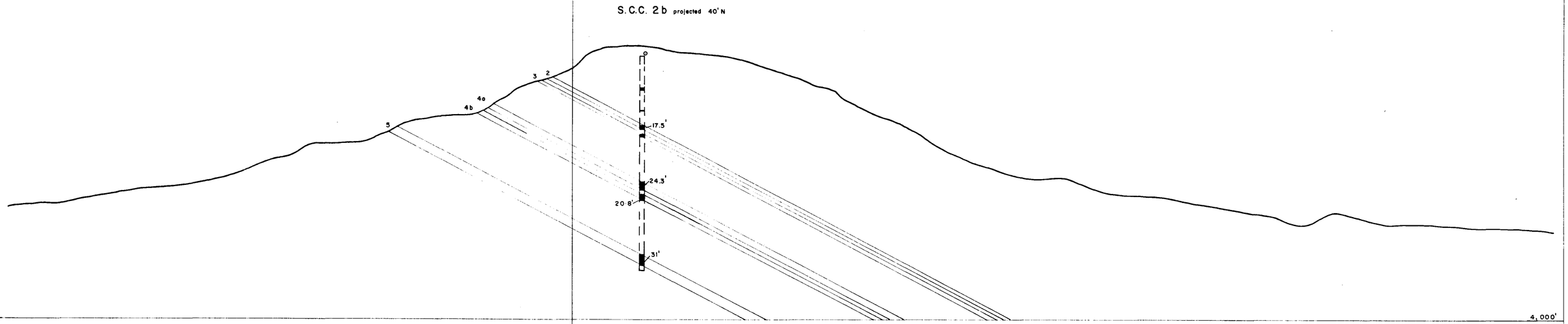
May — 1971 | R. A. B. / a. d. | DWG. D-3366-4

D-3366 - 5,6

MB.9

W.

E.



4,000'

4,000'

C.N.I. Boundary
70,000 E

(35,400 N)

N.T.S
82 - G-2

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. C. HART
Expiry Date: Mar. 3, 1972

SCALE

200 0 200 400 600 800

One Inch = 200 Feet

RIO TINTO CANADIAN EXPLORATION LIMITED

SAGE CREEK COAL LTD. — B.C.

DILLY HILL

SECTION 354+00N

May — 1971 | R. A. B. / a. d. | DWG. D-3366-5

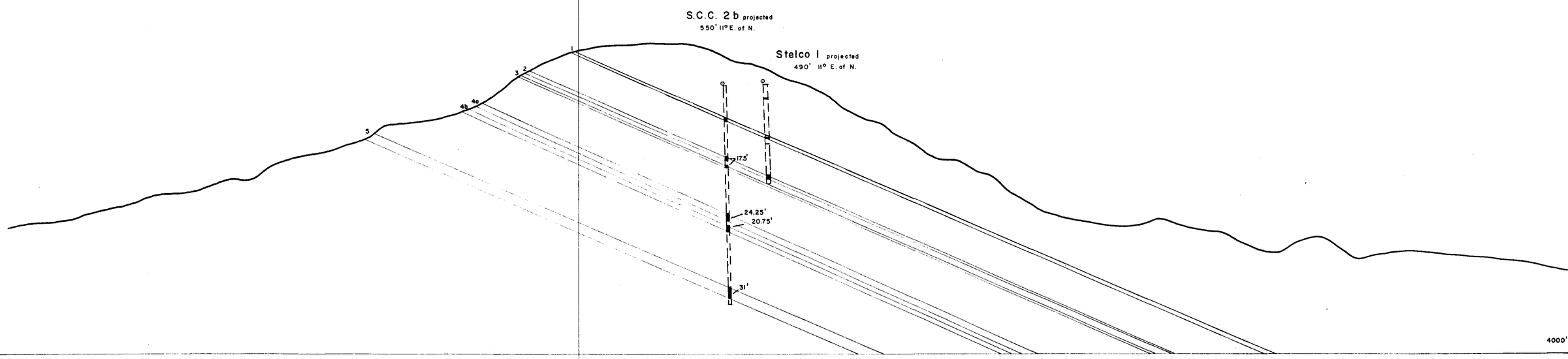
M8

SC 71(2)A

359 (2)

W.

E.



C.N.I. Boundary

70,000 E

N.T.S
82-G-2

SCALE

200 0 200 400 600 800

One Inch = 200 Feet

PROFESSIONAL ENGINEER PROVINCE OF B.C. R. C. LEITCH

Expiry Date: Mar. 3, 1972

(M9)

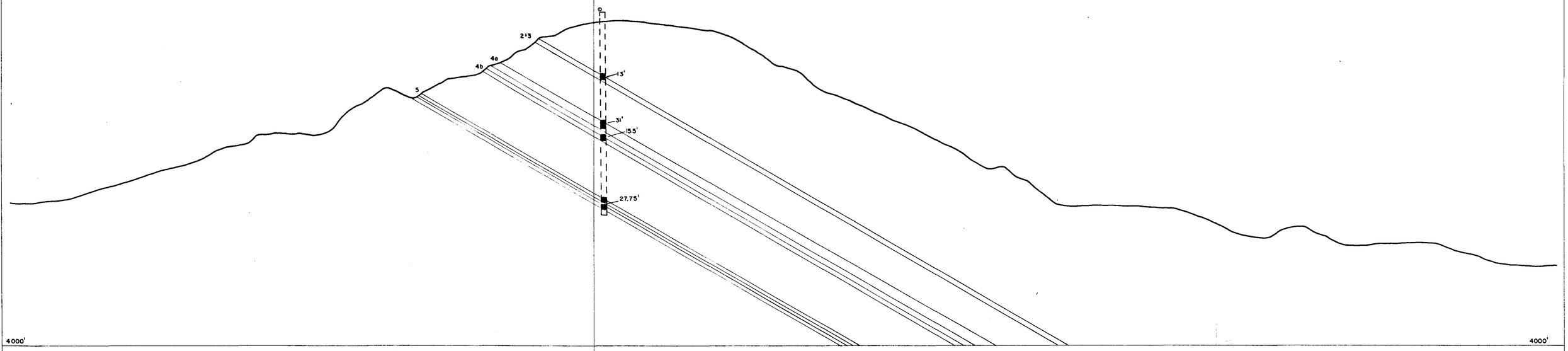
359 SC 71(2)A (2) (35,800 N)

RIO TINTO CANADIAN EXPLORATION LIMITED
SAGE CREEK COAL LTD. – B.C.
DILLY HILL
SECTION 358+00 N
May – 1971 | R.A.B. / a.d. | DWG. D-3366-6

W.

E.

S.C.C. 5 projected
390' 11° W.of S.



C.N.I. Boundary
70,000 E

(M 10)

359 (2) SC 71(2)A

(36,200N)

N.T.S
82-G-2

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. C. HART
Expiry Date: Mar. 3, 1972

SCALE

200 0 200 400 600 800

One Inch = 200 Feet

RIO TINTO CANADIAN EXPLORATION LIMITED

SAGE CREEK COAL LTD. — B.C.

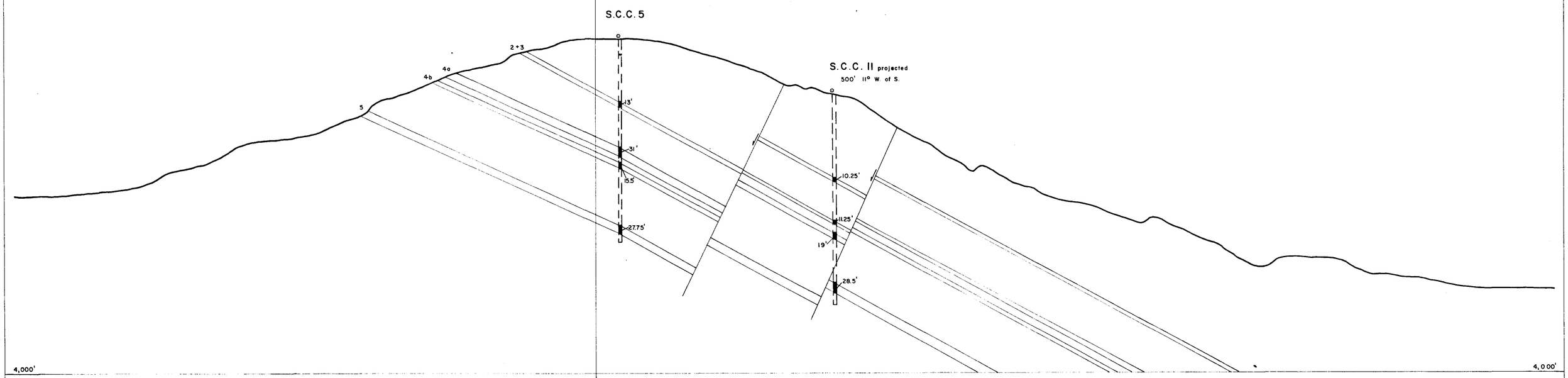
DILLY HILL

SECTION 362 + 00 N

May — 1971 | R.A.B. / a.d. | DWG. D-3366-7

W.

E.



C.N.I. Boundary
70,000 E

(111)

SC 71(2)A

359 (2)

(36,600N)

N.T.S
82-G-2

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. C. HART
Expiry Date: Mar. 3, 1972

SCALE

200 0 200 400 600 800

One Inch = 200 Feet

RIO TINTO CANADIAN EXPLORATION LIMITED

SAGE CREEK COAL LTD. – B.C.

DILLY HILL

SECTION 366+00N

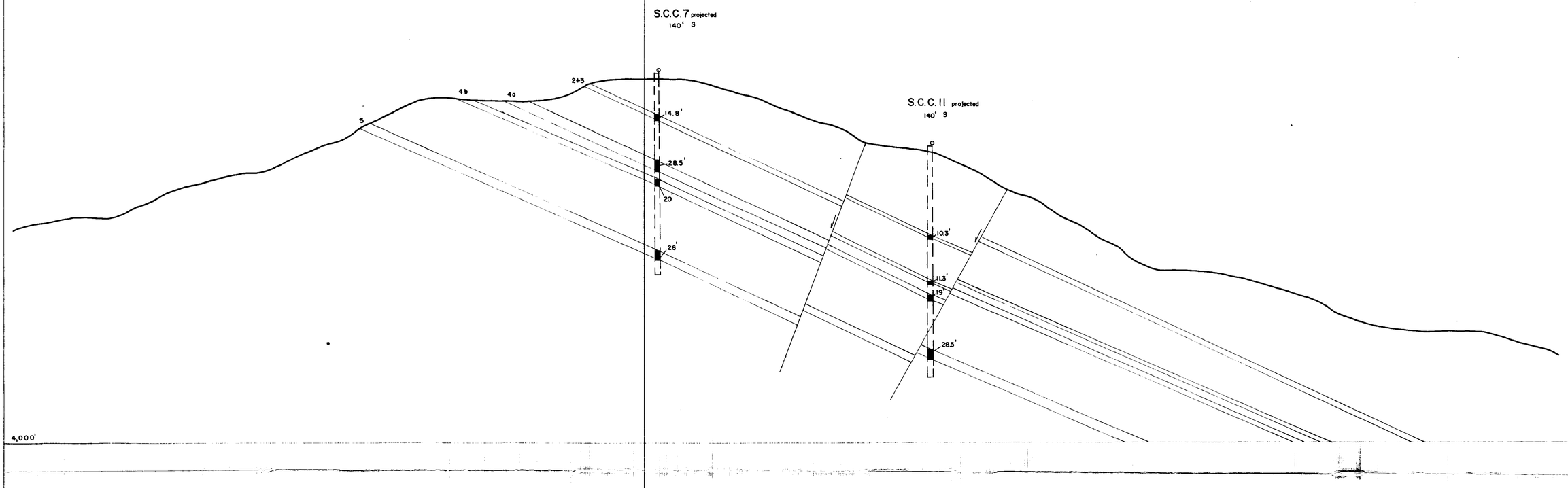
May – 1971 | R.A.B. / a.d. | DWG. D-3366-8

D-3366 - 9,10

M13-14

W.

E.



C.N.I. Boundary
70,000 E

(37,000N)

SC 71(2)A

359 (2)

N.T.S
82 - G - 2

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. C. HART
Expiry Date: Mar. 3, 1972

SCALE
200 0 200 400 600 800
One Inch = 200 Feet

RIO TINTO CANADIAN EXPLORATION LIMITED

SAGE CREEK COAL LTD. — B.C.

DILLY HILL

SECTION 370 + 00N

May — 1971 | R.A.B. / a.d. | DWG. D-3366-9

W.

E.

S.C.C. 3 projected
375' 11° W of S.

S.C.C. 7 projected
210' 11° E of N.

S.C.C. 12 projected
100' 11° W. of S.

S.C.C. 11 projected
325' 11° E. of N.

S.C.C. 14 projected
560' 11° W. of S.

S.C.C. 8 projected
650' 11° W. of S.

5 4b 4a 2+3

15·5' 15' 26' 27' 16·5' 18' 34·5' 30'

14.75' 24.25' 8.5' 44'

10.25' 11.25' 19' 28.5'

14' 16.5' 14.75' 38'

14.75' 17.5' 13' 13'

4,000'

4,000'

C.N.I Boundary
70,000 E

M14

SC 71(2)A

359(2)

(37,400 N)

N.T.S
82 - G - 2

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. C. HART
Expiry Date: Mar. 3, 1972

SCALE
200 0 200 400 600 800
One Inch = 200 Feet

RIO TINTO CANADIAN EXPLORATION LIMITED

SAGE CREEK COAL LTD. — B.C.

DILLY HILL

SECTION 374 + 00N

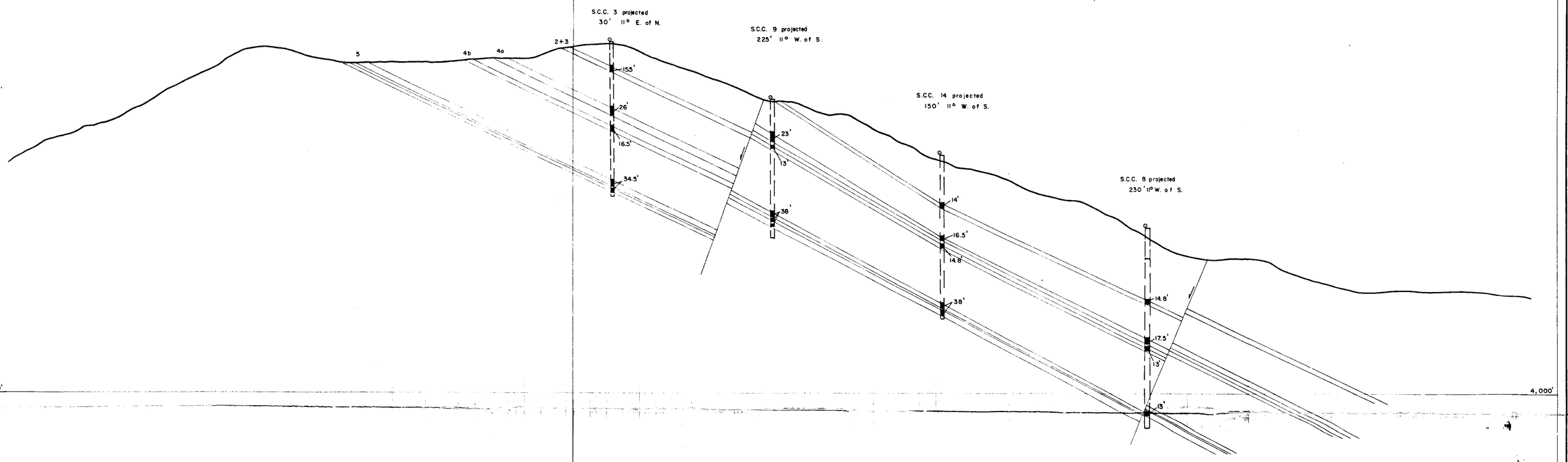
May — 1971 | R.A.B / a.d | DWG. D-3366-10

D-3366 - 11,12

M 15-16

W.

E.



C.N.I. Boundary
70 000 E

M15

SC 71(2)A

359 (2)

(37,800N)

N.T.S
82-G-2

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. C. HART
Expiry Date: Mar. 3, 1972

SCALE
200 0 200 400 600 800
One Inch = 200 Feet

RIO TINTO CANADIAN EXPLORATION LIMITED

SAGE CREEK COAL LTD. — B.C.

DILLY HILL

SECTION 378+00N

May — 1971 | R.A.B. / a.d. | DWG. D-3366-11

W.

E.

S.C.C. 3 projected
440' 11° E. of N.

S.C.C. 9 projected
170' 11° E. of N.

S.C.C. 14 projected
250' 11° E. of N.

S.C.C. 8 projected
150' 11° E. of N.

5

4b

4a

2+3

15.5'

26'

16.5'

34.5'

23'

13'

38'

14'

16.5'

14.8'

38'

14.8'

17.5'

13'

13'

4,000'

4,000'

C.N.I. Boundary
70,000 E

M16

SC 71(2)A

359 (2)

(38,200 N)

N.T.S
82-G-2

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. C. HART
Expiry Date: Mar. 3, 1972

SCALE

200 0 200 400 600 800

One Inch = 200 Feet

RIO TINTO CANADIAN EXPLORATION LIMITED

SAGE CREEK COAL LTD. — B.C.

DILLY HILL

SECTION 382+00N

May — 1971 | R.A.B. / a.d. | DWG. D-3366-12

D- 3366 - 13,14

117, 18

W.

E.

S.C.C. 3 projected
850' 11° E. of N.

S.C.C. 9 projected
580' 11° E. of N.

S.C.C. 10 projected
700' 11° W. of S.

S.C.C. 14 projected
650' 11° E. of N.

S.C.C. 8 projected
560' 11° E. of N.

5

4b

4a

2 + 3

15.5'
26'
16.5'
34.5'
23'
13'
38'
22.5'
9.5'
34.64'
14'
16.5'
14.75'
38'
14.75'
17.5'
13'
13'

4000'

4000'

C.N.I. Boundary
70,000 E

M17

359 (2)

SC 71(2)A

(38,600 N)

N.T.S
82-G-2

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. C. HART
Expiry Date: Mar. 3, 1972

SCALE
200 0 200 400 600 800
One Inch = 200 Feet

RIO TINTO CANADIAN EXPLORATION LIMITED

SAGE CREEK COAL LTD. — B.C.

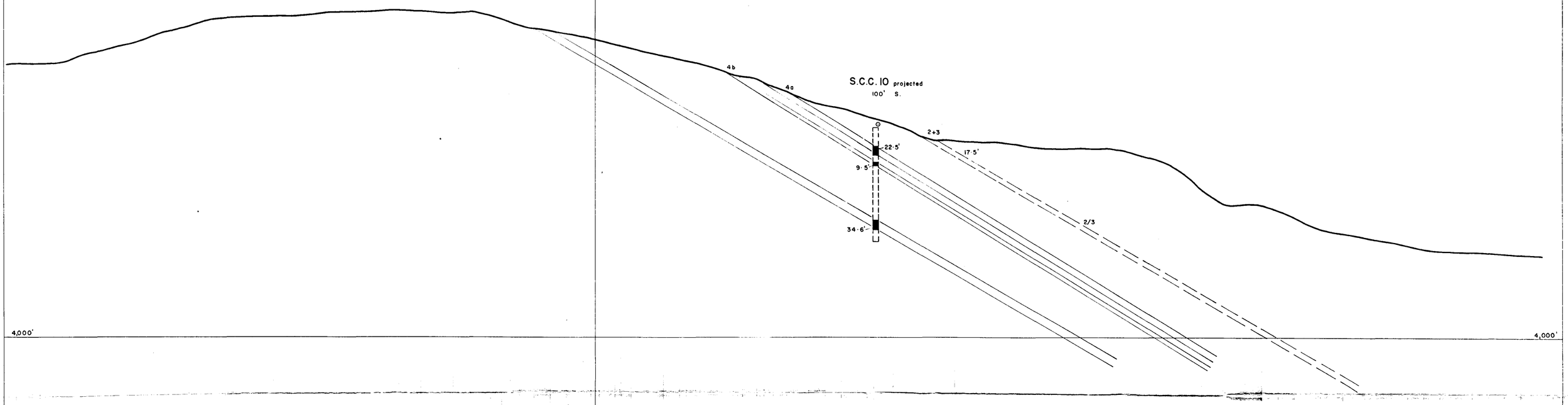
DILLY HILL

SECTION 386 + 00 N

May — 1971 | R.A.B. / a.d. | DWG. D-3366-13

W.

E.



C.N.I. Boundary
70,000 E

M18

Sc 71(2)A

359 (2)

(39,000N)

N.T.S
82-G-2

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. C. HART
Expiry Date: Mar. 3, 1972

SCALE

200 0 200 400 600 800

One Inch = 200 Feet

RIO TINTO CANADIAN EXPLORATION LIMITED

SAGE CREEK COAL LTD. — B.C.

DILLY HILL

SECTION 390+00N

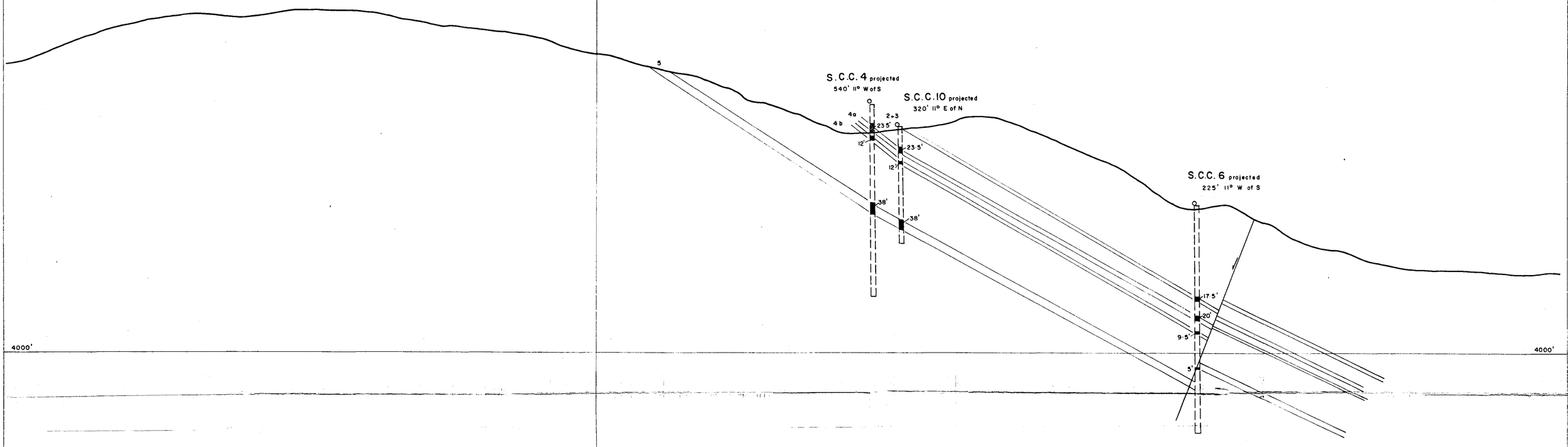
May — 1971 | R.A.B. / a.d. | DWG. D-3366-14

D-3366 - 15,16

M19, 20

W.

E.



C.N.I. Boundary
70,000 E

(M19)

359 SC 71(2)A (2)

(39,400N)

N.T.S
82-G-2

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R.C. HART
Expiry Date: Mar. 3, 1972

SCALE

200 0 200 400 600 800

One Inch = 200 Feet

RIO TINTO CANADIAN EXPLORATION LIMITED

SAGE CREEK COAL LTD. — B.C.

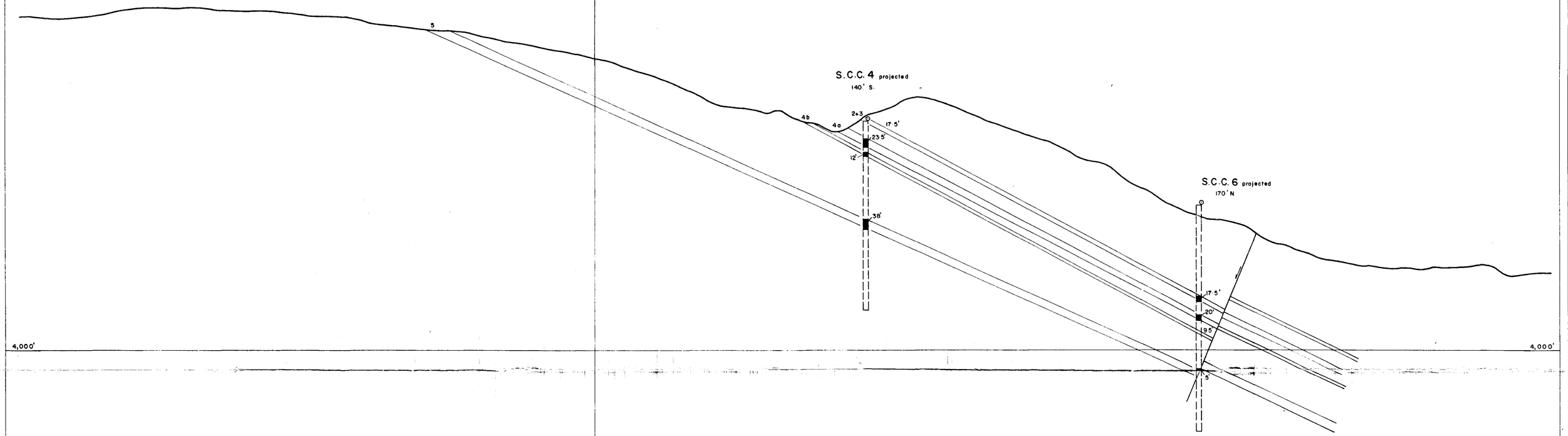
DILLY HILL

SECTION 394+00N

May — 1971 | R.A.B. / a.d. | DWG. D-3366-15

W.

E.



C.N.I. Boundary
70,000 E

(39,800N)

SC 71(2)A

359 (2)

M 20

N.T.S
82-G-2

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. C. HART
Expiry Date: Mar. 3, 1972

SCALE
200 0 200 400 600 800
One Inch = 200 Fett

RIO TINTO CANADIAN EXPLORATION LIMITED

SAGE CREEK COAL LTD. — B.C.

DILLY HILL

SECTION 398+00N

May — 1971 | R.A.B. / a.d. | DWG. D-3366-16

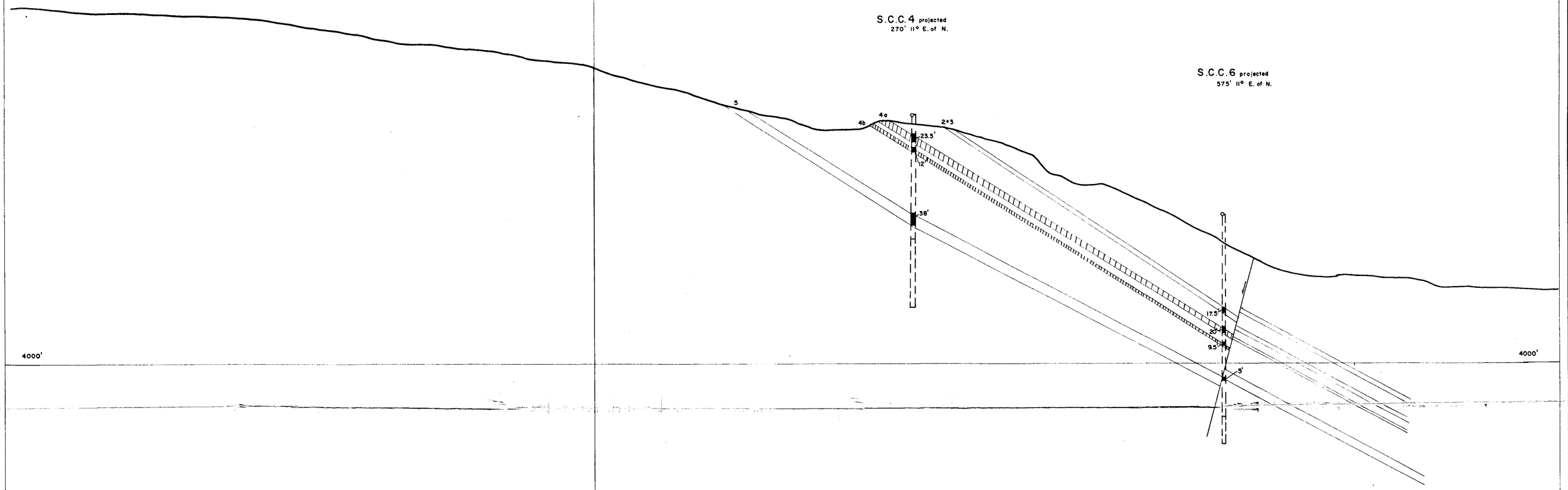
M21

W.

E.

S.C.C.4 projected
270' 11° E. of N.

S.C.C.6 projected
575' 11° E. of N.



C.N.I. Boundary

70,000 E

M21

359 (2) SC 71(2)A
(40,200N)

N.T.S
82-G-2

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. C. HART
Expiry Date: Mar. 3, 1972

SCALE

200 0 200 400 600 800

One Inch = 200 Feet

RIO TINTO CANADIAN EXPLORATION LIMITED

SAGE CREEK COAL LTD. — B.C.

DILLY HILL

SECTION 402 + 00 N

May — 1971 | R.A.B / a.d. | DWG. D-3366-17

K - SAGE CREEK 71(6)A

Detailed Reserve Calculations

SAGE CREEK COAL Ltd
Rio Tinto.

CONFIDENTIAL
OPEN FILE

GEOLOGICAL BRANCH
ASSESSMENT REPORT

00 359 (4)

DETAILED CALCULATIONS COAL RESERVES ON DALLY HILL

Section 294 + 00N

Appendix No. 21

Drill Hole	Seam No.	Thickness	Dip Length	Strike Length	Probable Geological Reserves in Short Tons
S.C.C. #20A	5	1	420	3000	2,920,000
S.C.C. #20A	5	5	320	3000	2,200,000
S.C.C. #15	2+3	6	320	3000	262,000
	4a	41	320	3000	1,790,000
	4b	17	320	3000	743,000
	4c	7	320	3000	306,000
	5	24	320	3000	1,050,000
S.C.C. #15	2+3	6	490	3000	400,000
	4a	41	490	3000	2,740,000
	4b	17	490	3000	1,135,000
	4c	7	490	3000	469,000
	5	24	490	3000	1,600,000
S.C.C. #19	2+3	10	730	3000	995,000
	4a	9	730	3000	895,000
	4b	18	730	3000	1,795,000
	4c	8	730	3000	796,000
	5	36	730	3000	3,580,000
Stelco #6	4a	37.5	450	3000	2,240,000
	4b	9.5	450	3000	583,000
	4c	5	450	3000	307,000
	5	30	450	3000	1,635,000
					28,441,000

DETAILED CALCULATIONS COAL RESERVES ON DILLY HILL

Section 346 + 00N

Drill Hole	Seam No.	Thickness	Dip Length	Strike Length	Probable Geological Reserves in Short Tons CNI	S.C.C.	Total
S.C.C. #2B	5	31'	270'	400'	152,300		152,300
S.C.C. #2B	2+3	17.5'	250'	400'		79,540	
	4a	24.25'	540'	400'		238,100	
	4b	20.75'	610'	400'		230,100	
	5	31'	740'	400'		417,200	965,040
Stelco #2	2+3	8'	1440'	400'		209,500	
	4a	27.75'	830'	400'		418,900	
	4b	18.0'	750'	400'		245,600	
	5	34.5'	200'	400'		125,400	999,400
					152,300	1,964,440	2,116,740

DETAILED CALCULATIONS OF COAL RESERVES ON DILLY HILL

Section 350 + 00N

Drill Hole	Seam No	Thickness	Dip Length	Strike Length	Probable Geological Reserves in Short Tons CNI	S.C.C.	Total
S.C.C. #2B	4b	20.75	50	400	18,870		
	5	31	400	400	225,500		244,370
S.C.C. #2B	2+3	1.75	1680	400		522,400	
	4a	24.25	1510	400		665,700	
	4b	20.75	1440	400		543,600	
	5	31	940	400		529,900	2,261,600
					244,370	2,261,600	2,505,970

DETAILED CALCULATIONS OF COAL RESERVES ON DILLY HILL

Section 354 + 00N

Drill Hole	Seam No.	Thickness	Dip Length	Strike Length	Probable Geological Reserves in Short Tons CNI	S.C.C.	Total
S.C.C. #2B	2+3	17.5	50	400	16,000		
	4a	24.3	300	400	133,000		
	4b	20.8	335	400	127,000		
	5	31	610	400	344,000		620,000
S.C.C. #2B	2+3	17.5	1,620	400		516,000	
	4a	24.3	1,250	400		553,000	
	4b	20.8	1,160	400		439,000	
	5	31	740	400		417,000	1,925,000
					620,000	1,925,000	2,545,000

DETAILED CALCULATIONS OF COAL RESERVES ON DILLY HILL

Section 358 + 00N

Drill Hole	Seam No.	Thickness	Dip Length	Strike Length	Probable Geological Reserves in Short Tons CNI	S.C.C.	Total
S.C.C. #2B	2+3	17.5	220	400	70,000		
	4a	24.25	410	400	180,800		
	4b	20.75	460	400	173,600		
	5	31	860	400	484,900		909,300
S.C.C. #2B	2+3	17.5	2425	400		771,600	
	4a	24.25	1900	400		837,900	
	4b	20.75	1775	400		669,900	
	5	31	1250	400		928,400	3,207,800
					909,300	3,207,800	4,117,100

DETAILED CALCULATIONS OF COAL RESERVES ON DILLY HILL

Section 362 + 00N

Drill Hole	Seam No.	Thickness	Dip Length	Strike Length	Probable Geological Reserves in Short Tons CNI	S.C.C.	Total
S.C.C. #5	2+3	13	260	400	61,460		
	4a	31	440	400	248,000		
	4b	15.5	500	400	140,900		
	5	27.75	790	400	398,700		849,060
S.C.C. #5	2+3	13	2150	400		508,200	
	4a	31	1810	400		1,021,000	
	4b	15.5	1680	400		473,500	
	5	27.75	1160	400		585,500	2,588,200
					849,060	2,588,200	3,437,260

DETAILED CALCULATIONS COAL RESERVES ON DILLY HILL

Section 366 + 00N

Drill Hole	Seam No.	Thickness	Dip Length	Strike Length	Probable Geological Reserves in Short Tons CNI	S.C.C.	Total
S.C.C. #5	2+3	13	300	400	70,910		
	4a	31	620	400	349,500		
	4b	15.5	690	400	194,500		
	5	27.75	990	400	499,600		1,144,510
S.C.C. #5	2+3	13	780	400		184.400	
	4a	31	710	400		400,300	
	4b	15.5	690	400		194,500	
	5	27.75	600	400		302,800	1,082,000
S.C.C. #11	2+3	10.25	1800	400		335,500	
	4a	11.25	1500	400		307,100	
	4b	19	1420	400		490,700	
	5	28.5	1100	400		570,100	1,703,400
					1,114,510	2,785,400	3,899,900

DETAILED CALCULATIONS OF COAL RESERVES ON DILLY HILL

Section 370 + 00N

Drill Hole	Seam NO.	Thickness	Dip Length	Strike Length	Probable Geological Reserves in Short Tons CNI	S.C.C.	Total
S.C.C. #7	2+3	14.8	260	400	70,000		
	4a	28.5	535	400	277,000		
	4b	20	720	400	262,000		
	5	26	1,165	400	550,000		1,159,000
S.C.C. #7	2+3	14.8	600	400		161,000	
	4a	28.5	600	400		311,000	
	4b	20	600	400		218,000	
	5	26	600	400		284,000	974,000
S.C.C. #11	2+3	10.3	2,400	400		450,000	
	4a	11.3	2,040	400		419,000	
	4b	19	1,880	400		650,000	
	5	28.5	1,450	400		751,000	2,270,000
					1,159,000	3,244,000	4,403,000

DETAILED CALCULATIONS OF COAL RESERVES ON DILLY HILL

Section 374 + 00N

Probable Geological Reserves in Short Tons

Drill Hole	Seam No.	Thickness	Dip Length	Strike Length	CNI	S.C.C.	Total
S.C.C. #3	2+3	15.5	150	400	42,280		
	4a	26	350	400	165,500		
	4b	16.5	470	400	141,000		
	5	34.5	860	400	539,500		888,280
S.C.C. #3	2+3	15	390	400		106,400	
	4a	27	350	400		171,900	
S.C.C. #7	4b	18	330	400		108,000	
	5	30	290	400		158,200	544,900
S.C.C. #12	2+3	14.75	610	400		163,600	
	4a	24.25	660	400		291,000	
	4b	8.5	680	400		105,100	
	5	44	710	400		568,200	1,127,900
S.C.C. #11	2+3	10.25	350	400		65,240	
	4a	11.25	300	400		59,960	
	4b	19	290	400		100,200	
	5	28.5	180	400		93,280	318,680
S.C.C. #14	2+3	14	620	400		159,700	
	4a	16.5	675	400		202,500	
	4b	14.75	680	400		182,400	
	5	38	750	400		518,300	1,062,900

Section 374 + 00N cont'd

Drill Hole	Seam No.	Thickness	Dip Length	Strike Length	Probable Geological Reserves in Short Tons CNI	S.C.C.	Total
S.C.C. #8	2+3	14.75	920	400		246,800	
	4a	17.5	620	400		197,200	
	4b	13	575	400		135,900	
	5	13	100	400		23,630	603,530
					888,280	3,657,910	4,546,190

DETAILED CALCULATIONS OF COAL RESERVES ON DILLY HILL

Section 378 + 00N

Drill Hole	Seam No.	Thickness	Dip Length	Strike Length	Probable Geological Reserves in Short Tons CNI	S.C.C.	Total
S.C.C. #3	2+3	15.5					
	4a	26	290	400	82,000		
	4b	16.5	440	400	132,000		
	5	34.5	930	400	585,000		799,000
S.C.C. #3	2+3	15.5	520	400		147,000	
	4a	26	520	400		246,000	
	4b	16.5	520	400		156,000	
	5	34.5	520	400		326,000	875,000
S.C.C. #9	2+3	14	360	400		91,600	
	4a	23	720	400		301,000	
	4b	13	720	400		170,000	
	5	38	720	400		498,000	1,060,600
S.C.C. #14	2+3	14	825	400		210,000	
	4a	16.5	825	400		247,000	
	4b	14.8	825	400		222,000	
	5	38	825	400		570,000	1,249,000
S.C.C. #8	2+3	14.8	1,270	400		342,000	
	4a	17.5	890	400		284,000	
	4b	13	810	400		191,000	
	5	13	260	400		61,500	878,500
					799,000	4,063,100	4,862,100

DETAILED CALCULATIONS OF COAL RESERVES ON DILLY HILL

Section 382 + 00N

Drill Hole	Seam No.	Thickness	Dip Length	Strike Length	Probable Geological Reserves in Short Tons CNI	S.C.C.	Total
S.C.C. #3	4a	26	320	400	151,000		
	4b	16.5	440	400	132,000		
	5	34.5	1000	400	627,000		910,000
S.C.C. #3	2+3	15.5	380	400		107,000	
	4a	26	575	400		272,000	
	4b	16.5	575	400		173,000	
	5	34.5	575	400		360,000	912,000
S.C.C. #9	2+3	14	320	400		81,500	
	4a	23	790	400		350,000	
	4b	13	790	400		187,000	
	5	38	790	400		546,000	1,164,500
S.C.C. #14	2+3	14	840	400		214,000	
	4a	16.5	840	400		252,000	
	4b	14.0	840	400		226,000	
	5	38.0	840	400		581,000	1,273,000
S.C.C. #8	2+3	14.8	1020	400		275,000	
	4a	17.5	710	400		226,000	
	4b	13	655	400		155,000	
	5	13	175	400		41,000	697,300
					910,000	4,046,800	4,956,800

DETAILED CALCULATIONS OF COAL RESERVES ON DILLY HILL

Section 386 + 00N

Probable Geological Reserves in Short Tons

Drill Hole	Seam No.	Thickness	Dip Length	Strike Length	CNI	S.C.C.	Total
S.C.C. #3	4b	16.5	50	400	15,010		
	5	34.5	520	400	326,200		341,210
S.C.C. #3	2+3	15.5	120	400		33,830	
	4a	26	580	400		274,300	
	4b	16.5	720	400		216,000	
	5	34.5	660	400		414,000	938,130
S.C.C. #9	4a	23	210	400		87,820	
	4b	13	350	400		65,610	
	5	38	460	400		317,900	471,330
S.C.C. #10	2+3	14	400	400		101,800	
	4a	22.5	420	400		171,800	
	4b	9.5	410	400		70,820	
	5	34.64	340	400		213,300	557,720
S.C.C. #14	2+3	14	650	400		165,500	
	4a	16.5	680	400		204,000	
	4b	14.75	700	400		187,800	
	5	38	780	400		539,100	1,096,400

Section 386 + 00N cont'd

Drill Hole	Seam No.	Thickness	Dip Length	Strike Length	Probable Geological Reserves in Short Tons CNI	S.C.C.	Total
S.C.C. #8	2+3	14.75	975	400		261,500	
	4a	17.5	680	400		216,400	
	4b	13	600	400		141,600	
	5	13	120	400		28,360	647,860
					341,210	3,711,440	4,052,650

DETAILED CALCULATIONS COAL RESERVES ON DILLY HILL

Section 390 + 00N

Probable Geological Reserves in Short Ton

Drill Hole	Seam No.	Thickness	Dip Length	Strike Length	CNI	S.C.C.	Total
S.C.C. #10	5	34.6	240	400	151,000		151,000
S.C.C. #10	2 + 3	17.5	1560	400		497,000	
	4a	22.5	1830	400		758,000	
	4b	9.5	1970	400		342,000	
	5	34.6	2180	400		1,370,000	2,967,000
					151,000	2,967,000	3,118,000

DETAILED CALCULATIONS OF COAL RESERVES ON DILLY HILL

Section 394 + 00N

Probable Geological Reserves in Short Tons

Drill Hole	Seam No.	Thickness	Dip Length	Strike Length	CNI	S.C.C.	Total
S.C.C. #4	2 + 3	17.5	590	400		189,000	
	4a	23.5	760	400		325,000	
	4b	12	800	400		175,000	
	5	38	1,710	400		1,180,000	1,869,000
S.C.C. #6	2 + 3	17.5	1,160	400		369,000	
	4a	20	1,015	400		369,000	
	4b	9.5	900	400		155,000	
	5	5	570	400		11,400	904,400
						2,773,400	2,773,400

Section 398 + 00N

Probable Geological Reserves in Short Tons

Drill Hole	Seam No.	Thickness	Dip Length	Strike Length	CNI	S.C.C.	Total
S.C.C. #4	5	27.8	700	400	354,000		354,000
S.C.C. #4	2 + 3	17.5	780	400		248,000	
	4a	23.5	845	400		334,000	
	4b	12	1,020	400		222,000	
	5	38	1,900	400		1,310,000	2,114,000
S.C.C. #6	2 + 3	17.5	1,190	400		379,000	
	4a	20	1,020	400		371,000	
	4b	9.5	905	400		156,000	
	5	5	540	400		49,000	955,000
					354,000	3,069,000	3,423,000

DETAILED CALCULATIONS OF COAL RESERVES ON DILLY HILL

Section 402 + 00N

Probable Geological Reserves in Short Tons

Drill Hole	Seam No.	Thickness	Dip Length	Strike Length	CNI	S.C.C.	Total
S.C.C. #4	2 + 3	17.5	280	340		75,700	
	4a	23.5	580	340		363,000	
	4b	12	640	340		119,000	
	5	38	1,250	340		735,000	1,292,700
S.C.C. #4	2 + 3	17.5	270	400		86,000	
	4a	23.5	270	400		115,000	
	4b	12	270	400		59,000	
	5	38	270	400		334,000	594,000
S.C.C. #6	2 + 3	17.5	1,130	400		360,000	
	4a	20	980	400		358,000	
	4b	9.5	870	400		150,000	
	5	5	565	400		51,400	919,400
						2,806,100	2,806,100