K - SAGE CREEK 75(3)D-2

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SAGE CREEK COAL LIMITED

LITHOLOGICAL REPORTS 1975

DRILL HOLES - SOUTH HILL

OPEN FILE

GEOLOGICAL BRANCH
ASSESSMENT REPORT

00 369 (1)

RIO TINTO CANADIAN EXPLORATION LIMITED

DRILL HOLES - SOUTH HILL

Hole No.	Elev.	Northings	Eastings	
75R-07	5049	17,846,660	584,203	
75R-08	5025	17,847,457	584,596	
75R-09	4777	17,845,856	585,202	
75R-10	5312	17,846,239	582,369	
75R-13	4352	17,848,628	585,978	
75R-14	4466	17,848,573	585,126	
75G-01A	4309	17,848,655	586,791	Not Submitted
75G-01	4310	17,848,659	586,769	
75G-03A	4425	17,846,237	586,806	
75G-05	4367	17,847,867	586,520	
75G-06	4320	17,849,487	585,995	" "
75G-06A	4320	17,849,477	585,974	
75D-08	4923	17,844,973	584,233	
75D-09	5421	17,846,644	581,602	
75D-10	5078	17,847,465	583,992	
75D-12	5214	17,846,657	583,188	
75D-14	5241	17,845,059	582,410	
75D-16	5094	17,845,834	583,826	
75D-18/18A	5189	17,845,421	582,932	
75D-21	5256	17,846,663	582,846	
75D-22	5217	17,847,481	583,255	
75D-22A	5218	17,847,477	583,309	
74D-24	5233	17,847,933	582,709	
75D-25	5421	17,846,244	581,894	
75D-27	5280	17,847,400	582,373	
75D-28	5317	17,847,379	582,111	
75D-30/30A	4987	17,848,531	582,513	
75D-32	5429	17,845,597	581,982	
75U-01	4726	17,848,115	583,474	

SOUTHWEST - SOUTH HILL

Hole No.	Elev.	Northings	Eastings
75R-15	6063	17,843,087	578,028
75R-15A	6063	17,843,091	578,046
75R-16	5660	17,843,074	580,400
75R-17	5650	17,844,684	580,391
75R-17A	5653	17,844,649	580,341
75R-18	5972	17,844,673	578,783

RIO TINTO CANADIAN EXPLORATION LIMITED

ROTARY DRILL RECORD

Hole No.: 75R-07 I

Property: Sage Creek Coal

Location: South Hill
17,846,656N
584,203E

Elevation: 5049' asl.

Contractor: Becker Drills Limited

Hole Size: 5 1/8" - 5 5/8"

Rig No.: 45-18

Date Commenced Drilling: August 3, 1975

Date Finished Drilling: August 7, 1975

Date Hole Completed: August 7, 1975

Logged By: Jim Baker

Date: August 7, 1975

Probed By: Roke Oil Enterprises

Date: August 7, 1975

Total Depth Drillers: 764'

Depth of Overburden: 30 ft.

Total Depth Logger: 765'

Water Level: 5018' asl.

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time
	5 5/8	TM 1-T	40	11	224	233	
	5 5/8	TM 1-T	40	224	434	210	
	5 1/8	RB #D350-51	40	434	650	216	
	5 1/8	Hughes	40	650	765	115	

Surface Casing: 10'
Total Drilling Time: 112.5 hrs.
Total Down Time: 7 hrs.
Total Footage Chargeable: 764'
Total Hourly Contact: 3 hrs.

Standby Time for Logging: 2.5
Other Standby Time: ———
Total Chargeable Standby Time: 2.5
Actual Moving Time Between Holes: 3
Chargeable Moving Time " " :
Quantity of Mud Used:
Gel - 54 bags
Barite - 23 bags
Kwik Seal - 1 bag
Cement - 6 bags

Remarks:-

Probe Report:

760-0.....Gamma Ray/Neutron.....Open Hole
760-0.....Sidewall Density.....Open Hole
760-0.....Caliper.....Open Hole
760-58.....E-Log.....Open Hole
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Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam #2	200'-212'	12'	202.75-211	8.25'
Seam #4U	402'-432'	30'	398.5'-431'	32.5'
4L	(not recovered)		437.25-449.5	12.25'
Seam 5U	700'-710'	34'	701 -710'	9'
5L	716'-734'		717.5'-733.5	16'

INTERVAL	UNIT THICKNESS	DESCRIPTION
0 - 30	30'	Overburden - weathered rock indurated with clay - contains frags. of chert pblm., SS. & sh. - heavily Fe stn.
		Cretaceous - Kootenay Formation
30 - 90	60'	Sandstone - lt. gray - m. gr., qtz & chert gr., a-r gr. - p. poros. - silica cement - p. to mod. sorted - abd. Fe stn. - abundant cavings from above.
90 - 200	110'	Shale - dark gray - micaceous - coaly in part (No. 1 Horizon) - somewhat silty - tr pyrite 140-170 Sandstone yellow-red colour Extreme weathering 190-200 Shale frags are rd. - Abd. Fe. stn.
200 - 212	12'	Coal - Seam #2 - argil and dirty - earty luster
212 - 220	8'	Shale - med-dark gray - coaly in part - micaceous - somewhat silty
220 - 380	160'	Sandstone - lt. gray, m. to c. gr. SS. - qtz & chert gr., AA - Sil. cmt. - p. sort. - in part lim. stn. 220-330 Siltstone & fine grained Sandstone - m. gy., sl. arg., sl. mica. - mod. sort., silt to f. gr. SS.
380 - 402	22'	Shale - Med. gray - micaceous - earthy and argil in part
402 - 432	30'	Coal - Seam #4 - black - argil - dirty appearance - shaley at top part of the section
432 - 500	68'	Shale - dark gray, carbonaceous to coaly in part - slightly micaceous - becomes silty near base of unit 440-450 abd. coal frags/sh. - prbly represents Seam 4L - insufficient coal to sample - abd. caving
500 - 550	50'	Sandstone - lt. to m. gy. - med grained, a, qtz & chert gr. - sil. cmt. - p. sort. - trace shale frags., probably cavings from above.
550 - 580	30'	Shale - med-dark gray - carb. in part, tr coal throughout.

INTERVAL	UNIT THICKNESS	DESCRIPTION
		- sl. mica.
580 - 700	120'	Sandstone - lt. gy to m. gy. - v. f. to f. gr., qtz & chert; a; mod. sort. - silica cmt. - tr. siltstone 620-640 siltstone 690-700 shale - grades from siltstone to sh. - dk. gy. - in part carb.
700 - 734	34'	Coal - Seam #5 - black - shiny - hard & brittle - becomes shaley towards base of unit - tr. marcasite throughout 710-716 - abundant shale
735 - 764	29'	Sandstone (basal) - lt. gray - f. gr., r-R, mostly qtz/minor chert - silica cmt - well sorted - white flecks of rotten feldspar - trace coal frags (prbly cavings)
	764'	Total Depth

RIO TINTO CANADIAN EXPLORATION LIMITED

ROTARY DRILL RECORD

Hole No.: 75R-08

Property: Sage Creek Coal

Location: South Hill
17,847,457N
584,596E

Elevation: 5025' asl.

Contractor: Becker Drills Limited

Hole Size: 5 1/8" - 5 5/8"

Rig No.: 45-20

Date Commenced Drilling: August 5, 1975

Date Finished Drilling: August 9, 1975

Date Hole Completed: August 10, 1975

Logged By: James Mitchell

Date: August 10, 1975

Probed By: Roke Oil Enterprises

Date: August 10, 1975

Total Depth Drillers: 696'

Depth of Overburden: < 5 ft.

Total Depth Logger: 696'

Water Level: 5001' asl.

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time
1	5 5/8	WM D-19607	40	8	230	222	
2	5 5/8	WM C-62213	40	230	368	138	
3	5 1/8	WM#2 13066	40	368	505	137	
4	5 1/8	WM#2	40.	668	696	28	

Surface Casing: 8'
Total Drilling Time: 109.5
Total Down Time: 2
Total Footage Chargeable: 696'
Total Hourly Contact: 5.5

Standby Time for Logging: 6
Other Standby Time: 4.5
Total Chargeable Standby Time: 10.5
Actual Moving Time Between Holes: 3.5
Chargeable Moving Time " " : 2.5
Quantity of Mud Used:
28 Quik-Gel

Remarks:- Casing set by Becker Hammer Rig.
- Hole cut by low angle fault @ 320 ft. Displaces approx. 80 ft. of stratigraphy.

Probe Report:

690-0.....Gamma Ray/Neutron.....Thru Dual Wall Pipe
690-0.....Sidewall Density.....Open Hole
690-0.....Caliper.....Open Hole
690-95'.....E-Log.....Open Hole
693-82'.....Focused Beam Log.....Open Hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 2	201' - 208'	7'	200.25-206.75	6.5'
Seam 4U	350' - 368'	18'	345' - 365.75	20.75'
4L	372' - 388'	16'	371' - 383'	12'
			385.25-387	1.75'
Seam 5U	620' - 632'	12'	619' - 630.75	11.75'
5L	638' - 640'	2'	637.5-638.5	1'
	644' - 662'	18'	640-641	1'
			643-664.25	21.25'

Hole 79E-[illegible]

INTERVAL	UNIT THICKNESS	DESCRIPTION
0 - 5	< 5'	Overburden - Less than 5 ft.; wthrd rock indurated with clay.
		Cretaceous - Kootenay Formation
5 - 57	52'	Conglomerate and Conglomeratic Sandstone - Conglomerate and Conglomeratic Sandstone. - P. sorted, chert pblo.; m gr. SS. matrix. - Heavily Fe stn.
57 - 95	38'	Sandstone - "salt and pepper" - qtz - chert - argillaceous matrix - mod sorted - med grained - becomes finer upward in section
95 - 122	27'	Shale - dk grey to black - bituminous in part - abundant marcasite @ 113-114
122 - 133	11'	Sandstone - dk grey - vf grained, chert - qtz. - argillaceous matrix
133 - 140	7'	Shale - med grey - bituminous - silty
140 - 185	45'	Sandstone - "salt and pepper" - qtz - chert - coarse grned basally, becomes fine upward in section - very porous, Fe stained.
185 - 201	16'	Shale - dk grey - bituminous
201 - 208	7'	Coal - Seam 2 - glossy
208 - 234	26'	Siltstone - lt-med grey - chert - qtz. - argillaceous matrix - gradational contact at top
234 - 293	59'	Sandstone - "salt and pepper" - very coarse grained basally; fines upward to vf. grained - moderate to severe ironstaining in part.
293 - 345	52'	Sandstone and Siltstone - vf. grained to siltstone - ironstained - shaley in part - m. dk. to dk. gy.
345 - 350	5'	Shale - black - bituminous - tr coal, marcasite
350 - 368	18'	Coal - Seam 4U - glossy and dull
368 - 372	4'	Shale - bituminous

Hole 75R-08

INTERVAL	UNIT THICKNESS	DESCRIPTION
372 - 388	16'	Coal - Seam 4L
388 - 410	22'	Shale - m. to dk. gy. - bituminous - fissile
410 - 600	190'	Sandstone - vf. to fine grained - qtz - chert - org. matrix - tr. coal - fractured in part / minor calcite infilling 460-490 - shale - dk. gy., carb. to coaly in part - fissile, sl. mica.
600 - 620	20'	Shale - med. gry - fissile - micaceous - tr. coal
620 - 632	12'	Coal - Seam 5U - glossy - granular
632 - 644	12'	Shale - md.-dk. gy. - bituminous - tr. marcasite 636-640 - Coal stringers
644 - 662	18'	Coal - Seam 5L - glossy vitreinous - tr. shale
662 - 664	2'	Shale - bituminous - mica.
664 - 696	32'	Sandstone - "basal" - med. grained - sub rounded - well cemented - white silica cmt. - well sorted
	696'	Total Depth

[illegible]

ROTARY DRILL RECORD

Hole No.: 79R-09

Property: [illegible] Creek Coal

Location: [illegible] Hill
17,785,[illegible]
575,[illegible]

Elevation: 4[illegible]' [illegible]

Contractor: Becker Drills Limited

Hole Size: 5 1/4" - 5 1/8"

Rig No.: 45-20

Date Commenced Drilling: August 10, 1979

Date Finished Drilling: August 15, 1979

Date Hole Completed: August 15, 1979

Logged By: Jim Baker

Date: August [illegible], 1979

Probed By: Lake Oil Enterprises

Date: August 15, 1979

Total Depth Drillers: 776'

Depth of Overburden: [illegible] ft.

Total Depth Logger: 770'

Water Level: [illegible]
(artesian [illegible])

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Ti
#2	5 1/8	[illegible]	40	[illegible]	492	[illegible]'	
#2	5 5/8	[illegible]	40	492	546	9[illegible]'	
#2	5 1/8	[illegible]	40	546	590	44'	
#1	5 1/8	[illegible]	40	590	690	10[illegible]'	
#1	5 1/8	[illegible]	40	690	745	1[illegible]'	
#1	5 1/8	[illegible]	40	745	776	31'	

Surface Casing: [illegible]'

Total Drilling Time: 76.5 hrs.

Total Down Time: ——

Total Footage Chargeable: 776'

Total Hourly Contact: 1.5 hrs.

Standby Time for Logging: [illegible] hrs.

Other Standby Time: [illegible] hrs.

Total Chargeable Standby Time: [illegible].5 hrs.

Actual Moving Time Between Holes:

Chargeable Moving Time " " :

Quantity of Mud Used:
6-1 - 21 bags

Remarks:-
Hole in good condition.

Probe Report:

770-0.....Gamma Ray/Neutron.....Thru Dual Wall Drill Pipe
770-0.....Sidewall Density.....Open Hole
770-0.....Caliper.....Open Hole
770-23.....E-Log.....Open Hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam #4 Upper	382 - 410	28'	377 - 410.75	33.75'
Lower	420 - 434	14'	417.25-430.5	13.25'
	440 - 444	4'	437.25-439.25	2'
Seam #5 U	690 - 709	19'	690.25-705.75	15.5'
5 L	715 - 743	28'	711.75-741.25	29.5'

INTERVAL	UNIT THICKNESS	DESCRIPTION
0 - 5	< 5'	Overburden - clay
5 - 250	245'	Tertiary - Eisenstein Formation Mudstones, Siltstones and Clay - lt. greenish gray for most part - loosely consolidated - mudstones to silt tones - clay matrix 5'-80' - sandstone - lt. gy. - f-m gr. - poorly consolidated - qtz. gr., - r. gr. - trace pyrite - minor Fe stn. 160'-180' - mod. Fe stn.
250 - 270	20'	Cretaceous - Kootenay Fm. Sandstone - med. gray - med. grained - chert and qtz. - silica cmt. - sub rounded - m. sorting - minor clay present 260'-270' - grades to coarse gr. SS.
270 - 300	30'	Shale - med.-dk. gray - micaceous - silty - minor Fe st. 290'-300' - Siltstone - lt. grey - micaceous, sil ca cmt. - minor shale
300 - 382	82'	Sandstone - lt.-med. gray - fn.-med. grained - silica cmt. - m. sorting - sub rd. - sub ang. - minor Fe st. 310'-330' - grades to crs. gr. SS, high content of chert - In part conglomeratic/chert pebs. - silica cmt. & SS matrix 360'-370' - Siltstone - med. gray, micaceous, silica cmt. 370'-382' - Shale - dark gray, micaceous
382 - 410	28'	Coal - Seam #4U - black shiny hard
410 - 420	10'	Shale - dk. gy., bituminous.
420 - 444	24'	Coal - Seam #4L - black, dull to vitreous - lower part of coal / high sh. content 434'-440' - Shale - blk., bituminous, some coal frags.
444 - 490	46'	Shale/Siltstone - lt. gy., micaceous - hd. blocky - silty sh. & arg. siltstone

INTERVAL	UNIT THICKNESS	DESCRIPTION
490 - 520	30'	Sandstone - lt.-m. gy. - f-m. gr., qtz & chert gr., a. - p.-mod. sorted - trace pyr.
520 - 540	20'	Siltstone - lt. to m. gy., sl. mica., arg.
540 - 570	30'	Shale - m. to dk. gy. - bituminous to coaly in part - mica.
570 - 690	120'	Siltstone - lt. to m. gy. - arg. in part. 610'-630' - Sandstone - m. gy., v.f.gr. - qtz & chert gr., r, mod. sorted - silica cmt. - silty 680'-690' - Shale - dk. gy., sl. carb., sl. mica. - becoming coaly downwards
690 - 743	53'	Coal - Seam 5 - dull to vitreous - earthy appearance in part - becomes more shaley downwards 709'-715' - Shale - dk. gy., in part bit. to coaly.
743 - 775	32'	Sandstone (Basal) - fn. grained - med.-dk. gry. - qtz & chert - silica cmt. - m. sorting - sub rd.-sub ang. - coaly in part - minor argil material present
	776'	Total Depth

BIG THREE CANADIAN EXPLORATION LIMITED

ROTARY DRILL RECORD

Hole No.: 75R-10

Property: Sage Creek Coal

Location: South Hill
17,846,239N
582,269E

Elevation: 5612' ±.1.

Contractor: Becker Drills Ltd.

Hole Size: 5 5/8"

Rig No.: 45-20

Date Commenced Drilling: August 13, 1975

Date Finished Drilling: August 17, 1975

Date Hole Completed: August 17, 1975

Logged By: James Mitchell

Date: August 17, 1975

Probed By: Poke Oil Enterprises

Date: August 17, 1975

Total Depth Drillers: 512'

Depth of Overburden: 39'

Total Depth Logger: 512'

Water Level: 0

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time
1	5 5/8	[illegible]	40	10	94	84'	
2	5 5/8	[illegible]	40	94	212	118'	
3	5 5/8	[illegible]	40	212	396	140'	
4	5 5/8	[illegible]	40	396	512	116'	

Surface Casing: 10'
Total Drilling Time: 88 hrs.
Total Down Time: 19 hrs.
Total Footage Chargeable: 512'
Total Hourly Contact: 1 hr.

Standby Time for Logging: 7.5
Other Standby Time: 4
Total Chargeable Standby Time: 6
Actual Moving Time Between Holes: 6
Chargeable Moving Time " " :
Quantity of Mud Used:
23 Gel

Remarks:- Increased thickening of Seam 4 and above probably reflects steepening dip.

Probe Report:

506-0.....Gamma Ray/Neutron.....Thru Dual Wall Drill Pipe
470-0.....Sidewall Density.....Open Hole
470-0.....Caliper.....Open Hole
470-30.....E-Log.....Open Hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 4U	118-158	40'	117-156.75	39.75'
4L	(164-182	18'	164.25-181.75	17.5'
	(198-210	12'	195.5-210	14.5'
Seam 5U	440-456	16'	427.25-433	5.75'
5L			442.75-454.5	11.75'

Hole 79R-10

INTERVAL	UNIT THICKNESS	DESCRIPTION
0 - 39	39'	Overburden - Gravel and sand - Glacial till - Severely weathered at 30'-40'
		Cretaceous - Kootenay Formation
39 - 115	76'	Shale - m. dk. gy. to dk. gy. - bituminous - silty and sandy at base - tr. marcasite
118 - 158	40'	Coal - Seam 4U - vitreous at dull - tr. marcasite
158 - 166	8'	Shale - dk. gy. to black - bituminous in part
166 - 182	16'	Coal - Seam 4L - dull to vitreous - granular appearance
182 - 198	16'	Shale - dk. gy. to black - bituminous and bitumen partings - tr. marcasite
198 - 210	12'	Coal - Seam 4L - dull to vitreous - fissile - shaley in part
210 - 222	12'	Shale - med. gy. - micaceous - tr. marcasite, coal
222 - 250	28'	Siltstone - med. gy. - well cemented (silica)
250 - 300	50'	Sandstone - med. gy. - vf-f. grained - qtz and chert - silica cmt.
300 - 352	52'	Shale - med. gy. siltstone at top grading to dk. gy.-blk. bituminous shale - tr. marcasite - coal stringers @ 317-319 323-325 333-335 344-348
352 - 415	63'	Siltstone - lt. gy. - micaceous - well cemented - sandy in part
415 - 440	25'	Shale - med.-dk. gy. - bituminous in part - tr. marcasite - silty

INTERVAL	THICKNESS	DESCRIPTION
440 - 456	16'	Coal - Seam 5 - dull - granular - high shale content
456 - 512	56'	Sandstone (Basal) - Fine to med. grained - well sorted - diagnostic white grains - qtz predominate
	512'	Total Depth

RIO TINTO CANADIAN EXPLORATION LIMITED

ROTARY DRILL RECORD

Hole No.: 75R-13

Property: Sage Creek Coal

Location: South Hill
17,848,628 N
585,378 E

Elevation: [illegible] msl.

Contractor: Becker Drills Ltd.

Hole Size: 5 1/8" - 5 5/8"

Rig No.: 45-20

Date Commenced Drilling: October 2, 1975 (in full)

Date Finished Drilling: October 7, 1975

Date Hole Completed: October 9, 1975

Logged By: James Mitchell

Date: October 9, 1975

Probed By: Roke Oil Enterprises

Date: October 9, 1975

Total Depth Drillers: 757'

Depth of Overburden: 16'

Total Depth Logger: 755'

Water Level: 13' [illegible]

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time
1	5 5/8	[illegible]		16	116	[illegible]	
2	5 5/8	[illegible]		116	162	46'	
3	5 5/8	[illegible]		162	329	167'	
4	5 5/8	[illegible]		329	398	69'	
5	5 5/8	[illegible]		398	516	118'	
6	5 5/8	[illegible]		516	578	62'	
7	5 5/8	[illegible]		578	636	58'	
8	5 5/8	[illegible]		636	716	80'	
9	5 1/8	[illegible]		716	757	41'	

Surface Casing: 7

Total Drilling Time: 136½ hrs.

Total Down Time: 1 hr.

Total Footage Chargeable: 760'

Total Hourly Contact: 10

Standby Time for Logging: 21 hrs.

Other Standby Time: 0

Total Chargeable Standby Time: 21

Actual Moving Time Between Holes: 5

Chargeable Moving Time " " : 0

Quantity of Mud Used:
Gel - 46 bags
Mud - 9 bags

Remarks:- Probable fault @ 523' - down dropped to the East; displaces N 400 ft. of strata. Samples are highly contaminated and tend to obscure stratigraphy.

Probe Report:

755-0.....Gamma Ray/Neutron.....Thru Double Wall Pipe
754-0.....Sidewall Density.....Open Hole
754-0.....Caliper.....Open Hole
756-22'.....E-Log.....Open Hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks		
Seam 5U	654-672	18'	642-655.5 659.75-660.75 664 - 668	13.5'] 1'] 4']	26
5L	686-722	36'	682.5 - 693.5 697.25-721.5	11] 24.25']	39

Hole 75R-13

INTERVAL	UNIT THICKNESS	DESCRIPTION
0 - 10	10'	<u>Overburden</u> - Glacial till and outwash material
		<u>Tertiary - Kishenehn Formation</u>
10 - 265	255'	Clays, Silts and indurated gravels. 10'-204' - Interbedded silts and clays - In part with indurated gravels 204'-252' - For the most part a greenish blue clay. 252'-265' - White quartzitic rock chips and gravels; in part indurated with clay.
		<u>Cretaceous - Blairmore Group</u>
265 - 324	59'	<u>Conglomerate</u> Interbedded Sandstones and Conglomerates - med. grn. SS at top grading quickly to typical Blairmore conglomerate - ironstained to 310' (weathered zone) - SS med. to coarse grned ang. chert pred. - conglomerate - rnded chert pbls. in SS matrix - very well cemented with silica cmt.
		<u>Cretaceous - Kootenay Formation</u>
324 - 355	31'	<u>Siltstone to Fine Grained Sandstone</u> - obscured in samples by uphole contamination - chert predominate - mod. well sorted - black to dk. grey - micaceous
355 - 403	48'	<u>Sandstone</u> - med. grained - "salt and pepper" (qtz & chert) becoming chert pred. basally - heavily ironstained at top, ironstain free at base - sub angular to sub rounded - becoming med.-crse. grained basally - conglomeratic 380'-390', tr. marcasite on chert fractures
403 - 438	35'	<u>Siltstone to Sandstone</u> - blk. micaceous siltstone pred. 403'-416' - grading to sandstone, med. grained - med. gy. overall - tr. marcasite - qtz pred. with chert
438 - 468	30'	<u>Mudstone</u> - dk. gry. to black - carbonaceous - thin vitrain bands (twigs) - coaly bands @ 442', 445', 451. - silty in part.
468 - 506	38'	<u>Sandstone</u> - med. grained - "salt and pepper" - poorly sorted - moderate to severe ironstain 480'-506'

Hole 75B-13

INTERVAL	UNIT THICKNESS	DESCRIPTION
506 - 605	99'	Mudstone - dk. gy. to black - silty, micaceous - tr. coal throughout - coal bands: 529'-532' and 6[illegible]' - interbedded with siltstone throughout - carbonaceous
605 - 642	39	Siltstone - siltstone to f. gr. SS - black - carbonaceous - micaceous - tr. coal throughout
642 - 668	26	Coal - Seam 5U - Clarain predomin te - mudstone b nds [illegible] and [illegible]
668 - 682	14	Mudstone - black - carbonaceous - silty
682 - 722	40	Coal - Seal 5L - clarain predominate - mudstone bands [illegible]'-697' 700'-701' 707'-7[illegible]' 710'-712'
722 - 755	33'	Sandstone - basal - "salt and pepper" - fine to med. grained - white qz cas
	758'	Total Depth

RIO TINTO CANADIAN EXPLORATION LIMITED

Ns

ROTARY DRILL RECORD

Hole No.: 75R-14

Property: Sage Creek Coal

Location: South Hill
17,848,573 N
585,126 E

Elevation: 4466' asl.

Contractor: Becker Drills Ltd.

Hole Size: 5 5/8"

Rig No.: 45-20

Date Commenced Drilling: October 8, 1975

Date Finished Drilling: October 10, 1975

Date Hole Completed: October 10, 1975

Logged By: James Mitchell

Date: October 10, 1975

Probed By: Roke Oil Enterprises

Date: October 10, 1975

Total Depth Drillers: 358'

Depth of Overburden: 5'

Total Depth Logger: 356'

Water Level: Flowing

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time
1	5 5/8	WM#1		16	187	171'	
2	5 5/8	WM#2		187	328	141'	
3	5 5/8	WM#1		328	358	30'	

Surface Casing: 10
Total Drilling Time: 37½
Total Down Time: Nil
Total Footage Chargeable: 358'
Total Hourly Contact: 4

Standby Time for Logging: 4
Other Standby Time: 5
Total Chargeable Standby Time: 9
Actual Moving Time Between Holes: 9.5
Chargeable Moving Time " " : 7.5
Quantity of Mud Used:
Gel - 18 bags
Cement - 6 bags

Remarks:-

Probe Report:

355-0.....Gamma Ray/Neutron.....Through Double Wall Pipe
355-0.....Sidewall Density.....Open Hole
355-0.....Caliper.....Open Hole
356-25.....E-Log.....Open Hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 4U	16- 60	44'	20.75-54.5	33.75'
4L	68-100	32'	63-94.75	31.75'
Seam 5U	304-320	16'	289.5-298.25	8.75'
5L			302.5-318.75	16.25'

Hole 79R-14

INTERVAL	UNIT THICKNESS	DESCRIPTION
0 - 15	15	Overburden - Less than 15' - weathered shale, sand soil and coal.
		Cretaceous - Kootenay Formation
15 - 55	40'	Coal - Seam 4U - clarain & clarro-vitrain - dull to vitreous (the more bright coal - becoming more arg. near base. Possibly more fusain nr. base. 19'-21' - Mud tone 49'-50' - Mud tone
55 - 63	8'	Mudstone - black - carbonaceous - tr. vitrain banding
63 - 95	32'	Coal - Seam 4L - vitrain and clarain med. becoming fusainous near base 91'-93' - Mudstone
95 - 160	65'	Mudstone - med. grey to black - silty - carbonaceous - tr. vitrain banding 128' - coal str. 158' - coal str.
160 - 180	20'	Siltstone - med. grey - micaceous - grading to vf. gr. and f. gr. SS in part
180 - 190	10'	Mudstone - dk. grey - carbonaceous - micaceous
190 - 250	60'	Siltstone - med. grey - micaceous - grading to vf. gr. and f. gr. SS in part 220'-250' - heavily Fe stn. - limonitic
250 - 289	39'	Sandstone to Siltstone - m. lt. grey - silt to f. gr. - qtz & chert; arg. matrix - p.m. sort. - a-A gr. - Fe stn. throughout - becomes m. gy. towards base.
289 - 319	30'	Coal - Seam 5 - clarain & shale predominate - mudstone bands 298'-303' 304'-305' 306'-308' 311'-312'
319 - 358	39'	Sandstone (Basal) - fine to med. grained - "salt and pepper", qtz predominates over chert - white specks (rotten feldspar) - r, m. to well sort. - hd., sil. cmt.
	358'	Total Depth

KIO TIMBER CONSOLIDATED EXPLORATION LIMITED

ROTARY DRILL RECORD

Hole No.: 276-07A

Property: [illegible] Creek Coal

Location: South Hill
17,246,275
586,[illegible]

Elevation: [illegible] a.s.l.

Contractor: Becker Drills Limited

Hole Size: [illegible]" - 4 7/8"

Rig No.: 46-18

Date Commenced Drilling: August 11, 1975

Date Finished Drilling: August 26, 1975

Date Hole Completed: August [illegible], 1975

Logged By: A. Gessner (Dawson & Moore)
J. Mitchell

Date: [illegible]

Probed By: John Oil Enterprises

Date: [illegible] 24, 1975

Total Depth Drillers: 1[illegible]4'

Depth of Overburden: [illegible]

Total Depth Logger: 1[illegible]4'

Water Level: [illegible]

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Ti[illegible]
	4 7/8	[illegible] Tricone		0 [illegible]	[illegible]		

Surface Casing:
Total Drilling Time: 276
Total Down Time: 64
Total Footage Chargeable: ----
Total Hourly Contact: 151.5

Standby Time for Logging: [illegible]
Other Standby Time: 10.5
Total Chargeable Standby Time: [illegible]
Actual Moving Time Between Holes: 13
Chargeable Moving Time " " : 12
Quantity of Mud Used:
Quik Gel - 10 bags
Barite - 4 bags

Remarks:- Hole was drilled to 602' and lost due to faulty drill pipe. Skidded rig 30 ft. [illegible] redrilled using 4" pipe instead of 5½" pipe. Hole completed [illegible] 1002', 1004' into Kootenay.

Probe Report:

1000-0.....Gamma Ray/Neutron.....Thru dual wall drill pipe.
280-96.....E-Log.....Open Hole.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	

INTERVAL	UNIT THICKNESS	DESCRIPTION
		Tertiary-Kishenchn Formation
0 - 40	40'	Claystone - lt. green. - silty. - breaks easily. 11'-12' - Fe Ox stains on fractures. 20'-26' - grades to dk. gy. 26'-26.5' - sandy.
40 - 44.5	4.5'	Sand - m. gy., silty to fine sd.
44.5 - 60	15.5'	Claystone - M. gy. 50' - slickensided.
60 - 86	26'	Sand - m. gy. - silty, f. gr. sd. - grades to f. gr. slty. SS. 69' - cobbles.
86 - 140	54'	Sandstone - m. gy. - f. gr., silty, p. cmt. 95'-109' - interbedded / siltstone & claystone. 115' - steep bedding, carbonaceous material in f. to m. gr. SS. 120'-140' - fractures @ 45° to 50° to C/A.
140 - 143	3'	Carbonaceous Claystone - fractures @ 45° - 50° to C/A.
143 - 260	117'	Sandstone - p. cmt. - f.-m. gr., in part silty and in part arg. - grades to siltstone at base of unit.
260 - 289	29'	Siltstone - blue-gy. - fairly hd. - some gouge material along fractures.
289 - 305	16'	Sandstone - m. gy. - f. to c. gr. SS / some conglomerate and f. gravel. - well cmt. - grading to siltstone.
305 - 366	61'	Sandstone - m. gy. - loosely cmt., m. gr. SS. - fractures @ 30° to C/A. 330' - grades to f. gr. 350' - some coaly seams.
366 - 386	20'	Siltstone - dk. brn. gy., clayey sltst. - contains some f. gravel.
386 - 450	64'	Claystone - dk. gy. - slickensided, fractured.
450 - 580	130'	Interbedded Sandstone/Siltstone/Claystone SS - f.-m. gr. - loosely cmt. - becomes quite clayey in some intvls. forming clay balls and plugging the drill stem. 520' - minor sks. & fractures.

INTERVAL	UNIT THICKNESS	DESCRIPTION
580 - 610	30'	Interbedded Siltstone/Sandstone - more compacted than above. - less clay.
610 - 908	298'	Interbedded Siltstones/Sandstones/Claystones - generally m.-lt. gy. grn. - in part calcareous. - occasional lenses of gravel indurated with silts & clay. - sandstones & siltstones / interbeds of gravel become more prevalent towards the base.
		Cretaceous-Kootenay Formation
908 - 1006	98'	Sandstone - fine to coarse grained. - well sorted. - cl. qtz. predominate. - sub angular to sub rounded. - Fe stained in part. - tr. shale frags.
	1006'	Total Depth

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND
~~XXXXXXX~~DRILL RECORD

Hole No.: 75G-05

Property: Sage Creek Coal

Location: South Hill
17,847,867 N
586,320 E

Elevation: 4367' asl.

Contractor: Becker Drills Limited
Connors Drilling Limited

Hole Size: 7" to 93.5'
HQ 93.5'-1223'

Rig No.: Becker Rig #4005
Connors Rig #3

Date Commenced Drilling: August 16, 1975. (Becker)
September 16, 1975. (Connors)

Date Finished Drilling: August 18, 1975. (Becker)
October 30, 1975. (Connors)

Date Hole Completed: November 7, 1975.

Logged By: E. Wilson
J. Mitchell

Date: To October 31, 1975.

Probed By: Roke Oil Enterprises

Date: October 30, 1975.

Total Depth Drillers: 1223'

Depth of Overburden: 38'

Total Depth Logger: 1221'

Water Level: Flowing.

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time

Surface Casing:
Total Drilling Time:
Total Down Time:
Total Footage Chargeable:
Total Hourly Contact:

Standby Time for Logging:
Other Standby Time:
Total Chargeable Standby Time:
Actual Moving Time Between Holes:
Chargeable Moving Time " " :
Quantity of Mud Used:

Remarks:- @ 990' water flow 5 gals./min.

Probe Report:

1221-1175.....Gamma Ray/Neutron.....Thru HQ Drill Rods.
1175-0.....Gamma Ray/Neutron.....Thru HQ Drill Rods.
1200-0.....Sidewall Density.....Thru HQ Drill Rods.
1209-0.....Sidewall Density.....Open Hole.
1209-0.....Caliper.....Open Hole.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 2	903' - 918'	15'	900.75' - 903 907.5 - 917.25	2.25' 9.75'
Seam 4 U	1103' -1152.5'	49.5'	1096.75' - 1135	38.25'
4L			1137-1140 1160.1-1163.5	3' 3.5'

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
0 - 88	88'	Overburden - Glacial till. - Silts, sands and gravels. Gravels indurated with clay. - Cobble & boulder till.			
		Tertiary - Kishenehn Formation			
88 - 93.5	5.5'	Claystone - gy to gy grn, silty. 89.3-91.6 - Claystone/cobbles.			
93.5- 99.5	6.0	Gravel - Well rounded pebbles to 50 mm with silty & sandy clay matrix. Intbd with lt gy-grn clayey silts.			
99.5-113	13.5'	Claystone - Lt gn gy sandy & silty, all fine textured, no pebbles. Core is compact & intact. 111-113.3 - Claystone is silty & grades to vfg consol. sandstone.			
113 -196	83'	Sandstone Lt gy gn, grains are pale gn, qtz with few cht gns, gen. med. to cg, sub A, SS is silty & clayey. 122 Cn - Core continues as sandy section with greenish cast. Scattered sections with vcg sandy or fine gravelly particles, mostly green, up to 10 mm. Core is weak, not cemented, very uniform. 171-175 - Scattered coaly sections. 181-182 - Pebbley section with fine sand & silty clay matrix. Section continues as a lt gy gn cg sandy section, quite clayey and silty. Compact, but unconsol.		Well consol.	100%
196 -282	86'	Claystone Lt gy dense silty, firm consol., breaks are all mech @ 90°. 215-219 - Pebbley zone, granule to fine pebbles, green colour, clayey matrix. 233.2-242 - V. soft clays, muddy dk gy. 239.5-245 - Core Lost. R .5/5.5. 245-249 - Core Lost. R 1.0/4.0. 245-268 - Clay is lt gy & silty. 268-276 - Clay. Dk gy, sl brn cast. Very sandy with pebbles up to 5-10 mm. They are well rounded. Clay is silty and breaks away from smooth pebbles. 276-282 - Clay. Lt gy to near white, sl. silty at base.			80% - 90%
282 -296	14'	Sandstone Lt gy gn, med to cg silty & clayey uniform section. Well consol.		Well consol.	

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
296 -337	41'	Claystone Blue-gy gn, plastic, grades to dk gy clay that is quite sandy by footage 300. 309-311 - Pebbley sandy sec. Pebbles are up to 15-20 mm, sub to well rd. Sec. has brn cast. Well consol. 311-317 - Dk gy, sandy with very dirty app. By 317 gr. to very dk gy silty clay. Firm. 335.5-336 - Clay is red, oxid., limonitic staining, clay is silty. Firm.			
337 -361.5	24.5'	Conglomerate Fine-med. well rd pebbles, multi-coloured, abnt red colour. Soft clayey silty matrix. Pebbles break from matrix easily. Firm. 342-343 - Sandy section, vcg, clayey, silty & grades back to cgl. 348 - Cobble about 75 mm, well rd. 353.5 - Cobble about 125 mm. Section to 361.5 essentially a coarse bould. congl. with sandy sections with sl. fol. near normal to core.			100%
361.5-376	14.5'	Conglomerate & Shale Intbds. 361.5-363 - Clay, dk gy consol., silty, sdy congl. towards base. Firm. 363-366.5 - Congl., dk gy sdy & silty & clay. Fine pebbles 2-3 mm granules. 366.5-369 - SS, v. arg, dirty, silty, finely cong. 369-372 - Congl. v. coarse, sdy matrix. Cobbles are multi-col. 372-376 - Claystone, Gy, sl. silty, v. friable, becomes v. silty, congl. towards base.		Compact. Breaks easily.	
376 -396	20'	Conglomerate Very coarse, cobbley, sdy, silty & clayey matrix. Cobble size 150 mm max. Few sdy str.			
396 -408	12'	Claystone Brn gy friable exfoliates, soft & weak. 402-404 - Congl. section 50 mm pebbles. Intbd with sandy & clay bands. 404-408 - Sdy, congl. with clay & silt, compact core.			
408 -498	90'	Conglomerate Very coarse cobbley congl., multi-coloured red green, few bl., well rd, sdy clayey matrix. Congl. is very loose & breaks apart readily, soft clay matrix. Weak.		Soft & Weak.	

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		426-427 - Clay band, silty. 443-451 - Clay, dk gy clay, contains odd well rd boulder scatt. thru. Coarse boulders, 200 mm, continue in congl. 460-466 - Claystone, v. sdy & silty. Breaks normal to core (mech.), contains odd 1.5 mm size pebble. 485-490 - Claystone is v. sdy & silty.			
498 -560	62'	Claystone Med. brn, silty near top, soft, crumbles readily. Generally uniform section. Weak. 502 - Large cobbles & few peb. 510 - Claystone has only traces of silt. 531-533 - Lt gy gn soft clay. 535.5 - Rusty area in clay. Section is very uniform claystone, very little, if any, silt, med. dk gy. Breaks are 90° (mech.). Slight tend. to break at an oblique angle. 552-553.5 - Red limonitic stained clay. 558-560 - Intense red hematitic oxidation. Base of clay erosion zone.		Breaks easily.	
		Cretaceous - Blairmore Group			
560 -616	56'	Conglomerate Fine pebble congl. Upper 20' has multi-coloured pbls. but below tend to dark chert & qtz pebbles. Range to 18 mm, are well rd / silica cmt. Typical Blairmore. Core is highly fractured. Fe stn on fracture surfaces. Becomes more sound downwards in section. 560-568 - Badly broken congl. Sandstone stringers in congl. are less broken. 571-578 - Badly broken, friable & rusty colour. 578-582 - Sandstone, c. gr. to congl. grading into congl. at base. 583-584 - Sandstone, c. gr. to congl. 586-589 - Broken, friable, soft. 591-594 - Rubbley, highly frac., disaggregated. 599-600 - Fracture. 613-616 - Appears disaggregated, rubbl y. Fe (hem.) stn. Possibly a water zone. Parting @ base is @ 25° to C/A. Joint laminations @	 50°-60°	1 to C/A 20° to C/A.	
616 -680	64'	Sandstone M. lt to m. gy, m. to c. gr., qtz & chert grains. In part conglomeratic SS and with			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		conglomeratic lenses. - Bedding laminations uniform thruout interval - Core is badly broken thruout but recovery is good. Fractures readily along foliation planes. - Low angle jointing - fairly numerous thruout - 5 joints /5' sect. 616-623 - Rubbley, soft, disagg., numerous low ∠ jointing. 623-624 - Core is more intact, but @ 623.4' clay gouge, @ 50° to C/A. 624-626 - Core badly broken, soft, disaggregated. In general core @ 616'-626', is badly weathered & disaggreg. Probably a water zone. 626-629.5 - SS, dk brn, very arg., soft but intact, well & finely laminated, thin carb. strgs. 629.5-631 - Siltstone, brn, v. arg., laminated. 631-631.5 - Mud or clay band 631.5-633.5 - Core is soft & disaggreg. 637 - Rusty zone. 643.5-644.5 - Soft, rusty & disaggreg. 648.5-651 - Rusty, generally loose sand. Possible water course. 653-673 - V. badly broken, numerous joints ⊥ to C/A, few joints @ 30° to C/A. 673-676 - Core is more intact, bedding is vague fine coaly to carb. laminations.	@ 60° 60° 60° 60° 50°	Parallel to 20° to C/A. 20° to C/A. 30°-90° to C/A. Open frac. @ 30° to C/A.	
		Cretaceous - Kootenay Formation			
680 -744	64'	Shale - Dk gy brn. - Finely laminated / carb. laminae. - Carbonaceous. - Silty in part. - Brecciated sdy material along fractures. - Contains thin coal strgs & bands. 680-682 - Broken, bdg. contorted, Jointed / micro offsets. 682-689 - Siltstone, lt gy brn arg., broken @ contact with shale. Jointed @ 1' intvls. 688 - 1/8" slty mud on joint surface. Faint bdg. laminations. 689.5-691 - Coaly shale, soft, broken, ½" of brn coaly mud at top of intvl.	45° - 90° 70°	30°-45° to C/A. 30° to C/A.	

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		702-703.7 - Shale, v. slty & carb. 703.7-704 - Coaly shale. 705.5-708.1 - Soft, mushy, some coaly material, poss. fusain, tr. marcasite. 708.8-709 - Coaly shale, soft. 709-717 - Sltst, dk brn gy. - arg. - Approaching v.f.gr. SS. - Finely laminated @ - Core is broken. - Fairly prominent frac. thruout. - Abundant foliation ptgs. /marcasite on ptgs.	70°	20° to C/A.	70%
		717-724 - Shale. - V. badly broken. - Numerous low ∠ fractures. - Marcasite on fracture surfaces. - Contains coal strgs & bnds. 718.4-718.8 - Coal, soft mushy. 721.8-722 - Coal, soft, friable. 723.7-724 - V. slty sh.		20° to C/A.	
		724-730 - Sltst, dk gy brn, finely laminated @ 724.3-724.7 - Coal.	50°		
		730-744 - Shale. - blk carb. & slty. - Few coal lam. & ptgs. 732-734 - Abnt jtg @ - Core badly frac, approx. 3 /ft. - laminated @ 737-739 - Badly jointed as above. 739-742 - Core is badly brec., sndy mat. in fractures.	60°	20° to C/A.	
744 -778	34'	Sandstone - M. gy brn, c. gr., arg. - Well sorted. - Qtz & chert grains. 744-759 - Core is very Fe stn (rusty colour). - In part disagg. - Appears as a water zone. - Low angle jointing. 757-759 - Very soft & friable, wthrd. appearance, possible aquifer. 766-767 - V. soft & disaggreg. 767-774 - Sound core, intact, m. gy, slt & vpr SS. 774-778 - V. badly broken. - Foliation ptgs @ - Fractured - 11 in intvl. @	50° 65° 65°	Badly broken thruout. 20° to C/A. 20° to C/A.	
778 -787	9'	Conglomerate - M. gy. - Granule to small pbls of dk gy to blk chert. - M. gy, m-c gr. SS matrix. - Some red Fe stn (hem.) - Core is badly fractured and in part disaggregated.			
787 -803	16'	Sandstone - M. gy.			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		- M. to c. grain, salt & ppr SS. - Qtz & chert grains. - In part to conglomeratic. - Badly shattered core, rubbley appearance. 790.5-791.5 - Congl SS. 791.5-798 - Badly broken & in part disagg. Fractures @ bdg. 799-799.7 - Congl SS, few chert pbls in SS matrix. 799.7-801 - Conglomeratic SS lenses with shale & coal strgs. Shale is blk, carb. Badly broken & hard.	65°	70° to C/A.	
803 -824	21'	Shale - Black. - V. carb. - Tiny coal str. & carb. ptgs, broken to frags. - Lam. @ 45°. 803.6-812.5 - Shale, crushed, brecciated with coal frags included. Sandy infilling. Core throughout fractured & shattered in place. (Fault zone ??) 812-824 - Shale, black carb., massive, very badly shattered and brec. with clay & silty-sdy material filling frag. Prominent jt set @ 45°.	45°	J 45°	
824 -839	15'	Siltstone - Dk brn to bl. - Very arg. - Finely lam. @ 65°, jointing @ 30° & 65°. - Silty, sdy material on joints. - Soft & friable, espec. 824'-829'.	fol. 65°	Jf 65° Jc 30°	
839 -850.6	11.6'	Sandstone - Dk gy, S & P. - V.c.g. to congltic. - V. carb. - Contains coal ptgs. - Foliated @ 60°. - Jointed, 2 sets @ 30° intersect fol. jts. 839-843.2 - SS - med. to cg, gen. soft & decem., broken & friable. 843.2-845 - Conglomeratic, v. coaly along ptgs., congl. SS grades to cong. (844'-845'). - Fine pebbles, multi-col. 845-848.2 - Cg, sl. congl. SS. Coaly on fol. planes @ 60°. V. coaly 847'-848'. 848.2-849.7 - SS, v. muddy, clayey & soft, coaly, v. broken. 849.7-850.6 - Broken coaly SS.		J 30° J 60° Gen. Sound.	100%
850.6-866.5	15.9'	Shale - Bl. & carb. - Intbd, coal str. - Broken by frac. & brecciated. - Marc. on frac. planes. - Jointed @ 30° & on fol. pl. 60	60°	Jc 30° Jf 60°	

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		850.6-852.6 - Bl., massive mudstone, carb., bkn. 852.6-853.4 - Bl. mudstone, thin lams. of vitrain, gr. to near coal & carbarg. 853.4-853.6 - SS, med. to cg, coaly. 853.6-856.5 - Sh, bl., carb. coaly, tr. marc., bkn to rubble. 856.5-859 - Sh., gougey Fault zone, contact 45°. Coaly muddy. 859-860.7 - Sh., bl., mass., bkn coal str. 859.5-860.7 - On whole v. coaly. 860.7-863 - V. bkn, coaly. 860.7-866.5 - Sh., bl., slty, jts. 30°. Coal at base of shale.		Soft. Broken Fault 45°.	
866.5-873.5	7'	Sandstone - Lt-med. by. - Finely lam. @ 60°, coal along lams. - Badly jointed 30°, 45° & 60°.	60°	Abnt. J 30° J 45° J 60°	
873.5-883	9.5'	Siltstone - Dk gy brn. - Arg. - Fine silt lams @ 65°. - X-bedded. - Grades to bl. brn, sl. silty sh. by 383'.			
883 -903	20'	Shale - Black, massive. - Carb. - Sl. lam. - Broken & split along lams @ 885-886 - Bdly bkn, j-30°, 2 sets @ 30° & 60°. 890.5-891 - Brec. sh., muddy infill. 891-894 - Sh., sl. slty, lams @ 70°. 898-899 - Coaly sect., broken, carb. 899-902.5 - Sh, dk gy to blk, silty, coal str. 902.5-902.8 - Coaly shale. 902.8-903 - Bl. shale, carb.	70°	J 30° J 60°	
903 -918	15'	COAL - Seam #2 903-906.5 - No core. 906.5-908 - Coaly shale. 908-908.2 - Shale, bl. carb. 908.2-908.8 - Coaly shale. 908.8-909.7 - Claro-vitrain, clean, crushed. 909.7-910 - Shale, brn, carb. 910-911 - Claro-vit., clean coal. 911-913 - No Core. 913-918 - Rec. 0.5' soft mushy claro-vitrain with shale frags. Recoveries 903-908 - Rec. 1.5/5.0. 908-913 - Rec. 3.0/5.0. 913-918 - Rec. .5/5.0.			33%

INTERVAL	UNIT THICKNESS	DESCRIPTION	< OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
918 -924	6'	Shale - Bl. carb. - Massive. - Abnt. marc. - Jtg 60° & 30°. 918.8-919.6 - Bkn & brec. 920.3-922 - Coaly, broken. 922-924 - Bl, frac., carb. & coaly bnds.		J 60° J 30°	
924 -943	19'	Siltstone - Med. gy. - Finely lam. @ 50°. - Frac. infilled with rusty slty material. - Core is intact. 937 - 1" rusty silt in shear zone. 942 - 2" rusty gouge, sandy infill. Siltstone gradually inc. in sandiness & by 940' is very sandy gr. to SS, brecciated.	50°		
943 -970	27'	Sandstone - Med. to dk gy. - Very rusty, soft, brec. thruout. 949-954 - Soft, friable, badly frac., strong 30° jt., decem. 954-957 - Fairly intact, rusty strong jt 40°. 957-961 - Soft sdy, badly frac. Rubbl y throughout. Recoveries 961-965 - Rec. 2/4. 965-968 - Rec. 1/3. 968-970 - Rec. 1/2. 970-973 - Rec. 2/3. 973-976 - Rec. 4/5.		J 30° J 40°	
970 -976	6'	Shale - Bl. - Massive compact, few frac. - Hd.			
976 -1009	33'	Sandstone - V. dk gy-bl. - S & P, silica cmt, sub R chert grns. - Badly broken. 976 - V. rusty frac., Low < jts. 979-980 - Soft, muddy, decem., Frac. @ 40°, rusty surfaces. 980-1001 - Badly frac. SS continues. Jtg @ low angle and 60°. Vague lams @ 50°-60°. 988 - 1" shale str. @ 60°. 990 - 8 gals/min. water flow initially. 1008-1009 - C.g. & part decem. Rec. 1001-1004 - Rec. 2/5.	50° - 60° 60°	J 20° Badly broken. J 20° J 60°	95%
1009 -1023.5	14.5'	Shale - Mudstone - Dk gy to bl. - V. brec. 1009-1010. - Slickensided. - V. heavily frac. @ random orientations. Rec. 1009-1015 - Rec. 5.2/6.0. 1022.5-1027-Rec. 3.0/4.5.			95%

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
1023.5-1045.3	21.8'	Sandstone - Very soft, weathered. - Rusty, med gr., qtz & cht. - Competent @ 1027.6'. - Yellow ochre stain. - Clay enriched snd, 1023.5-1024. Rec. 1027-1032 - R. 2.5/5.0. 1034-1038 - R. 1.5/4.0. 1038-1043 - R. 1.0/5.0.		Soft & wthrd.	60%
1045.3-1060.4	15.1'	Shale - Mudstone, dk gy to bl. - Carb. - Appears intact, but is riddled with numerous fractures & brec. zones. 1045.3-1046 - Soft fissile, tr. coal. 1050-1050.3 - SS str., bedding dist. by frac. 1058-1059 - Highly brec. slickensides.			
1060.4-1065.4	5'	Sandstone - F. g. basally to siltstone to mudstone. - Carb. & badly broken.			
1065.4-1103	37.6'	Shale - Mudstone, dk gy to bl., carb. - Slickensided & brec., blocky, - Random coal ptgs, brec. pred., jtg 45°. - Core app. sound, but is very frac. & soft. - Siltstone lams @ 60°. 1080 - Inc. silt → L vfg S lams. 1082 - X-bd, a slump. 1087 - Very soft mushy, pred. jtg. 1092-1095 - Soft mushy. 1103 - Clay with slick. & coal ptgs. Rec. 1068-1077 - R. 5.5/9.0. 1095-1099 - R. 1.0/4.0. 1099-1103 - R. 0.5/4.0.	60°	J 45° J 55° J 35°	
1103 - 1152.5	49.5'	COAL - Seam 4 1103-1119 -No recovery. 1119-1121 -Col, very soft fusain & mud. 1121-1124 -Carb. mudstone & coal 1124-1128 -No recovery. 1128-1130 -Fusain & durain. 1130-1144 -Recovery very poor & recovered interval is low quality coal & slickensided mudstone.		Poor.	23%

ERVAL	UNIT THICKNESS	DESCRIPTION	< OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		1144-1152.5 -Coal, carb. clay, highly slickensided.			
		* Recoveries (see overleaf)			
1152.5-1223	70.5'	Shale - Lt gy to dk gy. - Carb. ptgs in random orientations. - Highly frac. & brec. to 1154'. 1154-1160 - Competent. 1155 - Jt 20° with gouge. 1159-1160 - Slickenside, carb. clay on frac. 1162-1172 - Sh. is dk gy to bl. massive, badly broken & brec., shale is carb. 1172-1180 - Sh. is bl., coaly, bkn to rubble. Abnt 45° jts. Highly brec. Silty mud infill. 1180-1181 - Sh. silty, contorted silty lams. 1181-1222 - Sh. bl. broken, coaly 1181.5-1183. 1191-1191.2 - Coal. 1194-1194.5 - Coaly str. Shale is badly brec., primary. Thin gouge ptgs. 1195.2-1195.7 - Few thin coal str. & brec. shale. 1196.5 - Coal ptg. 1198-1198.8 - Coaly band, clar. with marcasite in sh., brec., v. bkn. 1200-1223 - Highly brec. with silt & mud infill. Jt 3 /9' sec. 30°. Scat. coal bands with scattered frag. of clarain in breccia. 1209-1211 - Quite coaly in high brec. section. 1218-1218.8 - Coal, clar. bright, shiney, fragmented. Core broken & jointed with slickensiding on jts to end of hole. Rec. 1163-1172 - R. 4/9. 1196-1203 - R. 6/7.		J 20° J 45° J 30°	
	1223'	Total Depth.			

Recoveries - Coal Seam B

1119-1121	Rec.	1.5/2.0
1121-1124	Rec.	.5/3.0
1124-1128	Rec.	0/4.0
1128-1130	Rec.	1.5/2.0
1130-1132	Rec.	0/2.0
1132-1138	Rec.	2.0/6.0
1138-1144	Rec.	1.5/6.0
1144-1146	Rec.	1.0/2.0
1146-1147	Rec.	0/1.0
1147-1152.5	Rec.	3.3/5.0

[illegible]

DRILL RECORD

Hole No.: 75 D08

Property: Sage Creek Coal

Location: South Hill
17,845,973 N
584,233 E

Elevation: 4933' asl.

Contractor: Cannons Drilling

Hole Size: HQ

Rig No.: 1

Date Commenced Drilling: October 23, 1975

Date Finished Drilling: November 3, 1975

Date Hole Completed: November 5, 1975

Logged By: E. Wilson & J. Mitchell

Date:

Probed By: Roke Oil Enterprises

Date: November 3, 1975

Total Depth Drillers: 750

Depth of Overburden: 135'

Total Depth Logger: 738

Water Level: Full (6:1)

Bit Record

No.	Size	Make and Serial No.	R.P.M.	Cu.	Oil	Footage	Drill [illegible]

Surface Casing: 177

Total Drilling Time: 215 hours

Total Down Time: 5 hours (frozen water line)

Total Footage Chargeable: 448

Total Hourly Contact: 110

Standby Time for Logging: 8 hours

Other Standby Time: 28 hrs. (piezometer)

Total Chargeable Standby Time: 36 hours

Actual Moving Time Between Holes: 3

Chargeable Moving Time " " : 9

Quantity of Mud Used:

Quick Gel	141 bags
Quik Trol	141 bags
CCLC	2
Asbestos	50 lbs.

Remarks:-

Lost circulation @ 161
Hole squeezing 588

Probe Report:

747 - 177 --- E-Log ---------- Open hole
737 - 0 --- Gamma Ray/Neutron -------- Thru HQ Drill Rod
735 - 0 --- Sidewall Density --------- Thru HQ Drill Rod
747 - 0 --- Sidewall Density ---------- Open Hole
747 - 0 --- Caliper ---------- Open Hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam #50	594 - 605	11	593.75-603	9.25'
5A	611.6 - 639	27.4	611.5-637.75	26.25'

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FLD TO CORE AXIS	CORE BREAK	%
0 - 135	135	OVERBURDEN TRICORED to 135' TERTIARY Kishenehn Formation			
135 - 210	75	Claystone Blue-gy, compact, but friable weak to v weak 135.5-141 - Hard 141 - 160 - Trifle silty, weak, tendency to joint @ 75° very friable, shatters easily 160-162.5 -dk gy clay-bitum 162.5-177 -bl gy clay v weak plastic shatters readily;slight [illegible] of 75° jointing Scattered lt gy hard band, cemented tr silt occas thin mushy clay seg Joint tendency @ 60 & 75-3/5' sec 177-179 - V weak 179-188 -clay no silt @ 188 20° J is slickensided 188-194 -clay, fossils, yellow shale limey hard tr silt gy gn 194-202-Clay lt gy gn, card str (lignite) from 198-202 perpend. core Scatt. jts 20° 175° 3/5' sec. @ 200 carb str @ 80° 208-209 -very hard cemented	F 90°	J 75° J 75° J 75° J 75°	100%
210 - 217	7	Siltstone Ly. gy, very clayey gr to claystone nearly hard. Core is intact. intbd with clay bands. 211-212 - v. hard, cemented slickensides on 20° j @ 210 & 211 Unconfined strength + 4.5 Shear strength +10.0			1[illegible]%
217 - 232	15	Claystone Blue-gy pure clay, no silt generally sticky, v. weak to weak Scatt 1' hard bands few 45° j. Clay shatters with knife, except for hard.		J 45°	
232 - 251	19	Siltstone Gy. gn. v clayey faint lams @ 40° of carb mat'l. Weak to firm occ. hard bands Joints @ 9/5' sec. SS - 5.0 US + 4.5	40°	3J 20° 3J 60° 3J 30°	100%
251 - 289	38	Claystone Blue-gy hard to j hard, massive, silty. Few 20° jts & 60°. 264-283 - Less hard, gr to weak to firm, abund frac ll to core & @ 60° becomes darker gy & tr. bitum. becomes mushy @ 276 SS-5.5 & US-4.5 283-291 - Clay soft mushy @ 276 - SS-5.5 US-06		J 0° J 60° Joints 3/5' sec.	100%

INTERVAL	PART THICKNESS	DESCRIPTION	∠ OF TIP TO CORE AXIS	CORE INTERVAL	[illegible]
		Crelac-Jur - Kootenay formation			
289 - 318.8	29.8	Sandstone			
		Med. to dk gy. Med to c g, sil cement Bioben. Appear to be boulders(v angular & jointed surfaces) with brecciation and clay infilling frac & brec zones		Broken crushed extreme	to 100%
		289-289.3 -ss boulder			
		289.3-289.5 -fine ss brec , Tert clay infill		Clay infill	
		290.5-295.8 -Tert clay, few ss frags imbedded			
		295.8-297 -ss boulder contains are joint surfaces @ 45°		Shatter[illegible]	
		297-298 - clay gouge, slickensiding all broken to rubble coal frags			
		298-308 -ss. generally broken, crushed. soft mushy, joints @ 25° infill of clay (Tert) along joint		J 25°	
		308-312.5 -ss boulder.fol is parallel to core.		J [illegible]°	
		312.5-317 -ss broken, jointed @ 45° & 60°		J 45°	
		313.5-314.5-soft clay infill ss frags		J 60°	
		316-317 -soft clay infill ss frags			
		317-318.8 -Congl. similar Cadomin fine pebble congl. bl. cht & white pebbles (no red pbles) Badly broken, frag of ss at base of congl.			
318.8-334.5	15.7	Coal Zone			
		318.8-320.2 -Crushed coal mixed with brown to bl plastic clay- very soft.			
		320.2-321.2 -ss soft mushy rusty brec grades to soft mushy clay. alldecom			
		321.2-323 -Soft mushy fusain v arg			
		323-323.7 -Clay brn-bl, plastic coaly			
		323.7-327 -Fusain, soft,mushy v arg clay str v impure.		70%	
		327-334 - rec $\frac{1.6}{7.0}$ clay bl soft, mushy plastic core lost			
		334-334.5 -Few frags of clean hard clarain with vitrain banding and frags of bl mudstone			
334.5-351	16.5	Shale			
		Mudstone, massive bl. carb joints @ 90° 41 ft sec. occ 45° jt		J 90° J 45°	
		334.5-341 - sh is very carb. Fine coal lams (clar) from 335-336 @ 335.4-1" of mushy fusain-fol of coal lam 80°-J-30° @ 338 joint is parall to core & rusty	80°	J 30°	
		337-341 -v broken		Soft weak core	
		341-343 - shale bl silty			

INTERVAL	UNIT THICKNESS	DESCRIPTION	ANGLE TO CORE AXIS	CORE DEFL.	[illegible]
		343-344.5 -Siltstone broken v rusty. joints are rust coated.		soft weak core	100
		344.5-350 -Shale intact silty cut by tight hairline rusty fracs		J 60°	
		350-351 -sh gr to carbon			
351 - 356	7	Coal Zone 4L (?)			
		351-351.4- fusain, soft mushy arg			
		351.4-353.3 -Coal, clar & durain broken			
		353.3-353.5 -mudstone bl massive		Broken & weak	
		353.5-355 -coal badly broken arg durain last 2" is soft mushy fusain			100?
		355-357 - sh bl, v carb, scott str of soft mushy fusain.			
		357-358 - Durain & shale bands, badly bkn.			
356-363	5	Shale			
		Bl. sl slty, massive @ 361 coal ptg jts 6/5' sec. .sh becomes inc slty.		J 55°	100?
363-368	5	Siltstone			
		Brn to med gy, gr to v f g ss. fine lams @ 75° where ss is badly rusted (water course) @ 365-15° rusty st core is badly broken to rubble. abund 15-20° joints - rusty decom.	75°	Many 15°, 20°	
368-378	10	Shale			
		Med to dk gy. Massive, core is intact - 90° mech br @ 372 45° jt.		J 45°	
378 403	25	Siltstone			
		Brn to brn gy. grtz.v.f.g.ss. lam @ 75°. finely lam to 388 then ribboned tex.	75°		
		381-382-core is cut by joints parall to core & very rusty v. sandy @ 386-386.5. ss is soft decom, rusty.			
		388-398 -ribboned texture. bl slty shale bands interlam with brn sand-silt stringers each up to 1" wide or more. Rusty along 75° fols.	75°		
		395.6-397-badly broken by low angle jtng & v.rusty			
		398-402 -Heavy rust. soft sed defm sdy @ 399, gouge rusty 25° jts, broken-appears primary brec .			
		402-403 -soft mushy siltstone badly broken			
403-451	48	Sandstone			
		Sltstn gr to v f g ss by 403 @ 408 is med gd finely lam @ 75-80°. core is very rusty. Joints along lams.	75°	J 75°	
		408-408 -Rubbly fol fracs & 20°j		J 20°	

INTERVAL	DRIFT THICKNESS	DESCRIPTION	∠ OF FOL TO CORE AXIS	CORE INCL.	[illegible]
		410-425 -Con bln throughout soft mushy decom @ 415-418, @ 420-421, also soft mushy rusty sand. Fracs are sand filled. 224-225 -soft mushy rusty sand			100%
		425-436 -Compact massive ss few breaks along 75° fol plncs.			
		436-451 - Abund low L jts 2-5' sec minor rust along frac. sr is med to c g.			
451-498	47	Shale			
		Abruptly to bl carb shale, v coaly massive.			
		451-451.4 -Black coaly mud or gouge			
		451.4-453.6 -Bl carb shale, bln to rubble.			
		453.6-454.2 - Carbarg & clar.			
		454.2-454.5 - Sh,bl,mass. tiny coal str.			
		454.5-455.6 -Coal, clarain, hard brittle scatt str of hard carbarg.			
		455.6-461 -Sh, bl mass few 90° jts. tiny coal stringers in first & last foot of section		90°	
		461-461.8-Clarain, scatt hard coaly sh.			100%
		461.8-464 - Sh, bl, massive.			
		464-466 - Sh, scattered coaly lam			
		466-467 - Clarain.			
		467-469 - Sh, bl, mass.			
		469-473 - Coal & sh intbeds. Coal is clar 471.6-472-bright clar 472.1-472.4- " " .			
		473-498 - Sh db gy to bl, silty. Intact 475-477 few coal str Core is faintly lam-very fine @ 75°. 485-498-20° joints @ s/5' sec. Becomes silty siltstone.		J 75°	
498-553	55	Siltstone			
		Med gy, finely laminated, grades to v f g ss.			
		498-508 -Lams @ 75°. 90° jts 2/5' sec.	75°	J 90°	
		508-514 - Fol @ 55-60°. Fol jts-core badly broken.		J 60°	
		514-524 - Arg gr to sh. Few fine lams. 519-523 slts/5' sec @ 20°.		J 20°	
		524-529 -Broken,rubbly, fine lams 75° xbedded. Low L jts 20°	75°	J 20°	
		529-539.5 -Gr to silty sh. Brec with clayey-silty, sdy infill from 532-534 & 538.5-539.5.			100%
		539.5-553 -Siltstone is med gy, well fol @ 75°. Abund fol jtg 5/5' sec & 45° 2/5' Sec. Jts are clean. Core broken esp from 550-553 horiz jtg up to 1/4" mud filled seams. Gr to c g sandstone.	75°	J 75°	
				J 0°	

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF JTS TO CORE AXIS	CORE EVAL.	
553-594	41	Sandstone			
		C.g. S & P, well cemented -lam @ 65°, dk gy. Core is badly broken, but indiv. pieces are sound.		J 25°	
		Strong 25° jts 7/5' Sec & 60°.	J 55°	J 60°	
		@ 553.4 - Coal str.			
		558 - Strong 20° jts.			
		560 - 1/4" coal str.			
		561 - Open 20° jt, sdy infil, broken to 563.5 .			
		568 - Broken tr. coal str.			
		575 - Ss grades suddenly to finely laminated vfg ss.			
		570-575-Thin coal str. frac & rubbly.			
		575-579 -V f g ss. highly lam.@ 80° abund fol jtgs.	80°	J 80°	
		579-583 -Compact my to cg S & P arg. Thin coal ptgs.			
		583-594 -Very badly frac & broken to rubble due to numerous coal ptgs & 20-45° jts. (15/5' sec. occ 60°) Coal str. are up to 1/8" wide hard clar.			
594-605	11	Coal Seam 5U			
		594-595.3 -Soft clar. & fusain			
		595.3-595.5 -Carbarg.			
		595.5-595.6 -Clar & fus.			
		595.6-595.9 -Durain & vit.			
		595.9-598 -Clar & dur, badly broken.			
		598-598.5 -Clar.			
		598.5-599.3 -Dur. tr. mare.			
		599.3-599.5 -Clar.			
		599.5-600.1 -Dur. tr. mare.			
		600.1-600.4 -Clar & dur.			
		600.4-601 - Clar.			
		601-601.7 -Dur tr mare.			
		601.7-603 - NO CORE		Fair	Rec. 8"
		603-603.8 -Dur.			
		603.8-604.1 -Cl & dur.			
		604.1-604.3 -Dur.			
		604.3-604.8 -Claro-vit.			
		604.8-605 -Dur.			
605-611.6	6.6	Shale			
		605-605.7 -Carb. bl sh with carbarg & dur str.			
		605.7-608 -Sh-bl carb tiny hairline clay str. @ 85° .			
		608-608.6 -Sh few coal intbeds bbn.			
		608.6-608.9 - Sh-bl carb.			
		608.9-609.2 - Clar.			
		609.2-609.3 -carbarg.			
		609.3-610 -Coal & carbarg intbd broken.			
		610-611.6 -Sh, carb massive cut by tiny hairline clay str.@90° .	90°		

INTERVAL	BELT THICKNESS	DESCRIPTION	∠ OF FOL TO CORE AXIS	CORE EVAL.	[illegible]
611.6-639	27.4	Coal Seam 5b 611.6-613.3 -Soft mushy fusain. Lost core. 613.3-615 - Core lost. 615-615.6 -Carbing. 615.6-616.6 - Clar & fus. 616.6-617 - Durain 617-617.2 -Clar & fus. 617.2-617.4 -Dur tr mare. 617.4-617.7 -Dur thin clar intbds. 617.7-618 -Dur. 618.8-620 -No core 618-618.8 - Fusain. 620-623.2 -Fus & clar, soft mushy. 623.2-626 - No core 626-627.2 -Clar. 627.2-628 - No core. 628-629.3 - Clar. hard. 629.3-629.8 -Fus. 629.8-630.6 - Clar & dur. 630.6-630.8 -Fusain. 630.8-634 - No core. 634-635.7 -Dur & vit bdg. 635.7-639 -No core. Recoveries 610-615 Rec 3.3/5.0' 615-620 Rec 3.8/5.0' 620-626 Rec 3.2/6.0' 626-628 Rec 1.2/2.0' 628-634 Rec 2.8/6.0' 634-639 Rec 1.7/5.0'		Poor recovery	
639-693	54	Sandstone Basal Unit Dk gy, arg med to cg sub ang-sub rd. m-sorting. Bl cht & qtz grains with few tiny coal str. Core parts along coal str. Core is badly fractured, reduced to rubble. Abund low angle (70-75° jointing). Joints are coated with whit calcite. Fol @ 75°. 663-671 -SS is badly bkn & frac. Fol @ 75-80° joints 1" space along coal lams also few 60° jts. 674-678 -Abund. 5/5' sec-20° jtg. 683-693 -Continues dk gy cq arg massive. at base of unit very cg. Recoveries - 639-644 Rec .5/5° 644-648 Rec 2.6/5°	75°	Core very badly broken 20-25° 75°	77.
		Jurassic - Fernie Group			
693-760	57	Siltstone - Passage Beds Dk gy,sltstn gr to v f g ss. Very well lam with very fine lams. Core is intact & sound. Scattered fine coaly hairline frac. Sparse 20° jtg & few 90° breaks. 693-709.5 -Dk gy v f g ss - sltstn fine lams @ 75-80°.	75°	Core is generally intact J 20°	

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF LAD TO CORE AXIS	CORE INTERVAL	
		709.5-715 -Ribboned. Frm to bt silty 1" shale bands intbd with siltstone, as above. Well jointed along lams @ 45°, broken breccia 710-724, infilled with sand, soft, decom. prob 45° jtg.	45°	J 45°	
		NB -Driller reports hole taken water plugged off with asbestos.			
		722-724 -Ribboned shale & sltstn.		75°	
		724-734 -Sltstn. dk gy as ab. Jointed @ 45° 1/8" clay along jts. Breccia not as severe.			
		734-750..Sltstn competent sil lams @ 45°, jts @ 45° out fol & are calcite coated. freq 1jt/1" see slikensiding on jt surfaces @ 743 20° jtg.	45°	J 45°	
				J 20°	
		744-750 - Rec 3.5/6.0			
		748-750 - Badly broken to rubble Badly jointed.		J 20°	
		EOH @ 750			

Drill Hole Sample Intervals and

Sample Weights in Grams

HOLE NO: 75D-08

Interval	Weight (Grams)
318.9-319.2	2318
319.2-320.2	1780
320.2-323	1287
323-325	2885
325-327	2785
327-334.5	3225
350-351	1709
351-353	3275
353-355	3130
355-357	2390
357-358	1265
594-596	2050
596-598	2232
598-600.5	1918
600.5-603	2030
603-605.7	2385
611.6-615	1735
615-620	4440
620-626	3965
626-628	1053
628-634	2515
634-639	1565

DIAMOND DRILL RECORD

Hole No.: 75p09

Property: Sage Creek Coal

Location: South Hill
1761 644 N
581 602 E

Elevation: 54 2 1 ' asl.

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: 3

Date Commenced Drilling: November 3, 1975

Date Finished Drilling: November 11, 1975

Date Hole Completed: November 12, 1975

Logged By: E. Wilson

Date: November 12, 1975

Probed By: Roke Oil Enterprises

Date: November 11, 1975

Total Depth Drillers: 228'

Depth of Overburden: 5'

Total Depth Logger: 223'

Water Level: Full (Gel)

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time

Surface Casing: 15'
Total Drilling Time: 155 hours
Total Down Time: -
Total Footage Chargeable: 228'
Total Hourly Contact: 49 hours

Standby Time for Logging: 0
Other Standby Time: 0
Total Chargeable Standby Time: 0
Actual Moving Time Between Holes: 34hr
Chargeable Moving Time " " : 34hr

Remarks:- Very bad ground, hole caving and squeezing.

Quantity of Mud Used:
Quik Gel 93
Quik Trol 93
CC 16 3 Asbestos 50 lb.

Probe Report:

220-0 Gamma/Neutron Thru HQ drill rods

222-0 Density Thru HQ drill rods

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
NIL				

INTERVAL	UNIT THICKNESS	DESCRIPTION	ANGLE TO CORE AXIS	CORE DESCR.	[illegible]
0 - 34	34.	Overburden - Broken bedrock - Wthrd Rock - Clay & Soil			
		JURASSIC - FERNIE GROUP			
34 - 42	8	Siltstone Passage Beds - Dk gy to brn black - argillaceous - finely laminated (faintly) - badly broken to rubble 36 - 42 Brecciated, infilled with silt & clay - very fragmental	80°	Poor badly broken	
42 - 52	10	Shale & Siltstone (Ribboned) - bl, silty shale 1 1" wide interlain with lt brn silt stone bands (Typical) - continues badly broken & brec . - Interbedded with bl siltstone 39 - 43 Rec. 3.5/5.0 49 - 51 Brecciated, gougy core extremely fragmental @ 53' foliated 54 - 61 Rec 3.0/7.0	65°		
52 - 138	80	Siltstone - black - very massive - badly broken jointed 61 - 96 completely reduced to rubble gougy sections. Siltstone often appears intact but is completely shattered & brecciated with silty - sdy infilling. Abundant core lost Recoveries 61 - 67, Rec - 5/6 67 - 70, Rec - 1.5/3.0 70 - 74, Rec - 1.5/3.0 75 - 78, Rec - 2.0/3.0 78 - 80, Rec - .75/2 80 - 86, Rec - 3.0/6.0 90 - 93, Rec - 1.0/3.0 93 - 94, Rec - .5/1.0 94 - 96, Rec - 1.0/2.0 96 - 111 All siltstone fragments in very soft clay & gouge zone. Complete rubble 111 - 114 Siltstone 96-105, Rec 6/9 - Kootenay type 105-107 , Rec 1/2 - lt. gy well lam 111-114, Rec 2/3 - low angle jtg 126-130, Rec 2/4 114-126 Siltstone rubble - gouge & mud filled - as 96 - 111 123 - 127 Siltstone db gy badly broken	75°	J55°-60° J 20° poor gougy breccia	Rec 75%

Interval	Rate Thickness	Description	Angle to Core Axis	Core Loss	Rec.
		127 - 132 Mud & gouge filled brecciated siltstone. Siltstone is dark brn black, appears Fernie type. Faintly lam @ 65°	65°		
		132 - 132.5 Gouge is very dark gy to black, appears carbonaceous			
		132.5 - 138 Broken brn to black arg siltstone - few carb pigs fractured, partings in siltstone are dark brn, carb.			
138-143.5	5.5	Siltstone - different color - possibly Kootenay type - lt. gy - very well & finely laminated - grades nearly - numerous fol jts 12 jts/ft - numerous horizontal jts calcite coated N.B. The above section is not gouge filled but generally completely shattered.	75°	175 12jts/ft	95%
143.5-168	24.5	Siltstone breccia 143.5-144.5 Dk carb. clay infilling siltstone frags 145.5-152 Bl brown shale, carb & silty -very soft weathered, interbedded with siltstone. Vague ribboned texture (suggests Fernie) Scattered brn-bl carb coaly stringers 152-159 Siltstone -med gy -finely lam. -broken to rubble -scattered carb bands of black & brn shale 159-161 Black laminated carb silty shale -few coaly : str in black silty sh. 153-158 Rec 3'/5' -whole section completely reduced to rubble 166-168 Black shale bands, 1" wide ribboned with brown siltstone -very badly broken			
168-228	60	168-180 shale fragments - sharp in mud or gouge matrix Shale frags consist of black brn silty shale, appears carbonaceous suggestive of Kootenay (V. badly faulted) 180-206 Shale breccia (Fault Zone) -black silty sh finely lam @	40°		

ORIGIN	PART THICKNESS	DESCRIPTION	∠ OF ISO TO CORE AXIS	HOLE DEPTH
		pieces randomly occur in mud & gouge, mud appears carbonaceous but no coal frags are found. 80% mud		Complete rubble in gouge
		206-210 Dk gy siltstone		
		-finely lam @ 30°	30	
		broken throughout		
		210-228 Siltstone (80%)		
		-dk gy to bl		
		-badly broken to rubble		
		-gouge appears to be ground up silt and shale		
		-siltstone frags are folia-ted @ 215° foliation	15°	
		@ 222 "	0-10°	
		-dark gy, finely laminated siltstone & gouge to end hole		
		EOH 228		

DIAMOND DRILL RECORD

Hole No.: 75 D10

Property: Sage Creek Coal

Location: South Hill
17,947,965 N
563,992 E

Elevation: 50 79' msl.

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: Rig 1

Date Commenced Drilling: November 6,1975

Date Finished Drilling: November 18, 1975

Date Hole Completed: November 18, 1975

Logged By: E. Wilson

Date: November 18, 1975

Cored By: Roke Oil Enterprises

Date: November 18, 1975

Total Depth Drillers: 658

Depth of Overburden: 7

Total Depth Logger: 658

Water Level: 87

Casing Record

No.	Size	Make and Serial No.	R.P.M.	Gal	Oil	Footage	Drillers

Surface Casing: 35'

Total Drilling Time: 240 hours

Total Down Time: 23 hours

Total Footage Chargeable: 658

Total Hourly Contract: 7 hours

Standby Time for Logging: 9

Other Standby Time: -

Total Chargeable Standby Time: 9

Actual Moving Time Between Holes: 9

Chargeable Moving Time " " : 9

Quantity of Mud Used:
102 bags Quik Gel
102 bags Quik Trol
4 bags CC16

Remarks:- Rods sticking @ 318

Roke Report:

Gamma Ray Neutron------650-0	Logged through HQ rods
Sidewall Density ------650-0	"
Sidewall Density ------653-0	Logged open hole
Caliper ----------653-0	"
E-Log ----------652-35	"

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 2	57 - 61	4.0	53.25-55.25 58.75-60	2.0 1.25) 6.75
Seam 4U	264 - 296.7	32.7	263.75-291.75	28
4L	299 - 316.8	17.8	297.25-313.25	16
Seam 5U	524 - 552	28	552 - 534	12
5L			542-549	7'

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	%
0 - 15	15	Overburden -Broken sandstone & weathered rock -Cased to 35'			
15 - 18	3	Cretaceous - Kootenay Fm Sandstone -coarse grained - S & P sub K carb ptgs -finely laminated jointed parallel to core -broken rusty - weathered	65°	J - 0°	
18 - 33.3	15.3	Shale -v bl & massive -silty -broken 18-18.3 coaly shale 19.5-20 broken soft coaly shale 27-30 sh is carb, massive -jointed 30-33.3 mudstone very black massive, carb with soft muddy coal partings Recoveries 25-27 ; .6/2 27-30 ; 2.5/3		J, 30°, 90° ll to core	
33.3 - 35.6	2.3	Coal 33.3-33.6 fusain, very soft arg 33.6-35.6 clarain, bright, clean hard intact sl arg in basal 2"			
35.6 -37.5	1.9	Siltstone -med gy -finely laminated -shaley grading to slty slate -few 90° frac	80°	J 90°	
37.5 -57	9.5	Shale -black mudstone -massive -very carbonaceous & with coal str & soft coaly sections -broken by 90° jts & horizontal jts 38-40.5 -badly broken 40.5-40.8 -soft mushy coaly shale 41.1-46 - soft carb broken shale with bands of soft clay 46-49 - Mudstone -black massive -broken throughout 46.7-47 -shale with vitrain bands 49-49.5 -shale & vitrain bands 53-57 - soft carb mud		J 90° J 0°	
57 - 61	4	Coal Seam 2 57-58 -Fusain, soft, arg & few thin shale str 58-59 -coal, finely crushed clarain soft, intact, clean 59-59.3 -mudstone brn-black soft carb 59.3-59.7 -coal as 58-59 59.7-60.3 -shale brn-bl soft coaly 60.3-61 -coal clarain soft crushed clean		Good Intact	100%

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FOL TO CORE AXIS	[illegible]	[illegible]
	-	Recoveries 57-61 4/8			
61 - 72	11	Shale (Mudstone @ top, gr to arg, siltstone basally) -bl to v dk gy -mostly massive -vague, very fine silty lam. -compact 66-72 broken & brecciated at intervals with silty mud infill - foliation jts @78 [illegible] -becomes silty basally	70-75°	intact [illegible]	100%
72-87	15	Siltstone -dk brn bl -argill, & sandy -generally massive at times faint lams -generally broken 766-772 brec -low angle jointing which are mud filled @ 78' & 84' -when struck siltstone parts into ± 1/4" wide laminae	70°	20° jt @ 57' [illegible]	
87-143	56	Sandstone -med to dk gy at start fol -hard intact-f to m gr well sorted qtz gr -grades to very dark brn to black argillaceous so that is soft & friable-rusty 87-95 -fairly intact fol jts -low ∠ 95-107 -very soft, weathered, broken dark & argill 107-118 med to dk gy laminated -badly broken 101-107 rec 1/8 107-113 rec 5/8 107-109-continuous 15° jtg-rusty sand filled 109-118-broken so j jointed strongly @ 20° ∠ 60° very rusty & weathered 122-124-soft weathered along jt surfaces 129-131-badly weathered along jts-rusty sandfilled The sandstone section is overall med-dark grey, speckled, generally mg but coarse grained towards base cut by low angle jointing-badly weathered & rusty	80° 80°	[illegible] 5/8 [illegible] 50'-1/50' [illegible] rusty badly jointed & rusty	[illegible] in section generally good.
143-160	17	Shale Dk gy to black [illegible] carb mudstone Carbonaceous, Massive 143-148 -Very coaly & carb. numerous 1/8" coal ptgs & along fractures so that shale shatters readily. 148-154 -Uniform black silty, massive sh. 154-154.7 -Very light dense siltstone band in black shale. 156-160 -Shale, broken badly.			

INTERVAL	FEET THICKNESS	DESCRIPTION	∠ OF FRAC TO CORE AXIS	CORE INTERVAL	[illegible]
160-205	45	Siltstone Med to dk gy, art gr to shale @ top becomes silty, massive. 161-164 -Brecciated, silty sandy infill rusty. 166-176 -Low angle jtg.-rusty open water course, broken. 173.5-175 -Very soft rusty silty sandy, weathered abund jtg. Becoming very sandy @ 171.5-175 is sandstone-med gy, that is dense & well cemented, siliceous. 175 & on is siltstone. Core is compact although jts are abundant System of 20-25° jts every 21 and random @ & 60°. Surfaces are rusty Core commonly xbedded & show lams @ steep angles. Broken throughout. 199-205 -Lam 2 60°.	60° 60°	0-30° jts open rusty @ 20-25° 172' sec Random @ & 60° jts. Jts 70° 2/5' sec	
205-226.6	21.6	Sandstone Med to dk gy, vague lam @ 60° Traces hairline coal ptgs. becomes v c g -pebbly towards base, broken by low angle jts & along coal ptgs 205-211 -Very rusty, broken, soft, mushy, water course, flat jts. 220-226.6 -V broken, rusty, pebbly Very abund coal lams from 225-226 in brn-bl sand & shale band.	60°	@ 0-30° @ 60° @ 0°	
226.6-244	17.4	Shale Grades to siltstone, dk gy to bl. Massive at top. Coaly str and coal along frac. 226-232 -Silty fine lams. Broken @ 234 1/4" coal ptg. Abund low 1 jts. 237-244 - Shale dk gy to near bl-at scatt coal ptgs. V silty vague lams, broken -60° & 30° jts.	60° 80-85°	60° jts 3/5' sec	
244-257	13	Siltstone Med gy (shale gradually grades to siltstone) broken. Abund 20° jts & strong 60° system. 247-249- badly shattered. 249-250 -Soft brn oxide mud or altered shale, very rusty. 250-257 -Very rusty, finely banded grades to fg sandstone.	75°	60° jts	
257-264	7	Shale (Breccia) Bl, badly brecciated, silty mud infill, rusty. 257-258.5 -Very badly shattered rusty.			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF ITEM TO CORE AXIS	CORE DESC.	
264-296.7	32.7	Coal Seam MU			
		264-267 -Coal?? No core recovered 267-272.5 -Coal. Uniform-excellent section, clarain & fusain, vitrain banding. Firm, compact, no shale. Rather crushed. 272.5-272.7 -Clarain-hard intact. 272.7-273.4 -Fusain & clarain, finely crushed, fairly soft. 273.4-273.6 -Clarain, hard intact. 273.6-277 -Coal, clean, crushed, bright, clarain & fusain no shale. 277-278 - No core recovered 27 -280.5 -Clarain, intact 280.5-280.7 -Hard coal, prob st ng. 280.7-281.2 -Clarain, firm finely ground. 281.2-281.3 -Hard coal 281.3-282 -Clarain, hard, bright. 282-282.1 -Brn , muddy shale 282.1-285 -Fusain- soft 285-286.5 -Fine grained clarain, soft intact vitrain banding. 286.5-286.8 -Fusain, soft-muddy argill 286.8-288 - No core recovered 288-289 -Clarain, vil bn dg -hard bright. 289-289.5 -Fusain & clarain,soft. 289.5-290.3 -Clarain,hard bright, fine vitrain banding. Very clean. 290.3-290.4 -Bl shale str. 290.4-292 -Clarain hard, bright brittle, vitrain banding clean. 292-293 -No core recovered 293-294.7 -Cla rain, hard bright, vitrain partings, clean. 294.7-294.9 -Hard shaley coal (carbarg) 294.9-295.3 -Fusain, soft 295.3-296.2 -Clarain. 296.2-296.5-Coal & few shale splints. 296.5-296.7 -Clarain, bright shiny vitrain badg. *Recoveries (see overleaf)		Generally sound intact	See FIG
296.7-299	2.3	Shale 296.7-297 -Black mudstone, very abrupt contact with coal. Carb & massive, grades to siltstone. 297-299 -Siltstone, dk gy, arg with thin coal lams, grades to sandstone.	60°		

Seam 4U

Recoveries

262-267	2/5
267-272	5/5
272-276	5/6
278-282.5	4.5/4.5
282.5-288	4.3/5.5
288-293	4/5
293-297	4/4

Seam 4L

Recoveries

299-302	0/3
302-307	5/5
307-311	3.5/4
311-316	5/5
316-318	2/2

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF PLD TO CORE AXIS	CORE EVAL.	[illegible]
299-316.8	17.8	Coal 5 in. 4L 299-307 -No recovery 303-303.1 -Fusain, sl, org soft 303.1-303.3 -Coaly clay. 303.3-304.2 -Clarain, bright, fine grained. 304.2-304.4 -Shale, v. coaly gr to coal. 304.4-307.3 -Clarain, crushed. 307.3-307.6 -Fusain, argill. 307.6-308.7 -Clarain, bright brittle vitrain banding. 308.7-309.1 -Fusain 309.1-310.5 -Clarain, gr to fusain soft. 310.5-311 -No core recovered. 311-311.4-Fusain. 311.4-311.7 -Clarain. 311.7-311.8 -Carbarg. 311.8-312.6 -Clarain thin shaly intbds. 312.6-314.1 -Shale, hard, black brn. Bituminous, thin coal ptgs 314.1-316 -Coal, clarain, hard, brittle vitrain bndg. 316-316.2 -Shale, bl mas., hard. 316.2-316.8 -Clarain, hard bright brittle. *Recoveries (See back of previous page)			
316.8-347	30.2	Shale Mudstone, black , very carb. hairline coal str. 317.2-318.3- Frac. shale coal filled fractures mostly shale. 318.3-318.6 -Coal str. 318.6-319.6 -Sh bl carb few coal str. v broken fol 319.6-320 -Soft coaly mud 320-323 - No recovery 318-323 2/5 323-347 -Massive bl shale, intact, sl silty, increasing basally -joints 60° 3/5' sec. 340-341-breccia mud infill 343-343.2 -coal str.	75°	75°	
347-408	61	Siltstone Med gy, v argill, finely lam exbd. 361-370 -broken, split horizontally , 60° jts. 378-383 -Very broken. 383-393 -Dk gy, massive argill, few vague lams. Core intact. 393-408 -V broken, foliation pronounced. 393-394 -horiz jt 60° jts cut fol 398-408 -prom horiz jts *Recovery - 368-373; 1/5	60° 45°	J 60° J 0°	

INTERVAL	UNIT THICKNESS	DESCRIPTION	∢ OF FOL TO CORE AXIS	CORE DRILL.	[illegible]
408-455	19	Shale (Mudstone) Bl to dk brn, massive, bitum, silty. @ 409.2" gouge brec zone generally broken. 411-411.5 -Coal clarain, soft bright broken with some dull earthy fusain. 411.5-413.5 -Coal str. scatt throughout. 414.3-414.5 -Coal, clarain. Coal along random fractures from 416-419. 421-423 -Shale breccia, very coaly coal filled frac;mostly shale. 423-425 -Siltstone, v massive, hard, dk gy. 425-426.8 -Coal, bright vitr coal, broken, clar & fus. last 3" is v arg. 426.8-427 -Shale breccia, clar str 427.3-427.4. Below 427.4 shale si silty & becomes siltier basally with siltstone bands. 445.5-454 -Badly frac, shattered clay indurated. v silty sh. 454-456 -Brn carb shale, hairline wh cal str. 448-453 Rec 4.5/5 454-459 Rec 3.5/5.0			
455-474	19	Siltstone Med gy brn, banded, sandy sections. Intbd shale, brn carb. v badly broken. Overall v arg gr to shale jointing, strongly jointed low ∢ & 60° . 459-463 ; 1/4		20° jts 1/1' sec	
474-485	11	Shale Dk gy w bl, sl silty, bitiminous. Quite intact 60° jts 1/5' sec. 481-485 -Brecciated, broken. Shale becomes sandy basally.			
485-489	4	Sandstone Very dirty & shaly, S & P with coaly str. Gen soft, disagg cul by tiny cal str. Vague foliation @ 75° fol str. Increasingly arg towards base	75°	J 75°	
489-503	14	Shale (Mudstone) Sl silty, dk gy to bl, numerous frac pred 60-70°. 500-503 -highly broken becoming very silty basally.		J 60-70°	
503-505.7	2.7	Siltstone Med gy, silty mudstone with interlam siltstone grades to ss @ 505.7 .			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FRAC TO CORE AXIS	CORE EVAL.	FRAC. DEC.
505.7-524	15.3	Sandstone Dk gy to bl. S&P f to mg coarsening downward. Sl fol @ 75°. Low < 15° & vert. Calcite infilled frac. tends to be disagglomerated. 515-524 -Med to cg, highly frac wisps of vitrain scattered thru. Abrupt contact with coal.			
524-552	28	Coal Seam 5 524-524.5 -Coal, clar tr mare. 524.5-524.7 -Shale 524.7-524.9 -Durain 524.9-526.2 -Clar & fus-soft. 526.2-526.4 -Shale 526.4-526.5 -Coal, dull soft 526.5-526.9 -Shale 526.9-528.1 -Coal, dull. 528.1-528.3 -Shale 528.3-528.8 -Coal, dull. 528.8-529.3 -Clar & fus. 529.3-529.7 -Durain 529.7-529.9 -Shale 529.9-531.2 -Durain 531.2-532 -No recovery 532-532.7 -Clar & dur. 532.7-534.1 -Clar & durain. 534.1-536.1 -Clar. 536.1-536.3 -Dur. 536.3-537 -Clar & dur. 537-537.2 -Clar vit. 537.2-537.4 -Shale 537.4-538.6 -clarain 538.6-539 -Shale 539-539.5 -Intbd sh & durain 539.5-540 -Dull coal. 540-542 -No recovery. 542-543.1 -Clarain 543.1-544.2 -Mudstone, brecc, carb. 544.2-545 -Clar & fusain, soft mushy. 545-545.1 -Shale str. 545.1-546.6 -Clarain, clean vitreous brittle. 546.6-546.7 -Shale 546.7-548.3 -Clarain & fusain 548.3-550 -No recovery 550-551 -Soft dull earthy coal 551-552 -Clarain, bright, brittle. *Recoveries (See overleaf)			
552-610	58	Sandstone - Basal Generally dk gy to near black. Sub ang to sub rounded S & P, med gd to c grained. very badly broken due to 2 strong jt system 20° & 45-60° . 552-555 -Complete rubble. 557-594 -Complete rubble. 576-586 Rec 5.9/10		J 20° J 45-60°	 90°

Recoveries

524-528	4/4	
528-532	3.2/4	.8
532-537	5/5	
537-539	2/2	2
539-542	1/3	
542-545	3/3	1.7
545-550	3.3/5	
550-552	2/2	

INTERVAL	DEPTH TO BOTTOM	DESCRIPTION	∠ OF FOL TO CORE AXIS	CORE INCL.	[illegible]
610-658	48	Dunnage Formic Group Passage Beds (Shale, siltstone, shale & sandstone) Very silty, interbedded with v l g ss. bl, micaceous. Core is competent, however, is mod to severely frac in softer sections. 610-617 -Core is highly frac. 617-649 -Very black silty sandstone, micaceous: frac throughout. 627-628.5 -Brn shale severely frac. Frac @ low angle. 649-658 -Ribboned brown-bl shale with black siltstone. Core is frac foliation @ 75-80°.	75-80°	1 [illegible]	[illegible]
TD	658				

Drill Hole Sample Intervals and

Sample Weights in Grams

Hole No: 75D-10

Interval	Weight (Grams)	Interval	Weight (Grams)
33.3-35.6	2358	535.4-537	2150
57-58	1285	537-538.6	2005
58-59	1265	538.6-540	2135
59-60.3	2393	542-543	822
60.3-61	1370	543-544	1530
267-269	2367	544-546	2505
269-271	2192	546-548.2	2212
271-273	1903	550-552	2108
273-275	2335		
275-277	2601		
278-280	2258		
280-282	2250		
282-284	1740		
284-285.4	1464		
285.4-286.8	1619		
288-290	2283		
290-292	2450		
293-294.7	1625		
294.7-296.7	3073		
302-304.2	1938		
304.2-306	1804		
306-308.2	2180		
308.2-310.5	2438		
311-312.6	1888		
312.6-314.1	2426		
314.1-316.8	2666		
524-526.2	2592		
526.2-526.9	780		
526.9-528	962		
528-529.6	1923		
529.6-531.2	1567		
532-533.7	1867		
533.7-535.4	2000		

DIAMOND DRILL RECORD

Hole No.: 75_D12

Property: Sage Creek Coal

Location: South Hill
17,846,657 N
584,188 E

Elevation: 5214' asl.

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: 3

Date Commenced Drilling: November 15, 1975

Date Finished Drilling: November 26, 1975

Date Hole Completed: November 26, 1975

Logged By: J. Mitchell, E. Wilson

Date: November 26, 1975

Probed By: Roke Oil Enterprises

Date: November 26, 1975

Total Depth Driller: 633'

Depth of Overburden: 15'

Total Depth Logger: 632'

Water Level: Full

Bit Record

No.	Size	Make and Serial No.	R.P.M.	Wt.	Off.	Footage	Drill Type

Surface Casing: 25'

Total Drilling Time: 229 hrs

Total Down Time: 24 hrs

Total Footage Chargeable: 633'

Total Hourly Contact: 12 hrs

Standby Time for Logging: 17 hrs.

Other Standby Time:

Total Chargeable Standby Time: 17

Actual Moving Time Between Holes: 16

Chargeable Moving Time " " : 16

Remarks:- Hole squeezing @ 630'

Quantity of Mud Used:

Quik Gel	81 bags
Quik Trol	81 bags
CC 16	2 bags

Probe Report:

624 - 0	Gamma Ray Neutron	Logged thru HQ rods
610 - 0	Density	Logged thru HQ rods
629 - 0	Density	Logged open hole
629 - 0	Caliper	Logged open hole
629 - 0	E-Log	Logged open hole
630 & 615	Deviation	Logged open hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks		
Seam 2	86 - 103.8	17.8	90 - 91.5	1.5	11
			95.75-101	5	
Seam 4U	270.3-302.3	32	270.75-274.5	3.75	29.25
			276 -291.5	15.5	
			294 -298	4	
			299 -300	1	
Seam 4L(1)	305.8-321.5	15.7	307.25-309	1.75	13
			310.25-313.75	3.5	
			315 -320.25	5.25	
Seam 4L(2)			332.5 -333.25	0.75	
Seam 5U	525.5-533	7.5	525.75-531.5	5.75	
Seam 5L	538 -555.6	17.6	536 -554	18	

INTERVAL	UNIT THICKNESS	DESCRIPTION	ANGLE TO CORE AXIS	[illegible] INTERVAL	[illegible]
0 - 15	15	OVERBURDEN - not cored - till & wthrd rock			
		CRETACEOUS - KOOTENAY FORMATION			
15 - 16	1	Coal Soft, mush.			
16 - 27	11	SHALE (Mudstone) - bl & massive - very broken, fragmented throughout - coaly - very poor recovery 16 - 17 brecc shale 17 - 20 bl shale frag & 8" of soft coal, mushy 20 - 27 black shale, v badly broken Recoveries 17 - 20 1/3 20 - 23 1/3 23 - 27 2.5/4			45%
27 - 38	11	SANDSTONE - med gy - v fine grained, near silty - broken but intact - weathered - finely fol @ 45°	45°		
38 - 43	5	SILTSTONE - gr to sandstone as above - when unweathered, db gy to bl arg - generally broken - very rusty			
43 - 68.3	25.3	SANDSTONE - med to v c g - S & P Qtz grains - very rusty, weathered, disagglomerated - badly frac jointed @ v low angle - massive nature 58.8 - 63.0 shale str brown weathered v sandy, plastic mud from 61-61.5 Recoveries 58 - 63 4.5/5 63 - 68 3.3/5		J 15°	
68.3-86.0	17.7	MUDSTONE - black coaly, carb - very soft, plastic 69.6-69.9 coal, clarain str 69.9-71.8 mudstone, bl, massive carb, coal str 71.8-72.0 coal str 72.0-73.2 sandstone, dark, v dirty 73.2-78.5 mudstone grad with very shaly sandstone scal coal str intbd with clay str			

INTERVAL	DRILL THICKNESS	DESCRIPTION	∠ OF FRAC TO CORE AXIS	FRAC INTVL.	%
		78.5-86.0 massive mudstone broken bl,very carb. scatt.coal str. frac normal to coal 85.3-86.0 shale,intbd with soft mushy clarain and fusain			
86.0-103.8	17.8	COAL SEAM 2			
		86.0-88.0 coal,clarain & fusain, soft,mushy 88.0-88.3 clarain & shale,intbd. 88.3-88.9 clarain & vit.budg,bright 88.9-90.4 soft,dull coal,mushy 90.4-92.4 shale 92.4-94.4 coal,clarain,bright,brittle 94.4-96.6 shale str 96.6-98.0 dull coal,soft,earthy, uniform 98.0-98.8 no recovery 98.8-100.5 dull coal,fusain 100.5-101.0 clarain,bright 101.0-101.8 dull,earthy coal 101.8-103.0 clay,bru,carb. 103.0-103.8 clarain,bright,brittle.			96%
103.8-110	6.2	SHALE - bl - massive - carb.fine,coaly str.			
110.0-133.7	23.7	SANDSTONE - dk gy - quartzose S&P - sl foliated @ 60° - broken throughout,strong low angle jtg. 118-123 complete rubble Recoveries: 118-123 2.5/5 123-128 4/5 128-133 4/5	60°	J 20°	70%
133.7-138	4.3	MUDSTONE - bl carb. - sl silty - abundant coal str & abund carb material.			
138.0-151	13.0	SANDSTONE - mg to cg - chert grains - S & P, sim to 110-133.7 - highly frac,prominent low angle jtg - highly frac,partly decemented 148-151 - rubble		J 20° 5'/5'sec	95%

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FRD TO HOLE AXIS	DEG/ EXTL.	
		137.5-138.7 mudstone 138.7-140.0 mudstone breccia. Recovery: 133-138 3.5/5			
151 - 167	16	MUDSTONE - dk gy to bl - weathered, lim stain throughout - carb abund carb ptgs core appears competent but frac few 60° jts. 162.0-167.0 bl carb mudstone, v carb broken soft 162.0-163.5 coaly sh str 166.0-166.5 coaly sh band brec sandy at base		J160° 1-5/sec.	
167.0-232	65	SANDSTONE - med to cg - S&P, black chert grains, sub rd - mostly massive - few vague lams @ 45° 167.0-173.0 broken weathered with coaly lams, soft, limonite stained, decemented, abund 45° fol jts and 15° J. 173.0-178.0 continuing broken to rubble - not weathered. 30° jts 1/ft 15° jts 8/5' section 196.0-198.0 coaly str common causing breakage 215.0-232.0 sandstone still badly broken -dk gy S&P, mostly massive -few vague lams @ 75° -jtg parallel to core & along coal ptgs. Horiz jts are continuous 10-20° jts 2/5'sec 225-226 very coaly, soft, broken water course. 230-232 coaly section in sandstone.	45°	J 15 J145	
232.0-250	18	SHALE - bl silty - badly broken throughout - massive, fractured from 243 to base - scatt coal str & shale is very carbonaceous. 247.0-249.0 brecciated silty muddy infill coal on fractures -jtg consists of frag bi-cabs @ 90° to core and sparse low angle jt. parts on coal str.		compact J 20	100

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FOL TO CORE AXIS	CORE LEVEL	[illegible]
250 - 263	13	SILTSTONE - med to dk gy - strongly laminated, consists of light brown siltstone gr to vfg ss - fol @ 65° - core is broken by low angle jts that cut foliation, parts along black shale partings on carb material. 259.0-261.0 black mudstone, few coaly str throughout.	65°		
263 - 270.3	7.3	MUDSTONE - black carbonaceous - appears competent but is highly fractured - fracturing @ low angles to core 268.6-269.1 coaly band 269.1-270.3 coaly band		J 20	100
270.3-303	32.7	COAL SEAM 4U 270.3-271.0 hard, bright, brittle 271.0-272.4 hard, bright, tr marc 272.4-272.8 soft clarainous 272.8-273.6 hard, brittle 273.6-274.2 soft, bright 274.2-274.9 dull, hard 274.9-276.0 fissile, bright 276.0-278.0 hard, bright 278.0-282.0 hard, bright with thin soft bands 282.0-285.0 soft bright 285.0-286.2 hard durain 286.2-288.0 soft, bright 288.0-290.0 hard, bright, fissile 290.0-290.2 hard, bright 290.2-291.2 fissile, bright 291.2-293.5 hard, bright 293.5-294.4 soft, fissile, bright 294.4-294.8 carbonaceous mudstone 294.8-297.1 hard fissile, tr marc, vitrain banding 297.1-298.0 soft fissile bright 298.0-298.6 soft, fissile, bright 298:6-299.0 carbargillite 299.0-300.6 soft, fissile, bright 300.6-301.1 carbargillite 301.1-301.7 hard, fissile, bright 301.7-302.3 carbargillite 302.3-302.7 soft, bright 302.7-303.0 carbargillite Recoveries: 268 - 271 3/3 271 - 276 5/5 276 - 278 2/2 278 - 283 4/5 283 - 288 5/5 288 - 290 2/2 290 - 293 3/3 293 - 298 5/5 298 - 303 5/5			100

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FRAC TO CORE AXIS	CORE LOCAL.	[illegible]
303 - 305.8'	2.8	"SHALE" BENCH - black carbonaceous mudstone, soft highly fractured, grading by 303.7 to sandstone. Fine to med grained, salt & pepper, highly fractured, partially decemented. - abrupt contact @ 305-70° to C/A with black carbonaceous mudstone, soft, fissile.			
305.8-323	17.2	COAL SEAM 4L 305.8-308.0 hard, bright, brittle, tr 308.0-308.9 hard, dull, tr marc 308.9-309.2 mudstone 309.2-310.5 hard, brittle 310.5-310.9 soft, bright 310.9-312.4 hard bright fissile 312.4-313 no core 313-313.9 bright fissile, thin shale laminae 313.9-316.4 hd bright, tr shale @ 316.6 316.4-317.0 hard, fissile, bright 317.0-318.0 no recovery 318.0-321.5 soft, fissile, bright 321.5-323.0 no recovery Recoveries: 303 - 308 5/5 308 - 313 4.4/5 313 - 318 4/5 318 - 323 3.5/5			98%
323 - 333	10.0	MUDSTONE - black carbonaceous - appears competent but is blocky, fractured & slickensided - abundant calcite stringers 323-328. - very soft, 323-328, 330-333. - thin coal stringers through interval.			
333 - 334.1	1.1	COAL - fissile, bright, hard.			
334.1-383	48.9	MUDSTONE - dk gy to black - carbonaceous - micaceous - silty 334.4-335.7 soft, interbedded mudstone and coal 336.4-337.0 soft interbedded mudstone and coal 339.0-340.0 soft clay gouge; broken core until 343; 343-383 core moderately sound 344.0-345.0 low angle & fracturing 350 very hard compact 374.0-376.0 with f gr ss laminae	75°	J 75° J 15°	

INTERVAL	UNIT THICKNESS	DESCRIPTION	% OF ISO TO CORE AXIS	CORE LOSS	[illegible]
383 - 401	18	SILTSTONE - siltstone grading to sandstone - cross bedded, interlaminated 395 - 396 severely broken.			
401 -410.3	9.3	MUDSTONE - black carbonaceous - slightly silty - apparently competent but is soft and highly fractured.			
410.3-414.1	3.8	COAL 410.3-411.0 coal and coaly shale 411.0-412.7 hard,bright,fissile 412.7-413.0 hard,bright 413.0-414.0 durain			100%
414.1-415.4	1.3	MUDSTONE - black carbonaceous - thinly banded			
415.4-419	3.6	COAL 415.4-418.0 hard,bright,fissile 418.0-419.0 soft,mushy			100%
419 - 423	4	MUDSTONE - black - micaceous - silty - competent with thin interbeds of vf-fgr ss - grading rapidly to siltstone by 423.			
423 - 488	65	SILTSTONE - black,compact,micaceous - core competent with bedding fractures @ 65° - thin mudstone interveds throughout - sandy (f gr) - 440 and 441 fracturing @ 45° 437.0-438.0 mudstone,soft,incompetent 456 coal stringer 458.0-459.0 ss, med grained laminated cross bedded,salt & pepper 463.0-486.0 soft,decemented,badly broken calcite throughout 464.8 coal stringer 465.0 coal stringer 471.0-473.0 mudstone,black,silty, competent 473.0 irregular,low angle, fracture 474.0-474.4 thin mudstone interbed 477.5-478.0 AA		J 45° J 55 90	

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FRAC TO CORE AXIS	CORE LEVEL	[illegible]
488-493	5	MUDSTONE - dk gy - silty in part 490.2-490.9 friable,broken,soft, mushy 492.4-493.0 AA 492.8-493 badly grained soft clay texture, carb slickensides, soft wavy texture.	J 0°		
493-495.9	2.9	SILTSTONE - siltstone,argillaceous, - frac @ 494.1 @ 50°, open, - numerous fractures @ 80°C/A 495.2-498.0 soft friable to blocky 495.2-495.9 carb to coaly siltstone	J 50°	good badly broken	
495.9-502.7	6.8	SANDSTONE - fine grained - med dk gy in part - coal partings - argillaceous - in part disaggergated 497.3-498.0 carb mudstone,slicken-sided,broken to blocky. 498.0-501.0 fine to med grained, numerous hairline frac and open frac @ 10° to CA. 501.0-502.7 fine gr argillaceous becoming more arg. core highly fractured, frieble,breaks readily.	J 10°		
502.7-513	10.3	SILTSTONE - med to lt gy - blocky - argillaceous,arenaceous 503.0-505.0 frac @ 5°-10° to C/A 4 frac @ 40° to C/A 505.0-508.0 silty mudstone, carbonaceous coaly partings & coalified plant frags. 508.0-513.0 numerous frac vertical to 5°-10° to C/A plant frags 8 frac @ 80°-85° to C/A			
513-518.4	5.4	MUDSTONE - silty - dk brn gy - friable - core breaks readily - carbonaceous - sucrosic coaly material numerous frac from vertical to 25° to C/A			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF LIN TO CORE AXIS	CORE INTERVAL	
513-518.4	5.4	MUDSTONE (cont'd) 513.4-513.7 soft & friable,highly weathered zone 515.8-516.0 coal & carb sh some friable soft mushy 516.0-518.4 slickensided soft,friable,dk gy to blk.		fractures @ 45° to C/A	
518.4-519.75	1.35	COAL 518.4-518.8 hard,brittle vitreous to dull, mostly clarain 518.8-519.15 carbargillite 519.15-519.35 coal/coaly shale ptys soft,friable 519.35-519.6 carbargillite 519.6 -519.75 shaly coal & coaly shale.			
519.75-523.2	3.45	MUDSTONE - dull, carbonaceous -slickensided,highly polished frac surfaces throughout 523.0-523.2 soft,mushy,clayey coal and carb shale.			
523.2-555.8	32.6	COAL SEAM 5 523.2-528.0 coal, soft,friable for most par,dull to vitreous, mostly clarain,becomes hd & brighter basally, tr marcasite 523.7 hd,brittle,bright, claro-vitrain 524.2-524.4 hd,bright with bands of clarovitrain 524.6-524.75 shale,carbonaceous 525.35-525.5 -Carbarg to shale. 528.0-533.2 coal,hd,bright to vitreous mostly clarain,tr marcasite 528.55-528.65 light lead grey durain 529.3 -529.35 shaley,hd,blocky 532.0 -532.2 carbargillite/coal ptgs. 533.2-539.5 carbargillite with sh plgs & thin bands of coal. 533.5-533.6 coal,dull,clarain/durain 534.2-536.0 coal,hd to soft,vitreous lustre;mostly clarain/ durain stringers 537.2-538.0 coal,soft,friable;mostly clarain Note - rec. .45/.8 539.5-555.8 coal, mostly soft & friable/thin bands of harder coal, dull to vitreous, mostly clarain, thin ptgs & bands of durain & carbargillite.			UC/

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF PLN TO CORE AXIS	TRUE REAL.	
		539.5-540.25 coal with partings of carb. & durain, hd, dull to vitreous. Note - 540.25-543 interval repres. by 2' out of 2.75'. 543.0-543.1 carbarg., coaly 551.6-552.0 coal, hd, brittle, dull to bright, interlamin. vitrain/durain. 555.6-666.8 ss/numerous coal ptgs. Recovery 523 - 528 4.1/5 528 - 533 4.5/5 533 - 538 4.6/5 538 - 543 3.9/5 543 - 548 1.1/5 548 - 553 4.8/5 553 - 558 5/5			
555.8-633	77.2	SANDSTONE 'Basal Sandstone' Contact with above @60° to C/A. - m.gy., f.m.gr., a-r - mod. to well sort. - qtz & chert/qtz > chert - X bdd - thin coal partings appearing to occupy fractures. 555.8-560.5 8 fractures @ 25°-30° to C/A. -2nd set of fractures @ rt angles to first @ 60°-65° to C/A (possibly bedding slip) 5 to same interval. -largest unbroken interval is 0.5' @ 557.2-557.7 -559.2-560.5 in part decemented & blocky, appears wthrd - poss. water zone. 560.5-572.6 severely broken core (rubbly) Rec. 90% 572.6-577.0 core is solid/irregular fractures @ 80°-90° to C/A 577.0-587.0 core is poor, with numerous low angle fractures, broken (possibly mechanical) 587.0-588.0 rubble zone 588.0-593.0 poor core, broken into 3" chunks severely frac & partially decemented low angle frac throughout 593.0-595.0 fractures @ 60° to C/A - possible bdg planes 597.0 sks on coaly ptg. 598.0-603.0 poor core, broken & rubbly 600.0-600.5 coal ptg sks.	60° 80° to C/A		

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FOLD TO CORE AXIS	CORE DIAL.	
		603.0-608.0 poor core, numerous sub vert irreg frac.			
		608.5 fract @ 45° to C/A			
		610.0-613.0 mod. to high degree of low angle 30° & 45° fract.			
		618.0-623.0 moderately sound partially decemented			
		623.0-628.0 Rec 0.5/5			
		628.0-633.0 Rec 0/5			
T.D.	633.0				

Drill Hole Sample Intervals and

Sample Weights in Grams

Hole No: 75D-12

Interval	Weight (Grams)
85-86	2240
86-88	2307
88-90.4	3167
90.4-92.4	4113
92.4-94	1580
94-96	2593
96-98	2051
98.8-100.3	1703
100.3-101.8	1546
101.8-103	1012
103-103.3	810
268.6-269.1	995
269.1-270.3	3983
270.3-271	1050
271-272.8	2262
272.8-274.2	1765
274.2-274.9	915
274.9-276	1266
276-278	2602
278-280	2165
280-282	1895
282-284	2280
284-286	1822
286-288	1770
288-290	1525
290-291.6	1845
291.6-293	2595
294.4-297.1	3772
297.1-298	815
298-300.6	2730
300.6-301.1	845
301.1-301.7	620
301.7-302.3	1035
302.3-302.7	572
302.7-303	330
305-305.8	1730
305.8-308	2730
308-309.2	1185
309.2-310.5	1747
310.5-312.4	2172
313-313.9	975
313.9-316.4	3107
316.4-317	576
318-319.7	2128
319.7-321.5	2360
410.3-411	1175
411-413	2390
413-414.1	1110
414.1-415.4	2240
415.4-418	3845
418-419	1615
518.5-519.75	2010
519.75-522	1500
522-525.5	3580
525.5-528	2745
528-530	3370
530.8-533	1980
533-534.2	2395
534.2-536	3150
536-536.9	1090
536.9-537.2	437
537.2-538	710
538-540	2575
540-543	3225
543-548	865
548-550	3530
550-553	2562
553-555.6	3662
555.6-555.8	693

DIAMOND DRILL RECORD

Hole No.: 75_D14

Property: Sage Creek Coal

Location: South Hill
17,865,059 N
582,410 E

Elevation: 5241' est.

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: 4

Date Commenced Drilling: November 16, 1975

Date Finished Drilling: November 22, 1975

Date Hole Completed: November 22, 1975

Logged By: J. Mitchell, E. Wilson

Date: November 22, 1975

Probed By: Role Oil Enterprises

Date: November 22, 1975

Total Depth Drillers: 410

Depth of Overburden: 25'

Total Depth Logger: 410

Water Level: 73

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time

Surface Casing: 40'
Total Drilling Time: 150 hours
Total Down Time: 0
Total Footage Chargeable: 410'
Total Hourly Contact: 27 hours

Standby Time for Logging: 14 hours
Other Standby Time: 0
Total Chargeable Standby Time: 14 hr
Actual Moving Time Between Holes: 25 hr
Chargeable Moving Time " " : 25 hr
Quantity of Mud Used:
Quik Gel 63 bags
Quik Trol 63 bags
CC 16 2 bags

Remarks:- Upper part of Seam 4 eroded

Probe Report:

Gamma Ray Neutron ---------- 408-0
Density ---------- 390-0
Density ---------- 406-0
Caliper ---------- 406-0
E-Log ---------- 406-41

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 4			26.2-45	18.8
4 L (2)	26.2-45	18.8	79 - 81	2
Seam 5U	268.8-272	3.2	268.5-270	1.5
	286 - 293.8	7.8	285.5-290	4.5
5L	296.4-297.8	1.4	298 - 300.75	2.75] 11.25
	303.5-309.2	5.7	304 - 309.25	5.25]

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FRAC TO CORE AXIS	CORE EVAL.	EST. REC.
0-25	25	Overburden - soil & - clay & coal wash			
		Cretaceous-Kootenay Formation			
25-26.2	1.2	Sandstone - fg to silty - coal str @ 25			
26.2-45	18.8	Coal Seam 4			
		26.2-27 coal dull, soft 27 -33 coal dull, soft 33 -35 coal dull, soft 35 -40 coal dull soft shale intbd 40 -45 mostly shale and coal Recoveries: 27-33 Rec 2/6 33-35 Rec 1.5/2 35-40 Rec 2/5.0 40-45 Rec 1/5.0 45-47 Rec .5/2.0		soft muddy poor	35%
45 - 92	47	Shale (mudstone) - bl carb - highly fine throughout becoming competent @ 62 - soft 62-75 fairly competent few 90° breaks & occ 45° 75-78 badly broken core breaks along fol planes @ 70° 78-83 Rec 4/5.0	70°		
92 - 140	48	Siltstone -d b gy to bl - micaceous - appears more intact than preceding section - frac @ low angles & vert frac & fol frac @ 75 - broc , decomented in part - grading basally into vfg ss with x bedding	75°		
140-171	31	Sandstone - vfg to rear siltstone - finely lam @ 60° - mod to severe fine - 147-149 disagglomerated 160-163 disagglomerated 165-167 diagglomerated @ 168 2" coal stringer.	60		

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FLD TO CORE AXIS	CORE EVAL.	RECOV.
171 - 201	30	Mudstone - silty - black, carb 172-173 intb coaly str 173-175.5 silty mudstone 175.5-175.7 coal str.bright clarain 177.8-178 coal str. bright clarain 179-180 coal-clarain str intbd with shale 180-182 mostly mudstone few coal str 182-185.2 coaly zone in black mudstone 185.2-201 fissile bl mudstone massive - breaks @ 90° to core - typical mudstone 195 - 198 coaly zone - soft broken becomes firm and intact with silt at depth			
201-246	45	Siltstone - Lt gy grades to vfg ss - finely lam @ 65° x bedded - shaly ptgs, plant fossils on planes - abundant fol stgs 3/5'section - moderately broken to 217 217-233 badly broken jointing parallel to core @ 225 brecciated sandy silty 230-233 scattered coal bands @ 221 to 272 whole section in uniform intact sl. fol siltstone	65°	gen sound	100%
246-268.8	22.8	Mudstone - dk gy to bl - silty at top - gradually grades into black v carb mudstone - with coal str @ 246,247.5,249.7 252.5 to 253 - from 253-254.5 abundant coal str. - abund fract along coal ptgs near normal to core - few 60° jts 1/5' sec - generally intact to 265 265-267.5 coaly str s on 20° ft 267.5-268 coal, clarain, bright brittle 268-268.8 bl carb mudstone		J60° 1/5'sec J 20'	
268.8-272	3.2	Coal Seam 5U 268.8-270 - gen hard bright coal - gr to carb to 270-271.1 - clarain hard bright few thin badn of v hard coal 271.1-272 - soft dull mushy coal contains shaly mud			100%

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF INT TO CORE AXIS	CORE EVAL.	RQD
272-286	14	Mudstone - bl - very massive & carb - numerous coal str e.g. 274-274.5; 275.7-276.2; 277.2-277.4, 278-278.5 all coal stringers are very shaly			
286-310	24	Coal Seams 5U & 5L 286 - 287 ; clarain, bright vitreous v.t. bndg clean coal 287-288.8 ; clarain, gen as above some fusain 288.8-289.8 ; clarain, good, bright more fusain, brecciated 289.8-292 ; hard, firm , gen bright more carborg bands 292-293.5 ; clarain 293.5-294.2 ; carborg shaly coal 294.2-294.8 ; soft mushy fusain shaly 294.8-296.4 ; Shale bl mudstone massive few thin coal str 296.4-297 ; clarain, bright 297 -297.8 ; coal dull earthy shaly 297.8-299.2 ; shale bl mudstone very shaly coal 299.2-303 ; coal dull earthy 303 -303.5 ; shale hard bl mudstone 303.5-304.8 ; carborg,shale str & dull earthy fusain 304.8-308 ; dull earthy coal - very uniform 308 - 309.2 ; clarain, vitrain bndg bright clear 309.2-310 ; shaley mushy coal Recovery: 292-298 5.5/6.0 298-303 3.3/5.0		generally good inc.	91%
310-385.6	75.6	Sandstone 'Basal' - med to dk gy - - quartz & chert grains S&P - broken to rubble - med grained - carbonaceous - twigs etc abundant - high to severe degree of fracturing - highly broken - core rubbly to 340' 363 - 337 decemented 340-345 thinly bedded with very thin coal partings 348 partially decemented 345 - 360 massive fracturing infrequently @ 30° and 70°		30° 75° 30°	323 325 0'

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FLD TO CORE AXIS	CORE INTAKE	[illegible]
		363-363.7 severely fractured vertical and decomented rubble 360-367 rubble 367-380 massive, fracturing @ 25° 380-385.6 massive with x bedding	25°		
		JURASSIC - FERNIE GROUP			
385.6-410	24.4	Passage Beds - contact with upper silty mudstone - mudstone has abundant mica thinly bedded 385.6-390 mudstone 390-415 siltstone to igrss - black, micaceous - generally massive appearance - core moderately sound 397 - 398 mudstone 400 - 405 severely fractured, low angle and vertical 405.5-406.5 mudstone			
T.D.	410				

Drill Hole Sample Intervals and
Sample Weights in Grams

Hole No: 75D-19

Interval	Weight (Grams)
25-26.2	2615
26.2-27	757
27-33	1842
33-35	1983
35-40	1842
40-45	1705
268.8-270	1360
270-271	1390
271-272	1760
286-287	1175
287-289	3000
289.8-292	2590
292-294.8	2665
294.8-296.4	3210
296.4-297.8	2840
297.8-299.2	2065
299.2-303	3135
303-304.8	2315
304.8-306	1175
306-308	2230
308-309.2	1195
309.2-310	720

BIG TIRTO & CADEAU EXPLORATION LIMITED

DIAMOND DRILL RECORD

Hole No.: 75-D-16

Property: Sage Creek Coal

Location: South Hill
17, 845.834 N.
583.826 E.

Elevation: 5094' asl.

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: 1.

Date Commenced Drilling: November 20, 1975

Date Finished Drilling: November 30, 1975

Date Hole Completed: December 1, 1975

Logged By: J. Mitchell, E. Wilson

Date: December 1, 1975

Probed By: ROKE OIL ENTERPRISES

Date: November 30, 1975

Total Depth Drillers: 790.5'

Depth of Overburden: 37'

Total Depth Logger: 788.0'

Water Level: 15'

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time

Surface Casing: 100'
Total Drilling Time:
Total Down Time:
Total Footage Chargeable: 790.5'
Total Hourly Contact: 20 hrs.

Standby Time for Logging: 18 hours
Other Standby Time:
Total Chargeable Standby Time: 18 hrs.
Actual Moving Time Between Holes: 20 hrs
Chargeable Moving Time " " : 20 hrs

Remarks:- E. log stuck in hole @ 342' unable to retrieve

Quantity of Mud Used:
Quik Gel - 123 bags
Quik Trol - 123 bags
CC16 - 1 bag

Probe Report:

777-0	Gamma Ray Neutron	Logged through HQ rods
775-0	Sidewall density	"
786-0	Sidewall density	Logged open hole
786-0	Caliper	"
786-342	E-log.	"

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam #2	239.5-256.8	17.3	244.25-253.75	9.5'
Seam #4U 4L	420.9-468.8	47.9	424.0 -454.25 459.25-466.75	30.25' 7.5'
Seam #5U 5L	641-684	43	641.0 -654.0 663.0 -682.25	13' 19.25'

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FRAC TO CORE AXIS	CORE RECOV.	RQD INDEX
0-37	37	Overburden No core-glacial till & without rock.		Poor.	47%
		Cretaceous - Blairmore Group			
37-78	41	Sandstone - dk. grey to black. - med. to c. grnd., c. prod. - tends to fine upward - severely broken & decemented throughout. 37.4-38.4 - totally decemented ss. mush. 43.0 - shattered, conglomeratic. 70-78 - conglomeratic/sm. rounded chert pebbles, thin coal bands and carb. particles.			
		Cretaceous - Kootenay Formation			
78-113	35	Mudstone - waxy plastic clay - lt. grey - gouge zone - small pebbles, thin coal bands and carb. particles. - contains bands of decemented ss. @ 93 colour change to gr. black. - more carb. & intact. 95.5-96.3 - coal str. in shale 98.7-99.1 - coal str. in shale Mudstone continues grades 100-100.7 - carb. mudstone grades to siltstone forms abrupt contact with sandstone below. 100.7-105 - sandstone - f. to m. g. - s. & p. - decemented & very soft. - contact 70° 105-108 - soft clay gouge - lt. grey brown slicks. 108-113 - thinly intbd. soft coal & carb. mudstone.			Overall 28% 78 to 88
113-146.5	33.5	Sandstone - fine to med. gnd. - S. & P. - sound, massive. - part. decemented @ 123 to 125. @ 127 fract. @ 70 (bdg and near vertical. 127-128 - mudstone band @ 140 becoming cg & lam. @ 70 - fractures along bedding with severe limonite stain.	70° 70°		Overal 95%+ 25% 33-137
146.5-153.3	6.8	Mudstone - thinly bedded - v. soft & gougy in part. 150-151 - sandstone stain.			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FRA TO CORE AXIS	CORE LOAL.	FRAC. REC.
153.3-173	19.7	Sandstone - med. grey - med. grained - severely broken, rubbly decemented, iron stained continues to 156.3.			
		156.3-157 - gouge soft		Sound.	
		157 - Sandstone - med. to cg with granules, bedded and massive with bedding @ 70°	70°		100
		- s. & p. - intact and med. sound. - low angle frac. common & 161 becomes c. to v.c.g.		15-20	
		162-163.5 - conglomeratic small bl-cht. pbls., soft, part disagglom.			
		163.5-167 - coarse; granules decemented. 167-168.0 - Competent 168-169 - soft decom. 169-170 - gouge, soft sandy 171.5-173 - Mudstone - massive - black - grading to siltstone by 173.			
173-178	5	Siltstone - laminated with med. gd. ss. - blk & wh. - moderately sound.	70°	Sound.	100
178-196	18	Sandstone - med. grnd. - s. & p. - very soft - decemented.		Gen. sound.	
		184.8-187 - partly decemented along frac. @ low angle, v. broken.		20	
		189.6-190.3 - decemented v. soft broken to 194: 194-196 - soft. decemented.			
196-210	14	Mudstone - bl. & massive - sl. silty			
		196-198.3 - very soft. 198.3-201 - broken. 201-203 - severely broken, brecc. 203-205 - AA, heavy Fe stain. 205-208 - broken brecc. 208-210 - grading to silstone, frac.			
210-218	8	Siltstone - very soft, more competent than above, still highly frac.			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FOL TO CORE AXIS	FORM INTVL.	[illegible]
		300 - thin carb. partcls. turnout			
		302 - bedding frac. @ 65 stg. sparse - low angle 20		65°	
		305 - vuggy porosity - core snd.		20°	
		308-311.5 - badly broken m. to cg.			
		313 - stg. @ 45 & 80 .			
		313-315 - core broken		45°	
		315-317.5 - sound			
		317.5-323 - broken part. decom.		80°	
		323-336 - core is rubble m to cg with some granular, severely frac. zones of total decom. & Fe stained @ 329.			
		332, 334 - Fracs. pred. @ 60° & up			
		335-353 - core is generally, s. & p. sound with some rubbly sections, med. to cg. fracs. pred. along bdg @ 60 .		60°	
		347.5-348 - Total decomentation abrupt contact with siltstone			
353-360.3	7.3	Siltstone			
		- db gy. to black.			
		- thinly laminated.			
		- v. soft fracs along lams @ 65° grading to ss.	65°		
		359-360.3 - very soft, highly iron stained, highly irreg. contact with underlying ss.			
360.3-407	47	Sandstone			
		- f. to m.g.			
		- severely frac.			
		363-370.5 - gouge zone, highly iron stained, clay soil (waxy slicks) vertical lams. Severely shat . in sub-hexg. pattern.	90°	frac.	80%
		370 - med. gd. highly iron-stained and shatt.inundated with clay.			
		Recoveries - 363-368 - Rec. 4.5/5.0 368-370.5 - 2.0/2.5 370.5-376 - 3.4/5.5 376-399 - Rec. 2.0/3.0			
		385-387 - gouge, clayey Fe stain			
		387-389.2 - mudstone med. gy. compact massive silty.			
		389.2 on - sandstone is silty to fg, s. & p. highly frac. but app. competent frac. along bdg.			
		406.3 - thin coaly band.	80°	80°	
		Recoveries: 403-410 - 6.4/7.0			
407.3-420.9	13.6	Mudstone (Predominates)			
		407.3-407.5 - coal, soft bright.			
		407.5-408.3 - mudstone, carb. tracings, twigs, etc.			
		408.3-409.4 - thinly bedded mudst, and coal ptgs.			
		409.4-410 - No core. Coal bands @ @ 410.5-410.9, 412.3-.4, 412.6-412.9.			
		416.8-417 - soft mudstone, highly frac. as major cons.			

INTERVAL	DEPT THICKNESS	DESCRIPTION	% OF LEG TO CORE AXIS	CORE EVAL.	[illegible]
		417-419.9 - disturb, mudstone, bkn breccia lensoid band infillers Recoveries: 410-415 - 4.0/5.0 418-423 - 4.0/5.0			
420.9-468.8	47.9	Coal: Seam 4 420.9-421.1 - Coal bright. 421.1-421.7 - mudstone. 421.7-421.9 - coal. 421.9-422 - mudstone. 422-423 - no core. 423-424.2 - mudstone carb. thin coal str. 424.2-428 - Coal soft mushy 428-429.4 - Coal hard, br. fiss. 429.4-432 - Coal soft br. fiss 432-433 - no core 433-437 - coal soft bright fiss. 437-437.1 - mudstone 437.1-438 - coal soft br. fiss. 438-439.7 - soft br. fiss 439.7-440.3 - hard bright brittle. 440.3-441.6 - soft bright fiss. 441.6-441.8 - Durain 441.8-443 - soft bright. fiss. 443-445.4 - soft bright fiss. 445.4-445.9 - soft bright fiss 445.9-448 - soft br. fiss @ 447.7 - thin shale str. 448-449.1 - hard bright thin durain bands @ 448.8-449.1 449.1-450.6 - soft bright fiss. 450.6-451 - No core. 451-452 - soft bright 452-457 - soft bright finely grnd. uniform. 457-458 - soft, brown carbonaceous clay 458-458.4 -clarain 458.4-458.5 -clay str. gy 458.5-459.8 -durain, soft crushed 459.8-466 -no core. 466-466.3 -soft bright durain 466.3-466.4 -clay band 466.4-468 -soft bright durain 468-468.8 -soft coal clayeyish str. * Recoveries (see overleaf)			80%
468.8-479.8	11	Mudstone - bl, carb. - breccia. - massive, becomes silty by 470. - coal str. @ 476-476.3; 477.3-477.8.			
479.8-487	7.2	Sandstone - s. & p. quartzose. - f. to m. g. - breccia, large ang. frags. in silty clay matrix.			

Recovered Ins. - Seam 4

428-433	4.0/5
433-438	5.0/5
438-443	5.0/5
443-448	5.0/5
448-451	2.6/3
458-460	1.8/2
460-466	No recovery

INTERVAL	UNIT THICKNESS	DESCRIPTION	% OF PEB TO CORE AVG	CORE EVAL.	[illegible]
487-499	12	Siltstone - arg. - massive. 488-490 - thin hairline frac. coal str. @ 489.5. 490-492 - sandstone band highly frac. along coaly lenses @ 75° Basal 5" is thinly lam. with coal bands. Fol. 75 . 492-499 - siltstone d b gy as prev			
499-519	20	Mudstone - (very carbonaceous) - brn to db gy - sl silty - very carb. scatt. coal str. 501-503 - soft black v. coaly & soft clay bands with coal. 504-508 - dark brown v. carb. coaly clay. 510-151 - black carb. mudstone numerous coal ptgs and str. throughout. 511.6-511.8 - coal str . 512.5-513.3 - coal shale. 513.9-514.2 - coal str. 515-518.8 - coal bright cl. shaly str. 515-518 Rec. 2.5/3.0			
519-530	11	Siltstone - med. to d.b. gy. - generally intact - scattered 15 jts. 1/5' sec. - massive. - becomes sandy.			
530-543	13	Sandstone grading to siltstone - vfg ss to siltstone - grey s. & p. - finely lam. @ 75 - competent scattered 10-15°			
543-589	46	Siltstone - med. gy. brn. - very shaly from 544.5-548. - fully lam. @ 75° 544.5-553 - 15° jts. 1/5' sec generally intact @ 588 lam & 65-70 560-579 - massive - dbgy bl shaley 576-578 - broken rubbly 579-589 - becoming sandy & lam. @ 65' intact.			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FOL TO CORE AXIS	CORE INCL.	[illegible]
589-638	49	Sandstone - med. gy. s.& p. - v f g thin med to c g, grain size increase with depth - well lam @ 65 - fol ptgs & low ∠ jts. 2/5' sec @ 590 (broken; fol. & low angle jts. 600-603 - siltstone v. shaly brokn. 603-613 - sandstone is veq s. & p. tends massive. Sl fol @ 45 jts. 15 1/5' sec 45-60 5/5' sec 627-630 - siltstone to vfgss finely laminated @ 45 630 - ss. as 589-600 633.6-637 - bec. silty - ss. lam @ 65 x bd numerous fractures. 637-638 - Fracs. are calcite coated about 30			
638-641	3	Mudstone - silty - black & massive - hard			
641-689	48	Coal Seam 5 641-641.5 -mudstone, soft coaly 641.5-642.5 -no core 642.5-644.1 -mudstone thin coal hard 644.1-644.5 -no core 644.5-645.7 -carb mud thin coal str 645.7-646 -no core 646-647.8 -clarain, hard bright trace marcasite 647.8-648.2 - Shale, grey, silty. 648.2-648.6 - Coal bright hard. 648.6-649.1 - Shale, frac. coal on fine planes - sh. is a d b bm bl. 649.1-650 - Coal v. hard bright gr. to carbarg marcasite. 650-650.6 - coal soft mushy fusain shaly. 650.6-653.4 - Coal v. hard bright dense gr. to carbarg. Marcasite. 653.4-654.4 - Coal fusain soft seat shale str. 654.1-656.3 - Coal.Carbarg, hard bright. Marcasite. 656.3-656.8 - Shale, carb. hard brittle tr marcasite. 656.8-657.9 - Coal soft mushy fusain 657.9-660 - Coal shale intbd shale part carb. and part db bl shale str. 660-660.7 - Shale & coal str. 660.7-661.2 - Soft shale			

INTERVAL	GRIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE INTAL.	
		661.2-665.7 - Mostly shale - few neat. coal str. 665.7-667.2 - Clarain bright. 667.2-667.4 - Shale. 667.4-669.5 - Coal soft broken. 669.5-671.8 - Coal soft mushy fusain-some clay str. 671.8-672.5 - Shale. 672.5-673.5 - Coal soft mushy fusain. 673.5-674 - Clarain, bright britt. 674-676.7 - No core recovered. 676.7-677.3 - Fusain. 677.3-677.4 - Shale str. 677.4-678.4 - Clarain. 678.4-679.2 - Fusain, soft dull earthy. 679.2-680 - Clarain bright. 680-684 - Fusain soft dull earthy. Coal rests directly on top of sandstone.			90°
		Seam 5 Recoveries 637-642.5 - 4.2/5.5 642.5-644.5 - 1.6/2 644.5-646 - 1.2/1.5 646-674 - 28/29 674-676.7 - 0/2.7			
684-705	21	Sandstone Basal - med. grained. - well sorted. - S. & P., carb. ptgs. - sl. foliation near normal to core. - broken to rubble. - 60 jts. 3/ft. sec. 684-705 - completely broken to rubble 1" frags.			
705-719	14	Siltstone - grading to v f g ss - less broken. - v argillaceous, dense - low angle jtg. ½' sec			
719-728	9	Sandstone - cg - S. & P., med gy. - massive. - broken but gen. competent. - jtg 60°.		60	
		JURASSIC-FERNIE GROUP			
728-735	7	Siltstone (Passage beds) - d k brn - bl - v arg appears bit - massive - broken - jts 30 1/1' sec 60 2/1' sec 734-735 - Breccia zone, silty sandy infilling.		30	

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FOL TO CORE AXIS	CORE EVAL.	REC. EFF.
735-742	7	Ribbone d Shale & Siltstone			
		- d b brn to bl but shale bands. - intbd with brown siltstone - well ribboned or foliated - jtg along fol.	70°	70°	
		736-739 - Brecciated, on jts @ 65		60°	100
742-768	26	Siltstone			
		- d b gy to black - very arg. massive - gr. to v f g ss - heavily brecciated, gouge sandy sections.'			
		755-768 - sand gouge with frags. of siltstone.		altho bree is intact	
		N.B. appears as fault zone from 742-768.			100
768-787	9	Ribboned Shale & Siltstone			
		Repeat zone?? Ribboned shales as 735-742. This section contains scattered brecciated sections, offsetting laminations.	70°	Brec . Intact	100
787-790.5	2.5	Siltstone			
		d b gy to bl massive grades nearly to v f g arg ss as 742-768		Intact	100
		EOH @ 790.5			

Drill Hole Sample Intervals and
Sample Weights in Grams

Hole No.: 75D-16

Interval	Weight (Grams)
239.5-241	1675
242-242.7	1215.
243-243.7	706
243.7-244.9	1455.
244.9-246	790
247-248.6	1905.
248.8-250	600
250-252.5	2065.
253-254	1230
254-255.4	1450.
255.5-256.8	1060
257.1-257.4	465
420.9-422	2515
423-424	1975.
424.2-426.1	2670
426.1-428	2960
428-430	2485
430-431.7	2035
431-434.7	2115
434.2-436.4	2085
436.4-438	1990
438-439.7	1900
439.7-441.6	2270
441.6-443	1390
443-444.7	1740
444.7-446.4	2145
446.4-448	2305
448-449.1	1420
449.1-450.6	1750
451-452	935
452-454	2220
454-456	2240
456-457	1340
457-458	2075
458-459.8	2355
466-468	3540
468-468.8	900
515-518	2592
642.5-644	2630
644.5-645.7	1333
646-647.8	2325
647.8-649.1	1960

Interval	Weight (Grams)
649.1-650	1737
652-653.4	1577.
653.4-655	1360
655-656.3	1770
656.6-657.9	1915
657.9-660	2420.
660-662	3130
662-664	3437.
664-665.7	2490
665.7-667.2	1177
667.2-669.5	2429
669.5-671	1534
671-671.8	1258
671.8-672.5	1555
672.5-674	1430
676.7-678	1510
678-680	2724
680-682	1810
682-684	2525
741-741.4	710
750-752	1965

DIAMOND DRILL RECORD

Hole No.: 75_D18

Property: Sage Creek Coal

Location: South Hill (Site 2111)
17,845,421 N
582,932 E

Elevation: 5189' asl.

Contractor: Connors Drilling

Hole Size: HQ (-60°)

Rig No.: 4

Date Commenced Drilling: November 25, 1975

Date Finished Drilling: November 27, 1975

Date Hole Completed: November 27, 1975

Logged By: J. Mitchell

Date: November 27, 1975

Probed By: Roke Oil Enterprises

Date: November 27, 1975

Total Depth Drillers: 87

Depth of Overburden: 21'

Total Depth Logger: 87

Water Level: Full (Gel)

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time

Surface Casing: 39'
Total Drilling Time: 45 hrs
Total Down Time: 1 hr
Total Footage Chargeable: 87'
Total Hourly Contact: 15 hrs

Standby Time for Logging: 4 hr
Other Standby Time: -
Total Chargeable Standby Time: [illegible]
Actual Moving Time Between Holes: [illegible]
Chargeable Moving Time " " : [illegible]

Remarks:- 8% recovery of seam 2, completely oxidized

Quantity of Mud Used:
Quik Gel 14
Quik Trol 14

Probe Report:

86 - 0 ..... Gamma Ray Neutron ..... Logged thru HQ rods
39 - 0 ..... Sidewall Density ..... Logged thru HQ rods

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks		
Seam 2	22.7 - 39	16.3	26.5 - 27.5 28.5 - 38.5	1'] 10']	12'

INTERVAL	BEDT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE INCL.	R.Q.D.
0 -21.4	21.4	OVERBURDEN - cased to 20' - wthrd. rk., sd. clay & boulders			
		CRETACIOUS KOOTENAY FORMATION			
21.4-22.7	1.3	MUDSTONE - m. gy. brn.; wthrd.			
22.7-39	16.3	COAL SEAM 2 22.7-23.0 coal mush. 23.0-26.0 coal mush. 26.0-38.0 no core 38.0-39.0 coal mush. Recoveries 20 - 23 1.6/3 23 - 26 0.9/3 26 - 38 0/12 38 - 39 0.5/1			15%
39 - 44	5	MUDSTONE 39.0-40.4 mudstone rubble 40.4-44.0 mudstone grading basally to siltstone. Core is sound, massive.			
44 - 63	19	SILTSTONE - dk gy to bl - appears massive & competent but highly frac. 50 - 63 frac along bdg low angle 2/5' sec finely lam, arg. grdg to mudstone, rusty 62 - 63 rubble, rusty, soft, decemented.	75°	J_f 75 J 18°	
63 - 87	24	SANDSTONE - f to mg - S & P - vaguely foliated, normal to core 63.0-73.5 rubble, broken, decem., soft rusty 73.5-87.0 low angle jty 15°, 20° horizontal jtg. badly broken throughout.		J15°-20° J90°	
TD	87'				

Drill Hole Sample Intervals and
Sample Weights in Grams

Hole No: 75D-18

Interval	Weight (Grams)
22.7-23	215
23-26	1030
38-39	313

DIAMOND DRILL RECORD

Hole No.: $75_p 18a$

Property: Sage Creek Coal

Location: South Hill (Site 2 III)
17 845 421 N
5829 32 E

Elevation: 5180' A.S.L.

Contractor: Connors Drilling

Hole Size: HQ (-90°)

Rig No.: 4

Date Commenced Drilling: November 27, 1975

Date Finished Drilling: November 28, 1975

Date Hole Completed: November 29, 1975

Logged By: J. Mitchell

Date: November 28, 1975

Probed By: Roke Oil Enterprises

Date: November 28, 1975

Total Depth Drillers: 63

Depth of Overburden: 20'

Total Depth Logger: 63

Water Level: Full (Gel)

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Hrs.

Surface Casing: 20'
Total Drilling Time: 25 hours
Total Down Time: -
Total Footage Chargeable: 63'
Total Hourly Contact: 7 hours

Standby Time for Logging: 9 hours
Other Standby Time: -
Total Chargeable Standby Time: 9 hr
Actual Moving Time Between Holes: 18 hr
Chargeable Moving Time " " : 18 hr

Remarks:- No coal recovered in core
Lost circulation @ 8'

Quantity of Mud Used:
Quik Gel 10
Quik trol 10

Probe Report:

61-0 Gamma Ray neutron ------- logged through HQ rods
56-0 Density ---------- logged through HQ rods
28-0 Density ---------- logged open hole
29-0 Caliper ---------- logged open hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 2	None		20-29	9+

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF F-D TO CORE AXIS	CORE INTAC.	[illegible]
0-20	20	Overburden - sd, boulders & wthrd rock - clay & some coal wash			
		Cretaceous-Kootenay Formation			
20-28	8	Sandstone - rubble - possibly boulders - m to cg - weathered - rusty 24-28 mg S & P - bedded @ 65° not weathered Recoveries: 20-23; Rec .5/3.0 23-28; Rec 3/5.0	65°		44%
28-32	4	Mudstone - rubble - highly brecc. - dk gy - carb @ 32 grades to siltstone Recoveries: 28-32; Rec 2/5.0			
32-42.7	10.7	Siltstone - massive - carb ptgs - finely laminated	65-70		100
42.7-63	20.3	Sandstone - vfg to fg coarsing rapidly to f to mg by 44' - thin carb lenticules - weathered - foliation @ 65° - core is gen rubbly - highly broken, essentially rubble - a tend of section is c.g. - abund jts near horizontal to 20° and @ 65° from 50' to end of hole	65°	3200-65°	
T.D.	63				

DIAMOND DRILL RECORD

Hole No.: 75_D21

Property: Sage Creek Coal

Location: South Hill
17, 846 663 N
582 846 E

Elevation: 5256' msl

Contractor: Connors Drlg

Hole Size: HQ (-90°)

Rig No.: 3

Date Commenced Drilling: November 25, 1975

Date Finished Drilling: November 30, 1975

Date Hole Completed: November 30, 1975

Logged By: E. Wilson

Date: November 30, 1975

Cored By: Roke Oil Enterprises

Date: November 30, 1975

Total Depth Drillers: 87'

Depth of Overburden: 22'

Total Depth Logger: 87'

Water Level: 21'

Bit Record

No.	Size	Make and Serial No.	F.P.H.	On	Off	Footage	Drilling Time

Surface Casing: 30'
Total Drilling Time: 48 hours
Total Down Time:-
Total Footage Chargeable: 87'
Total Hourly Contract: 8 hours

Standby Time for Logging: 10 hr.
Other Standby Time: 12 hr.
Total Chargeable Standby Time: 23 hr
Actual Moving Time Between Holes: 14
Chargeable Moving Time: " " : 14

Remarks:- Oxidation lost hole
cost circulation problems
encountered from 28' to EOH

Quantity of Mud Used:
Quik Gel 39
Quik Trol 39
Asbestos 10016

Probe Report:

82-0 Gamma Ray Neutron --------- logged through HQ rods
75-0 Density ---------- logged through HQ rods
84-0 Density ---------- logged open hole
84-0 Caliper ---------- logged open hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Coal Seam 2	46 44.4-67 53 - 67	22.6 14'	45-64 54.75-66	19'] 1.25'] 21

INTERVAL	DEPTH THICKNESS	DESCRIPTION	ANG. FOR TO HOLE AXIS	CORE RECOV.	R.Q.D.
0-22	22	Overburden - sand, gravel & boulders - withrd rock			
		Cretaceous-Kootenay Formation			
22-29	7	Sandstone - vf to med gd, mostly vfg - s & p - well foliated @ 60° - broken - abund. fol jts @ 60° 2/1'sec jts @ 10° 1/1'sec - hairline coaly lags 25-29 ss becomes vcg - very abund. coaly lams - broken rusty	60°	broken but intact J 60° J 10°	100
29-44.4	15.4	Mudstone - blue carb. - massive 31-31.5 bright clarain str 33-44.5 Very coaly section interbedded with very thin clarain str. 39-39.5 thin str of shaly clarain however section is dominantly shale Recoveries: 30-33 Rec 2.5/3		broken but intact	95
44.4-67	22.6	Coal Seam 2			
		44.4-45 ; clarain hard bright, marc fissile @ 65° 45-45.5 ; Mudstone bl hard carb marc on planes. 45.7-46.2; Mudstone, coaly fissile 46.2-46.7; clarain intbd shale 46.7-47 ; shale grading to carbarg 47-48 ; No core 48-51 ; coal-poor, v shaly with abund. marcasite Clar. bright, clean between 48-49.8 51-53 ; mostly shale scattered coaly str. NB At 53 start of clean coal section 53-57 ; clarain, clean bright 57-57.5 ; fusain dull earthy 57.5-60 ; clarain & fusain generally clean but ¼" shale str @ 60' 60-61 ; clarain soft sucrosic 61.1-61.7; fusain dull shaly 61.7-61.9; clarain bright 61.9-62.4; fusain, soft earthy 62.4-62.8; clarain scattered shale str 62.8-64.5; clarain, bright soft Appears clean, marcasite 64.5-67 ; No recovery	65°		85%

INTERVAL	BED THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE INCL.	BED INCL.
		Recovery: 47-48; Rec 0/1 51-53; Rec 1.5/2 60-67; Rec 4.5/7			
67-69	2	Mudstone - bl to db gy - sl silty, increasing silt with depth - carbonaceous - badly broken			
69-87	18	Siltstone - db gy - vague laminations & x/bd over 65° - fairly sandy from 69-74 - broken but full recovery - abundant jtg rusty coating in fracs 10°-20° jts 1/1' sec 60° jts 3/1' sec - core variably vfg sdy			
T.D.	87				

Drill Hole Sample Intervals and
Sample Weights in Grams

Hole No: 75D-21

Interval	Weight (Grams)
31-31.5	285
37-39.5	2725
45-47	2860
48-49.5	2125
49.5-51	2280
51-53	2525
53-54.5	1660
54.5-56	1620
56-58	2415
58-60	2594
60-61	1180
61-62.4	1325
62.4-65.5	2790

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

Hole No.: 75_D22

Property: Sage Creek Coal

Location: South Hill
17,847,481 N
583,255 E

Elevation: 5217' asl

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: 4

Date Commenced Drilling: November 29, 1975

Date Finished Drilling: November 30, 1975

Date Hole Completed: November 30, 1975

Logged By: J. Mitchell

Date: November 30, 1975

Probed By: Not probed.

Date:

Total Depth Drillers: 22'

Depth of Overburden: 6.5'

Total Depth Logger:

Water Level: Full

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Ti

Surface Casing: 20'
Total Drilling Time: 17 hrs.
Total Down Time: 0
Total Footage Chargeable: 22'
Total Hourly Contact: 9 hrs.

Standby Time for Logging: -
Other Standby Time: -
Total Chargeable Standby Time: -
Actual Moving Time Between Holes: 10
Chargeable Moving Time " " : 10
Quantity of Mud Used:
Quik Gel 6 bags
Quik Trol 6 bags

Remarks:- Oxidation test hole
Drilled @ 60° on
Azimuth of 270°

Probe Report:

Not probed.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 2	6.5 - 16	9.5		

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
0 - 6.5	6.5	CASING			
		CRETACEOUS-KOOTENAY FORMATION			
6.5 - 16	9.5	COAL SEAM 2			
		6.5-8.0 coal, dull earthy soft 8.0-11 coal, dull, earthy, soft 11 - 13 coal, dull earthy soft 13 - 14 coal dull earthy soft 14 - 15 coal shaley, brn cast 15 - 16 coal shaley, brn cast			
		Recoveries			46%
		6.5-8.0 1.0/1.5 8.0- 11 1/3 11 - 13 0.6/2 13 - 14 0.7/1 14 - 15 0.8/1 15 - 16 0.3/1			
16 - 22	6	MUDSTONE - bl - massive - sl silty - generally competent			
		Rig skidded 50' east to drill 22a.			
TD	22				

Drill Hole Sample Intervals and
Sample Weights in Grams

Hole No: 75D-22

Interval	Weight (Grams)
6.5-8	943
8-11	292
11-13	450
13-14	794
14-15	775
15-16	292

KIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

Hole No.: 75-D-22A

Property: Sage Creek Coal

Location: South Hill
17, 847 477 N
583 309 E

Elevation: 5218' asl.

Contractor: CONNORS DRILLING

Hole Size: HQ

Rig No.: 4

Date Commenced Drilling: December 2, 1975

Date Finished Drilling: December 3, 1975

Date Hole Completed: December 3, 1975

Logged By: E. Wilson, J. Mitchell

Date: December 3, 1975

Probed By: Roke Oil Enterprises

Date: December 3, 1975

Total Depth Drillers: 71 feet

Depth of Overburden: 8 feet

Total Depth Logger: 70 feet

Water Level: 20 feet

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time

Surface Casing: 12 feet
Total Drilling Time: 33 hours
Total Down Time: 0
Total Footage Chargeable: 71 feet
Total Hourly Contact: 14 hours

Standby Time for Logging: 8 hours
Other Standby Time: 0
Total Chargeable Standby Time: 8 hours
Actual Moving Time Between Holes: 10 "
Chargeable Moving Time " " : 10 "

Remarks:- Oxidation test hole drilled at -60° on azimuth of 270°.

Quantity of Mud Used:
Quik Gel: 28 bags
Quik Trol: 28 bags
CC 16: 1 bag

Probe Report:

69-0	Gamma ray neutron	logged through HQ rods
56-0	Sidewall density	logged through HQ rods
67-0	Sidewall density	logged open hole
67-0	Caliper	logged open hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Coal Seam 2	29-49.5	20.5	29-31	2
			38-46	8
			47.5-49	1.5

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FLD TO CORE AXIS	CORE EVAL.	EXP. REC.
0-8	8	OVERBURDEN - Soil & withrd rock.			
		CRETACEOUS-KOOTENAY FORMATION			
8-29	21	Siltstone - d b gy to bl - arg. - badly broken to rubbly - abund. jointing @ 60 and normal to core 16-29: siltstone - med. grey - laminated, normal to core	90°	Broken 60 90	93%
29-54.5	25.5	Coal Seam 2 29-31.7: bright clean brittle clarain within vit bndg - some fusain. Few scatt. thin shale str 31.7-35.8: Mudstone. - bl - massive - sl silty - hard comp. 35.8-37.5: Clarain intbd. fusain dull & br. coal bnds. sucrosic 36.8-36.9: shale strata 37.5-37.9: mudstone brwn to bl hard fissile 37.9-39: carbarg. & clar str. intbd 39-41.4: gen. dull coal, fusain and clarain intbd. 41.4-44: clarain sucrosic & fusain 44-46.2: bright clarain, brittle mealy 46.2-47.3: clay, very coaly and str. of soft fusain, very arg. 47.3-49: clarain gen hard bright str. of very hard br. durain 49-49.5: clarain, br. shaley bands Recoveries: 8-13: Rec. 3.0/5.0 25-30: Rec. 5.0/5.0 30-35: Rec. 5.0/5.0 35-39: Rec. 3.5/4.0 39-44: Rec. 4.0/5.0 44-49: Rec. 5.0/5.0 49-54: Rec. 5.0/5.0			
49.5-54	4.5	Mudstone - bl brn - massive - carb - broken Grades to bl siltstone.			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	[illegible]
54-71	17	<u>Siltstone</u> - d b gy to bl - quite comp. - jtg. minor 1 20° jt/5' sec 66-69: str. of mudstone - soft carb - broken 69-71: siltstone - intact - massive - brn carb. mudstone from 68.4-68.7 and 69.2-69.5			
T.D.	71 feet				

Drill Hole Sample Intervals and Sample Weights in Grams

Hole No: 75D-22A

Interval	Weight (Gram)
29-30	1450
30-31.7	1550
35.8-37.5	2430
37.5-39	1630
39-41.4	1885
41.4-42.7	1445
42.7-44	1225
44-45	1397
45-46.2	1300
46.2-47.3	1635
47.3-49	1715
49-49.5	535

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

Hole No.: 75D24

Property: Sage Creek Coal

Location: South Hill
17,847,933 N
582,709 E

Elevation: 5233 asl.

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: 3

Date Commenced Drilling: December 2, 1975

Date Finished Drilling: December 3, 1975

Date Hole Completed: December 4, 1975

Logged By: E. Wilson & J. Mitchell

Date: December 4, 1975

Probed By: Roke Oil Enterprises

Date: December 4, 1975

Total Depth Drillers: 148

Depth of Overburden: 25'

Total Depth Logger: 148

Water Level: 10'

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time

Surface Casing: 36'
Total Drilling Time: 47 hours
Total Down Time: 0
Total Footage Chargeable: 148'
Total Hourly Contact: 20 hours

Standby Time for Logging: 5
Other Standby Time: 0
Total Chargeable Standby Time: 5
Actual Moving Time Between Holes: 17
Chargeable Moving Time " " : 17

Remarks:- Oxidization test hole drilled at -60° on azimuth of 270°.

Quantity of Mud Used:
Quik Gel 46 bags
Quik Trol 46 bags
CC16 1 bag

Probe Report:
148-0 --- Gamma Ray, Neutron ------ Logged through HQ rod
136-0 --- Sidewall Density -------- Logged through HQ rod
145-0 --- Sidewall Density -------- Logged open hole
145-0 --- Caliper ---------- Logged open hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 4U	50-123	73'	51.5-86	34.5
Seam 4L (1)			92.5-115.5	23
Seam 4L (2)			137-139.25	2.25

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	[illegible] REC.
0-25	25	Overburden Soil, boulders, weathered and broken rock.			
		Cretaceous - Kootenay Formation			
25-38	13	Mudstone Silty, med to kd gy, highly frac & brecciated. 27-28 - Very soft, weathered. 28-30 - Badly frac & becoming siltier. Laminations @ 70°. low ang fractures. 30-34.3 - Sev frac ironstained 0-30°. 34.3-37 -Soft plastic, putty-like deceim siltstone finely lam with carb material. 37-38 -As 30-34.3 fol frac @ 65°.	70° 65°	J20° J 0-30° J 65°	
38-50	12	Sandstone Abrupt contact, med to v cg ,S & P. Partially decment throughout, chert granules present. 43.5-46.5 -Weathered siltstone, very soft, clay rich matrix with angular siltstone cobbles. 46.5-48 -Rubble, siltstone. 48-50 -Carb mudstone fissile with thin carb ptgs. ironstained severely fractured. Recoveries 41.5-43.5 Rec 1.2 43.5-46.5 Rec 1.6 46.5-50 Rec 3.0		Broken	Rec 78%
50-123	73	Coal Seam 50-51 -Coal soft clay with mudstone. 51-51.7 -Soft bright fissile,clarain. 51.7-52 -Carbarg 52-52.5 -Clarain, hard bright. 52.5-52.7 -Mudstone 52.7-53.7 -Clarain, bright sucrosic vit bndg. 53.7-54 -Mudstone intbd clarain. 54-57.4- Clarain, bright clean with vitrain bndg -uniform. 57.4-57.8 -Soft mushy shaley coal. 57.8-58 -Carbarg, hard. 58-60.4 -Clarain, hard fissile @ 75°. 60.4-61 -Clar & carbarg, hard,bright. 61-63 -Clarain, hard firm. 63-68 -Clarain, firm fissile, refulgent. 68-68.5 -Clarain, bright fissile tr durain. 68.5-68.7 -Durain. 68.7-69.4 -Hard, refulgent, clarain & vit bndg. 69.4-69.5 -Mudstone 69.5-69.7 -Clarain 69.7-69.8 -Mudstone 69.8-70 -Clarain 70-71.1 - Durain 71.1-71.5 -Clarain 71.5-72 -No core			From 50 to 78 66.3%

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF PEN TO CORE AXIS	CORE EVAL.	[illegible]
		72-73 -Clarain with durain bndg. 73-73.1 -Durain 73.1-73.5 -Clarain, soft fissile. 73.5-73.6 -Carbarg. 73.6-74 -Clarain, soft. 74-76.2 -Coal, Soft clayey 76.2-76.4 -Clarain, soft fissile. 76.4-76.8 -Durain. 76.8-77.5 -Clarain, soft fissile. 77.5-78 - No core	25.2		
		Recoveries 50-51 Rec 0.7 51-54 Rec 3.0 54-57.4 Rec 2.7 57.4-63 Rec 4.8 63-68 Rec 5.0 68-72 Rec 3.5 72-73 Rec 1.0 73-78 Rec 4.5	24.21		
		78-81.3 -Clarain, soft fissile 81.3-81.9 -Hard brittle durain & clarain. 81.9-82.2 -Durain. 82.2-82.5 -Clarain, soft bright. 82.5-83 -No core 83-83.4 -Durain 83.4-83.6 -Claro-vitrain. 83.6-84.2 -Durain tr vitrain. 84.2-84.5 -Clarovitrain & durain. 84.5-85.0 -Durain,vitrain bndg. 85-85.9 -Durain, hard bright fiss. 85.9-86.3 -Durain 86.3-86.5 -Clarain,soft. 86.5-86.6 -Durain. 86.6-88 -No core. 88-90.5 -Mudstone & durain. 90.5-92 -Durain & mudstone. 92-92.3 -Clar, soft fiss. 92.3-93 -No core. 93-93.3 -Clarain. 93.3-93.4 -Durain. 93.4-95.7 -Clarain, soft fiss tr durain. 95.7-96.9 -Clarain & durain. 96.9-97.5 -Durain. 97.5-98 -Clar & durain. 98-98.5 -No core. 98.5-99.4 -Clarain fissile. 99.4-99.5 -Durain str. 99.5-100.2 -Clarain, bright,brittle & vitrain. 100.2-100.3 -Durain str. 100.3-101 -Clarain, bright. 101-101.1 -Durain 101.1-101.4 -Clarain. 101.4-102 -Durain. 102-103 - No core			
		Recoveries 78-83 Rec 4.5 83-85 Rec 2.0 85-88 Rec 1.6 88-89 Rec .8 89-90.5 Rec .5 90.5-93 Rec 1.8 93-98.5 Rec 5.0 98.5-103 Rec 3.5			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	% REC.
		103-103.7 -Durain w clar str. 103.7-104.2 -Durain w clar. 104.2-105.5 -Clar soft fissile. 105.5-106 - No core 106-109 -Clarain, soft. 109-112 -No core. 112-113 -Clarain, soft. 113-116 -Soft clar, fiss & vit bndg. 116-116.5 -Durain & clar. 116.5-117 -Clarain, soft. 117-118.1 -Mudstone black carb. 118.1-118.9 -Durain & carbarg. 118.9-119.5 -Clarain, soft. 119.5-119.9 -Clarain, bright brittle. 119.9-120.2 -Durain & clarain. 120.2-120.6 -Clarain, soft earthy arg. 120.6-123 -Intbd mudstone & durain. Recoveries 103-106 2.5/3 106-110 3/4 110-112 0/2 112-117 5/5 117-119 2/2 119-123 3/4			
123-136.5	13.5	<u>Mudstone</u> Massive, sl silty, brn-bl, massive to 129. Few low ang fracs 30° to vert. 129-131 -Badly broken, becoming siltier. 131-136.5 -Siltstone is broken to rubble. Med to dk gy vaguely lam. 60-90° fracs abund.	90°	J 60-90°	79.5%
136.5-138.8	2.3	<u>Coaly Zone</u> 136.5-136.8 -Soft clar & durain. 136.8-138.8 -Durain-vit bndg, hard brittle.			
138.8-148	9.2	<u>Mudstone</u> Carbonaceous, then coal str. 141-144 -Coaly, broken. 144-148 -Becoming silty fissile broken. scattered thin coal str. Abundant vert & 60° frac. Vague fol @ 65°.	65°	J 90° J 60°	
TD	148				

Drill Hole Sample Intervals and Sample Weights in Grams

Hole No: 75D-24

Interval	Weight (Gram)
50-51	855
51-52	500
52-53	1215
53-54	1595
54-55	845
55-56	970
56-57.4	1065
57.4-59	2080
59-61	2190
61-63	1465
63-65	2765
65-67	2250
67-68	1272
68-69.7	2172
69.7-72	2145
72-73	1550
73-75	2765
75-77	1907
77-78	965
78-80	3755
80-83	2686
83-85	3235
85-88	2393
88-89	1253
89-90.5	324
90.5-93	2535
93-94	1090
94-96	2560
96-98.5	2445
98.5-100.5	2460
100.5-103	1850
103-104.2	1245
104.2-106	1603
106-107.5	2017
107.5-110	1727
112-114	2860
114-116	2470
116-117	1290
117-118.1	1735
118.1-119.5	1728
119.5-120.6	1500

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

Hole No.: 75_D25

Property: Sage Creek Coal

Location: South Hill
17,846 244 N
581 894 E

Elevation: 5421' asl.

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: 1

Date Commenced Drilling: December 2, 1975

Date Finished Drilling: December 8, 1975

Date Hole Completed: December 8, 1975

Logged By: E. Wilson, J. Mitchell

Date: December 8, 1975

Probed By: Roke Oil Enterprises

Date: December 8, 1975

Total Depth Drillers: 420

Depth of Overburden: 46

Total Depth Logger: 418

Water Level: Full (Gel)

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling

Surface Casing:

Total Drilling Time: 133 hr

Total Down Time: 0

Total Footage Chargeable: 420'

Total Hourly Contact: 23 hrs.

Standby Time for Logging: 8 hr

Other Standby Time: -

Total Chargeable Standby Time: 8 hr

Actual Moving Time Between Holes:

Chargeable Moving Time " " :

Quantity of Mud Used:

Quik Gel 74 bags

Quik Trol 74 bags

CC 16 1 bag

Remarks:-

Probe Report:

417-0 ---------- Gamma Ray Neutron ------Logged through HQ rods
410-0 ---------- Density ----------Logged through HQ rods
417-0 ---------- Density ----------Logged through open hole
417-0 ---------- Caliper ----------Logged through open hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
	188.6 - 193	4.4	187 - 192.25	5.25
	205.2 - 222	16.8	207 - 222.5	15.5
	252.7 - 307.2	54.5	252.25 - 290.75	38.5
			294.75 - 306.75	12
			310.75 - 312	1.25
Seam 5U	365.4 - 369	3.6	365.25 - 369.25	4
5L	379.9 - 399.2	19.3	381 - 385.75	4.75)
			390.75 - 398.5	7.75)17.25

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FED TO CORE AXIS	CORE EVAL.	EST. L.C.
0-46	46	Overburden - withrd. rock, clay, sand & soil - boulders Drillers report triconing in black clay & boulders			
		Cretaceous-Kootenay Formation			
46-48		In core sandstone fragments in black clay matrix that is coaly Sandstone fragments are typical Kootenay at 48 drillers report loose gravel & boulders - probably unconsolidated gauge zone as 20-48.		extremely soft or unconsol	20 to 105 is 1c 10%
48-58	59	No core. Report loose boulders and silty clay material			
58-63		Sandstone boulders - are s&p, cg typical Kootenay			
63-101		No core prob similar to above			
101-105		Sandstone (Kootenay in silty clay and sand matrix			
105-130	25	Mudstone - highly weathered - micaceous - hard dense massive - complete rubble - very dark grey to black 113-130 broken - very soft muddy - completely shattered Recoveries 113-118 Rec. 2.2 118-120 Rec. 1.1 120-125 Rec. 2.9 125-129 Rec. 3.5			
130-138	8	Gouge Zone Mudzone - soft grey clay - contains thin irreg coal str. - very soft - fragments of silty mudstone imbedded			
138-151	13	Siltstone - black - very arg. - massive - ext. badly frac gouge brecc. zones 140-142 145-148 150-151 all gouge zones infilled with silty sandy clay			
151-156	5	Breccia Siltstone fragments as above are angular and infilled with sandy muddy matrix.			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FLD TO CORE AXIS	CORE EVAL.	EVAL. REC.
156-182	26	<u>Siltstone</u> - db gy to black - very massive - very argillaceous - broken throughout with abund. brec . sections jtg is abund aver. 3/1' sec. 30°, 60° and 0°. Brec sect. 156-156.3 162-163 167-179 Core from 168-178 is extremely brecciated with sandy silty infilling. Quite soft, shattered in place. <u>Recoveries</u> 160-163; 1.5/3 163-168; .7/5		30,60 0°	
182-194	12	Coal Seam 2 & Intbd Mudstone			
		182-183 Undifferentiated 183 - 185.5; No core. Drillers report soft black mush 185.5 - 186.3; Mudstone bl grading to coal 186.3 - 187.5; Mudstone, soft plastic cash clarain str @ 45° 187.5 - 188 ; Mudstone bl gr to coal 188 - 188.6; Mudstone AA coaly str 188.6 - 190 ; clarain bright, shaly 190 - 191 ; Dull early coal 191 - 193 ; No core 193 - 194 ; Mud, clar str intbd <u>Recoveries</u> 182 - 183 Rec 1/1 183 - 188 Rec 2.5/5 188 - 193 Rec 2.0/5 193 - 194 Rec 1/1	45°		50%
194-205.2	11.2	<u>Mudstone</u> - bl - carb - sl silty - frac & broken			
205.2-222	16.8	Coal Seam 2 (?)			
		205.2-206.7; clarain&Durain crushed 206.7-208.0; carbarg - hard shaly 208 - 209.5;Durain&Clarain fissile @ 45 209.5-210.2; Soft dull with durain intbds shaly 210.2-213 ; Durain fissile arg. 213 -215.5; Heavy mudstone section with scattered clarain str throughout 215.5-216.5; clarain bright 216.5-218 ; mudstone-soft, thin coaly bands 218 -218.6; clarain & durain 218.6-219.7; durain & clarain 219.7-221.5; clarain, soft	45°		

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FLD TO CORE AXIS	CORE INCL.	CORE DESC.
		221.5 - 222 No core			
		Recoveries 194-218 24/24 218-222 3/4			
222-252.7	30.7	Mudstone - black to brn, carb - v. soft plastic - appears disturbed & broken throughout - massive - silty fracs normal to core 242-244 - mudstone is black, coaly less silty 244-245.7 - very black coaly mud soft 248-250.2 - very black coaly mud soft			
252.7-307.2	54.5	Coal Seam 4			
		252.7-253.0; soft dull coal argil; 253.0-253.6; clarain,bright granular 253.6-254.7; soft dull coal,durain str 254.7-258 ; durain brittle, hard shaly 258 - 259 ; carbarg & durain 259 - 261 ; soft fissile clarain muddy at base 261 - 263 ; Durain with vitrain 263 - 265 ; Durain with vitrain which increases marcasite abund. 265 - 266 ; clarain & vitrain soft fiss 266 - 266.6; carbarg 266.6-267 ; Dur & Clarain 267 - 268 ; Durain & carbarg 268 - 270.3; Broken durain & clarain 270.3-272 ; Durain & carbarg 272 - 273 ; Clarain 273 - 281.7; Thinly intbd dur & clarain homog throughout. Intbds of dur &clar are .1 to .2" 281.7-283 ; carbarg, thin clar beds 283-286.5 ; Thinly intbd durain clarovitrain - marcasite quite abund. 286.5 -288 ; soft fissile clarain 288 -289.6; clarain bright 289.6-293 ; No core 293 -293.7; clarain bright brittle 293.7-295.2; Dull earthy coal argil 295.2-296 ; Dull earthy coal intbd with durain 296 - 298 ; No core 298 - 298.3; clarain, soft, mushy 298.3-299.3; Dull earthy coal, argil 299.3-302.4; Clarain, bright sucrosic 302.4-303 ; No core 303 -303.3; Dull earthy coal, argil 303.3-307.2; Clarain bright fissile (45°) abund marc.	45°		

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FED TO CORE AXIS	CORE EVAL.	[illegible]
		Recoveries 252.7-288 Rec 35.3/35.3 288 - 293 Rec 1.6 293 - 298 Rec 3.0 298 - 303 Rec 4.4 303 - 308 Rec 4.8			
307.2-365.4	58.2	Mudstone 307.2-307.8 - Mudstone bl-brn sliken sided coated with marcasite @ 25° 307.8-308 - No core; 308 - 310 - Mudstone brn with marcasite 310 - 311 - coal, clarain, very shaly slicken sided 311 - 312 - No core 312 - 323.7 - Mudstone, black lt.gy clay silty 323.7-325.5 - coal, soft fissile, clar marc. 325.5-327.5 - Mudstone, broken 327.5-328 - Clarain, softy mushy 328 - 330 - Mudstone, soft broken, coaly slickensided coated with talc. 330 - 333 - Mudstone silty, sl foliated @ 60°, slightly coaly 333 - 336 - Mudstone, slub, talcy 336 - 353.5- Mudstone 30 & 60° jts. 353.5-358 - Mudstone, coaly slicken 358 - 359 - Mudstone 359 - 359.3 - Coal str 359.3-363 - Mudstone thinly bd @65 363 - 365.4 - Coaly mud and mudstone sound Recoveries: 308-312; Rec 3.0 312-315; Rec 1.5 315-319.5; Rec 3.5 319.5-323; Rec 3.0 323-327.5; Rec 3.0 328-330; Rec 1.0 358-363; Rec 2.0	65°	Soft, broken J30 60°	85%
365.4-399.2	33.8	Coal Seam 5 365.4-366.7; soft coal clar pred. 366.7-367.9; clarovitrain fissile hard 367.9-368.7; Durain 368.7-369 ; Clarain 369 - 373 ; Durain & carbarg 373 - 375 ; Clarain, soft tr shale 375 375.7; Mudstone 375.7-376.6; carbarg & Clarain 376.6-377.9; Mudstone; massive 377.9-379.9; Rubble, thinly bedded coaly 379.9-383 ; Coal soft rubbly tr shale str 383 - 387 : Fissile clarain tr durain 387 - 388 ; soft coaly mudstone 388 - 389.5; Soft coal & durain rubble 389.5-392.5; Soft clarain tr durain 392.5-395.7; Clarain intbd durain 395.7-398.6; Durain & Clarain			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FED TO CORE AXIS	CORE EVAL.	EST. REC.
		398.6-399.2; clarain bright			
		Recoveries 363 - 369 6/6 369 - 373 2.5/4 373 - 375 1.5/2 375 - 379 4/4 379 - 383 4/4 383 - 387 3.4/4 387 - 388 1/1 388 - 389.5 .5/1.5 389.5 - 390.5 .5/1 390.5 - 392 .8/1.5			
399.2-420	20.8	Sandstone Basal Lt to mid gy sl arg sub arg to sub rd s & p - fine to md gd - abundant frac 45-60 and prominent frac parallel to core - broken			85%
T.D.	420'				

Drill Hole Sample Intervals and Sample Weights in Grams

Hole No: 75D-25

Interval	Weight (Grams)	Interval	Weight (Grams)
185-186.3	1965	305-307.2	1195
186.3-187.5	1484	311-312	823
187.5-188.6	1170	323.2-325.6	2787
188.6-190	1310	364-365.4	2491
190-191	1106	365.4-366.7	1542
193-194	1375	366.7-367.9	1474
205.2-206.7	1884	367.9-369	1675
206.7-208	1830	369-373	3202
208-209	920	373-374.5	2110
209-211	2158	375.6-376	1057
211-213	3050	379-380	1620
213-215	3515	380-381.5	1830
215.5-216.3	1135	381.5-383	1408
216.3-218	2282	383-384.7	1935
218-219.7	1530	384.7-386.4	1612
219.7-221.5	1415	387-388	1612
252.3-253	650	388-389.5	928
253-255	2313	389.5-392.5	1517
255-256.5	1710	392.5-394	1780
256.5-258	1769	394-396	1510
258-259	910	396-397	1320
259-261	1965	397-399.2	2610
261-263	2118		
263-265	2234		
265-267	2395		
267-268	925		
268-270.3	2212		
270.3-272	2053		
272-273	1235		
273-275	2135		
275-277	2239		
277-278	1285		
278-280	1423		
280-281.7	1870		
281.7-283	1565		
283-285	2250		
285-286.5	1715		
286.5-288	1507		
288-289.6	1370		
293-293.7	965		
293.7-295.2	2250		
295.2-296	1028		
298-299.3	1445		
299.3-300.8	1534		
300.8-302.4	1825		
303-305	2320		

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

Hole No.: 75_D27 | Property: Sage Creek Coal

Location: South Hill
17,847,400 N
582 373 E | Elevation: 52 8 0' asl

Contractor: Connors Drlg. | Hole Size:

Rig No.: 4

Date Commenced Drilling: December 5, 1975

Date Finished Drilling: December 7, 1975

Date Hole Completed: December 7, 1975

Logged By: F. Wilson, J. Mitchell | Date: December 7, 1975

Probed By: Roke Oil Enterprises | Date: December 7, 1975

Total Depth Drillers: 133 | Depth of Overburden: 34'

Total Depth Logger: 132' | Water Level: Full

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Ti.

Surface Casing: 18'
Total Drilling Time: 48 hr.
Total Down Time: 0
Total Footage Chargeable: 133
Total Hourly Contact: 5 hr.

Standby Time for Logging: 6 hr.
Other Standby Time: -
Total Chargeable Standby Time: 6 hr.
Actual Moving Time Between Holes: 19hr
Chargeable Moving Time: " " : 19hr

Remarks:- Oxidation test hole drilled @ -60° on azimuth of 270°.

Quantity of Mud Used:
Quik Gel 30 bags
Quik Trol 30 bags
CC 16 1 bag

Probe Report:

131-0 Gamma Ray Neutron--------Logged through HQ rods
126-0 Sidewall Density ---------Logged through HQ rods
129-0 Side wall Density --------Logged open hole
129-0 Caliper ----------Logged open hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 4U	34-115 .4	81.4	35 - 57 *(67.75 - 73.75)	22' 6')
$^4L(1)$			82 - 105	23
$^4L(2)$			111.5 - 113.5	2

*Repeat section of Seam 4U due to thrust fault cutting hole @ 67.75'.

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FLD TO CORE AXIS	CORE DIAM.	% REC.
0 - 34	34	Overburden - sand, gravel boulders - withrd rock 18 - 34 cobbles and boulders of rusty weathered sandstone. Some are well rounded. Probably over-burden in part mixed with wthrd rock and coal. @ 30' .5' of coal wash @ 34 cool wash overlying few sandstone pebbles			
		Cretaceous-Kootenay Formation			
34 - 115.4	81.4	Coal Seam 4U			
		34-35 : soft earthy coal mush 35-36.3 : coaly-clay 36.3-38 : No core 38-38.7 : soft mush of granular clarain 38.7-39 : soft earthy coal 39-40 : soft clarain intbd with earthy coal core not rec'd Recoveries 34-38 ; Rec 2.3' /4 38-40 ; Rec 2.0 /2 40-40.5 : clarain, granular & soft dull coal 40.5-41.3: Dull earthy coal clarain str very soft. 41.3-42 : soft dull earthy coal 42-43 : No core 43-44 : soft dull earthy quite shaly partic 43.5-44 44-45 : No core 45-45.8 : clarain, gran, very soft fusain intbd. 45.8-46.9: soft, dull, dense earthy coal 46.9-49 : No core Recoveries 40-43 ; Rec 2.0/2 43-45 ; Rec. 2.0/2 45-49 ; Rec 1.9/4 49-51 : clarain, granular -very soft 51-53.5 : No core 53.5-54 : clarain, scattered thin shaly str. 54 -55 : No core 55-55.5 : shale, broken in soft coal mush 55.5-57.2: clarain, very soft 57.2-59 : clarain intbd with shale & soft argill (about 50% shale) 59-63 : clarain soft			63%

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FLD TO CORE AXIS	CORE INCL.
		63-64 : No core		
		Recoveries : 49-53 Rec 2/2 53-55 Rec 1.5/2 55-59 Rec 4.0/4 59-64 Rec 4.0/5		
		64-64.8 : soft coal indurated mud 64.8-66.4 : soft clarain 66.4-67 : carborg and shale, silt ironstain 67-67.5 : soft clarain 67.5-69 : No core 69-70.1 : soft clarain & vitrain 70.1-70.3 : Durain 70.3-70.7 : thinly bedded vitrain & durain 70.7-70.8 : Durain 70.8-72.5 : Clarain & Vitrain 72.5-73 : Durain & Vitrain 73-74 : No core 74-75.6 : clarain & vitrain tr 75.6-76 : No core 75.6-77 : soft clarain shale str 77-78.5 : clarain, soft, tr vitrain & fusain 78.5-81 : soft coal with plastic mud 81-82 : No core		
		Recoveries : 64-69 Rec 3.5/5 69-74 Rec 4.0/5 74-76 Rec 1.4/2 76-77 Rec 1.0/1 77-82 Rec 4.0/5		
		82-83.4 : coarse pebbles of light brown chert or quartzite (well rounded 3-4") underlain by smaller pebbles includ limestone finally grading to granule size particles resting on 2" of coaly mud. Black coaly mud fills pebble & boulder voids		
		83.4-87.7 : Durain hard intbd with clarain, vit bndg, marcasite 87.7-88.4 : soft clarain 88.4-89 : soft bright clean clarain 89-92 : no core 92-92.6 : soft clayey clarain 92.6-96 : no core		
		Recoveries : 82-87 Rec 4.5/5 87-92 Rec 2.0/5 92-96 Rec 3.6/4		

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FLB TO CORE AXIS	CORE EVAL.	CORE REC.
		96-98.8 : clarain, soft clayey 98.8-101 : <u>no core</u> 101-103.8 : clarain soft clayey 103.8-104.5: Intbd shale & durain slicken 104.5-106.3: clarain bright, brittle & vit bndg. Minor durain str. 106.3-108 : Intbd durain & clar 108-108.4 : clarain fissile 108.4-109.2: shale with soft coaly mud 109.2-110 : Durain 110-111.7 : claro vitrain minor durain 111.7-113 : <u>No core</u> 113-114.3 : clarain 114.3-115.4: thinly bedded dur & clar. <u>Recoveries</u> : 96-101 Rec 2.8/5 101-108 Rec 7.0/7 108-113 Rec 3.7/5 113-118 Rec 5.5/5 118-123 Rec 3.0/5 123-128 Rec 4.0/5 128-133 Rec 2.5/5			
115.4-133	17.6	<u>Siltstone</u> - bl to db gy - argillaceous gr to mudstone - frac @ 65° possib bdg - grades to vfg ss by 133 120-120.5 coaly str in mudstone - rubble	65°	J 65° J 90	
TD	133				

Drill Hole Sample Intervals and Sample Weights in Grams

Hole No: 75D-27

Interval	Weight (Grams)
34-35	1215
35-36.3	1310
38-39	1215
39-40	990
40-41	1032
41-42	855
43-45	2155
45-49	2120
49-53	2300
53-55	1380
55-57	2560
57-59	2760
59-61	2650
61-63	3550
64-64.8	805
64.8-66.4	2898
66.4-67.4	1470
69-70.8	2085
70.8-73	2275
74-75.6	1895
76-77	1057
77-78.5	2303
78.5-81	4900
85.2-87	2586
87-92	2380
92-96	760
96-97.6	1945
97.6-98.8	1175
101-103	2122
103-105	3190
105-106.3	1475
106.3-108	1568
108-110	3168
110-111.7	1075
113.7-114.3	1668
114.3-115.4	1410

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

Hole No.: 75D28 | Property: Sage Creek Coal

Location: South Hill 17,847;379 N 583,111 E | Elevation: 5317'asl.

Contractor: Connors Drilling | Hole Size: HQ

Rig No.: 3

Date Commenced Drilling: December 5, 1975

Date Finished Drilling: December 7, 1975

Date Hole Completed: December 7, 1975

Logged By: J. Mitchell & E. Wilson | Date: December 7, 1975

Probed By: Roke Oil Enterprises | Date: December 7,1975

Total Depth Drillers: 208' | Depth of Overburden: 10'

Total Depth Logger: 207' | Water Level: Full (Gel)

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time

Surface Casing: 10'

Total Drilling Time: 48 hours
Total Down Time: 0
Total Footage Chargeable: 208'
Total Hourly Contact: 2 hours

Standby Time for Logging: 5 hours
Other Standby Time: 0
Total Chargeable Standby Time: 0
Actual Moving Time Between Holes: 21 hr
Chargeable Moving Time " " : 21 hr

Remarks:- Oxidation test hole.

Quantity of Mud Used:

Quik Gel	34 bags
Quik Trol	34 bags
CC16	2 bags

Probe Report:
206-0 --- Gamma Ray Neutron ---------- Logged through HQ rods
196-0 --- Sidewall Density ---------- Logged through HQ rods
205-0 --- Sidewall Density ---------- Logged open hole
205-0 --- Caliper ---------- Logged open hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
			10-18.75	8.75
			22.5-23.25	0.75
			27.25-29.5	2.25
			31-32	1
			34.25-37.75	3.5
			41.75-44	2.25
			52.25-60	7.75
			65.25-95	29.75
			98-99	1
			107.5-110	2.5
			111.75-160.75	49
Seam 5U			162-171	.9
Seam 5L			172.25-190	17.75] 28

INTERVAL	UNIT THICKNESS	DESCRIPTION	< OF FOD TO CORE AXIS	CORE EVAL.	[illegible] DESC.
0-10	10	Overburden Wthrd rk soil, wthrd coal or coal wash.			
10-191	181	Cretaceous - Kootenay Formation Coal - Seams 4 & 5 10-11.3 -Coal, soft earthy mushy 11.3-13 -No core 13-13.2 -Mudstone str. bl, carb. 13.2-15.5 -Soft earthy compact coal 15.5-18 -No core 18-21.4 -Dull earthy coal, contains mudstone chips. 21.4-22 -No core 22-27 - Mudstone str intbd with shaly coal that is soft & mushy. 27-27.5 -No core 27.5-28.5 -Clarain, bright crushed mushy. 28.5-29.7 -Mudstone carbarg and durain. Whole is broken. 29.7-30 -No core 30-33- As 28.5-29.7 33-35.3 -Intbd clarain, vitrain str & some durain. 35.3-37.5 -No core. 37.5-38.4 -Intbd clar & vitrain 38.4-38.8 -Durain 38.8-40.7 -Clarain, soft. 40.7-43 -No core 43-46.9 -Soft fissile, clarain tr durain. 46.9-48 -No core. 48-49 -Clarain, soft fissile. 49-49.9 -Soft mushy coal. 49.9-53 -No core 53-54.7 -Soft mushy coal 54.7-58 -No core 58-61.3 -Soft mushy coal. 61.3-63 -No core. 63-64.5 -Soft mushy coal. 64.5-68 -No core. 68-69 -Soft mushy coal. 69-69.7 -Mudstone intbd durain. 69.7-71.7- Soft mushy coal. 71.7-73 -No core. 73-75 -Soft mushy coal. 75-89 -Soft mushy coal in part finely granular. 89.5-92.5 -Soft coal mush, some mudstone, becoming fissile towards base. 92.5-93 -No core. 93-94 -Durain, hard fissile, crushed 94-97 -Clay soft. 97-101.5-Intbd, hard durain & mudstone. 101.5-103 -No core. 103-106 -Intbd, hard durain & mudstone. 106-108 -Clarain, soft, with durain. 108-108.8 -Clarain, fissile. 108.8-111 -Soft mushy clarain. 111-112 -Intbd clar & durain. 112-113 -No core 113-118 -Soft clar durain @ 112.5 . 118-122 -Clar & vitrain, soft. 122-123 -No core. 123-128 -Soft fissile dur & vitrain. 128-133 -Soft mushy clar tr mudstone.		Soft earthy coal thruout	

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FED TO CORE AXIS	CORE EVAL.	[illegible]
		133-138 -Soft mushy clar tr mudstone.			
		138-153 -Soft clayey homog. coal.			
		153-163 -Clarain, soft sl fissile homo.			
		163-164.5 -Mud coaly some slickensiding.			
		164.5-168 -Soft muddy coal, clarain pred.			
		168-169.5 -Claro-vitrain, hard, bright fissile.			
		169.5-170.5 -Clarain			
		170.5-171 -Clarain & durain.			
		171-172 -Soft coal clarain sl arg.			
		172-173 -No core.			
		173-177.5 -Soft coal clarain.			
		177.5-178 -Fusain & clarain, arg.			
		178-183 -Clarain soft arg from 179-179.9; muddy.			
		183-188 -Soft arg clarain.			
		188-191 -Hard fissile, bright clarain tr durain, marc fissile. Contact with sandstone abrupt @ 30°.	30°		

Recoveries

10-13	1.3/3
13-18	2.5/5
18-22	3.4/4
22-27.5	4.5/5.5
27.5-30	2.2/2.5
30-32.5	.6/2.5
32.5-37.5	2.8/5
37.5-43	3.2/5.5
43-48	3.9/5
48-49	1/1
49-53	.9/4
53-58	1.7/5
58-63	3.1/5
63-68	1.5/5
68-73	3.7/5
73-75	2/2
75-78	3/3
78-83	4/5
83-88	4.5/5
88-89.5	1/1.5
89.5-93	3/3.5
93-103	7.5/10
103-106	2.2/3
106-108	1.3/2
108-113	4/5
113-118	5/5
118-123	4/5
123-128	4.7/5
128-133	4.7/5
133-138	4.2/5
138-143	4.8/5
143-148	4/5
148-153	5/5
153-158	2.5/5
158-163	4.5/5
163-168	4.7/5
168-169.5	1.5/1.5
169.5-173	2.5/3.5
173-178	5/5
178-183	3.6/5
183-188	4.4/5
188-191	3/3

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FED TO CORE AXIS	CORE EVAL.	EST. REC.
191-208	17	Sandstone (Basal) Typical "basal". Core is rubbly commonly @ 45°. 198-208 -Highly frac, open. Abund slickensiding. 75% of fracture surfaces are talc coated. Slickensides are normal to core and indicate horizontal slipping along inclined fractures. EOH @ 208		J 45 Core is rubbly & badly broken by jointing	

Drill Hole Sample Intervals and Sample Weights in Grams

Hole No: 75D-28

Interval	Weight (Grams)	Interval	Weight (Grams)
10-13	1520	115-117	2355
13-14.5	1645	117-118	1318
14.5-18	1670	118-120	1955
18-20	1724	120=122	2220
20-22	1820	123-125	2208
22-24	2360	125-127	2390
24-26	2094	127-129	1870
26-27.5	1210	129-131	2397
27.5 28.5	1306	131-133	2070
28.5-29.7	1323	133-135	2840
30-32.5	1618	135-137.2	2530
32.5-33.4	2012	138-140	2795
33.9-35.3	1750	140-142	2400
37.5-39.1	2549	142-143	733
39.1-40.7	2895	143-145	2340
43-44.5	3475	145-147	2095
44.5-46.3	2860	148-150	2156
48-49	2085	150-152	2333
49-53	1490	152-153	1375
53-58	1805	153-155.5	2790
58-63	4103	158-159.5	1895
63-68	2495	159.5-161	1565
68-70.5	1773	161-162.5	2115
70.5-73	2015	163-164.5	2103
73-75	2377	164.5-166	2173
75-76.5	2152	166-167.	1698
76.5-78	1500	168-169.5	1730
78-80	2250		
80-82	2635	169.5-170.5	787
83-85.5	2927	170.5-172	1470
85.8-88	2238	173-174.5	1692
88-90	2338	174.5-176	1390
90=91.5	2205	176-178	2150
91.5-93	1680	178-180	2780
93-95	2260	180-181.6	1592
95-97	3370	185-186.4	1714
97-99	2160	186.4-187.4	1305
99-101.5	2740	188 -189.5	1460
103-106	2935	189.5-191	1365
106-108	1600		
108-110	2530		
110-112	2580		
113-115	2395		

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

Hole No.: 75_D30

Property: Sage Creek Coal

Location: South Hill
17,848,531 N
582,513 E

Elevation: 4987' asl.

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: 4

Date Commenced Drilling: December 9, 1975

Date Finished Drilling: December 10, 1975

Date Hole Completed: December 10, 1975

Logged By: J. Mitchell

Date: December 10, 1975

Probed By: Roke Oil Enterprises

Date: December 10, 1975

Total Depth Drillers: 62'

Depth of Overburden: 10'

Total Depth Logger: 59'

Water Level: 27'

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Tim

Surface Casing: 20'
Total Drilling Time: 21 hr.
Total Down Time: 0
Total Footage Chargeable: 62'
Total Hourly Contact: 3 hr.

Standby Time for Logging: 4 hr.
Other Standby Time: 3 hr.
Total Chargeable Standby Time: 7 hr.
Actual Moving Time Between Holes: 7
Chargeable Moving Time " " : 7

Remarks:- Oxidation test hole.

Quantity of Mud Used:
Quik Gel 16
Quik Trol 76
CC 16 1

Probe Report:

58 - 0 ..... Gamma Ray Neutron ..... Logged thru HQ rods
54 - 0 ..... Density ..... Logged thru HQ rods
46 - 0 ..... Density ..... Logged open hole
46 - 0 ..... Caliper ..... Logged open hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 5U	Eroded		Eroded	
Seam 5L	10 - 47	37'	24.5 - 25.5	1
			27.5 - 28.0	0.5
			29.0 - 42.75	13.75

INTERVAL	UNIT THICKNESS	DESCRIPTION	< OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
0 - 10	10	OVERBURDEN - wthrd. rk. & soil.			
		CRETACEOUS KOOTENAY FORMATION			
10 - 12	2	MUDSTONE - m. brn. gy. - wthrd. & Fe. stn.			50%
12 - 47	35	COAL SEAM 5 12 - 26 soft mushy oxidized argillaceous coal and mudstone. 26 - 31 rubbly mudstone with soft argillaceous oxidized coal. 31 - 47 soft argillaceous oxidized coal mush. Recoveries 12 - 17 2.2/5 17 - 21 4/4 21 - 26 3.3/5 26 - 31 2/5 31 - 33 0.8/2 33 - 36 1.7/3 36 - 39 3/3 39 - 43 1.2/4 43 - 47 1/4		poor	55%
47 - 62	15	SANDSTONE (Basal) - fine to med. grained. - salt & pepper - typical basal ss. - core is rubble, ironstained.		very poor	30%
T.D.	62				

Drill Hole Sample Intervals and Sample Weights in Grams

Hole No: 75D-30

Interval	Weight (Grams)
12-17	1985
17-19	3213
19-21	3670
21-23	3502
26-31	3542
32-33	1400
33-36	652
36-37.5	2222
37.5-39	1535
39-43	1178
43-45	942

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

Hole No.: 75_D30A

Property: Sage Creek Coal

Location: South Hill
17,848,531 N
582,513 E

Elevation: 4987' asl.

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: 4

Date Commenced Drilling: December 10, 1975

Date Finished Drilling: December 11, 1975

Date Hole Completed: December 11, 1975

Logged By: James Mitchell

Date: December 12, 1975

Probed By: Roke Oil Enterprises

Date: December 11, 1975

Total Depth Drillers: 74'

Depth of Overburden: 10'

Total Depth Logger: 72'

Water Level: Full (Gel)

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time

Surface Casing: 10'
Total Drilling Time: 24 hrs
Total Down Time: 0
Total Footage Chargeable: 74'
Total Hourly Contact: 7 hr.

Standby Time for Logging: 4 hrs.
Other Standby Time: 0
Total Chargeable Standby Time: 4 hr
Actual Moving Time Between Holes: Demob
Chargeable Moving Time " " :
Quantity of Mud Used:
Quik Gel 18 bags
Quik trol 18 bags
CC 16 1 bag

Remarks:- Oxidation test hole
Drilled at -60° on
Azimuth of 90°

Probe Report:

71-0 ..... Gamma Ray Neutron ..... Logged through HQ rods
62-0 ..... Density ..... Logged through HQ rods
60-0 ..... Density ..... Logged Open Hole
60-0 ..... Caliper ..... Logged Open Hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 5U	10 - 28	18'	8 - 23	15'
Seam 5L	34 - 58.7	24.7	30 - 42.25 48 -57	12.25' 9'] 24.7

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	% REC.
0 - 10	10'	OVERBURDEN - wthrd. rock & soil.			
		CRETACEOUS - KOOTENAY FORMATION			
10 - 58.7	48.7	COAL SEAM 5 10 - 28 soft argillaceous, oxidized coal and sh. stringers 28 - 29 mudstone and soft coal 29 - 33 soft argillaceous coal mudstone fragments basally 33-36.4- mudstone and soft arg.coal 36.4-38 -No core 38-40-soft argillaceous coal 40-43-mudstone and arg. coal 43-46-soft argillaceous coal 46-58.7 -soft dull argillaceous coal with mudstone stringers. Recoveries 10 - 14 1.5/4 14 - 16 1.1/2 16 - 18 1.2/2 18 - 21 2.2/3 21 - 24 2.4/3 24 - 28 2.3/4 28 - 29 0.7/1 29 - 33 2.4/4 33 - 38 3.4/5 38 - 40 1.2/2 40 - 43 1.7/3 43 - 46 1.0/3 46 - 50 1.1/4 50 - 53 1.1/3 53 - 57 2.3/4 57 - 62 2.0/5			56%
58.7-74TD	15.3	SANDSTONE (Basal) - typical basal - fine to med. grained - salt & pepper - rubble - core in small pieces.		very poor	30%

Drill Hole Sample Intervals and Sample Weights in Grams

Hole No: 75D-30A

Interval	Weight (Grams)
10-14	1290
14-16	1726
16-18	1825
18-21	3015
21-24	3532
24-28	3550
28-29	1183
29-33	3925
33-35	2775
35-36.4	1782
38-40	1665
40-43	2510
43-46	1450
46-50	1480
50-53	1332
53-57	3455
57-58.7	2251

DIAMOND DRILL RECORD

Hole No.: 75_D32

Property: Sage Creek Coal

Location: South Hill
17,845,597 N
581,982 E

Elevation: 5429' asl

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: 1

Date Commenced Drilling: December 10, 1975

Date Finished Drilling: December 13, 1975

Date Hole Completed: December 14, 1975

Logged By: James Mitchell

Date: December 14, 1975

Probed By: Roke Oil Enterprises

Date: December 13, 14, 1975

Total Depth Drillers: 388'

Depth of Overburden: 131'

Total Depth Logger: 388'

Water Level: 28'

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time

Surface Casing: 136'
Total Drilling Time: 84 hrs
Total Down Time: 0
Total Footage Chargeable: 388'
Total Hourly Contact: 35 hrs

Standby Time for Logging: 5 hr.
Other Standby Time: 4 hr.
Total Chargeable Standby Time: 9 hr.
Actual Moving Time Between Holes: Demob
Chargeable Moving Time " " :
Quantity of Mud Used:
Quik Gel 64 bags
Quik Trol 64 bags
CC 16 1 bag

Remarks:-

Probe Report:

387 - 0 ..... Gamma Ray Neutron ..... Logged thru HQ rods
380 - 0 ..... Density ..... Logged thru HQ rods
385 - 0 ..... Density ..... Logged open hole
385 - 0 ..... Caliper ..... Logged open Hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
	198.3 - 203.5	5.2'	201.5 - 203	1.5
	251.2 - 253.5	2.3'	254.5 - 255.25	0.75
	254.2 - 256.4	2.2'	270 - 271	1
	269.3 - 273	3.7'		
	322.9 - 325.3	2.6'		
	328.6 - 330.2	1.6'		
Seam 5U	340.4 - 375.8	35.4'	324 - 324.75	0.75
			340.75- 349	8.25
Seam 5L			354 - 357.75	0.75]
			360.5 - 362	1.5] 20
			365.25-374	8.75]

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
0 - 131	131	OVERBURDEN - till & wthrd rock - possible breccia zone			
		CRETACEOUS-KOOTENAY FORMATION			
131-133	2	SANDSTONE - rubble ss - wthrd appearance			
133-198.3	65.3	MUDSTONE - very highly weathered and fractured - dk gy to black - carbonaceous - very soft & brecciated throughout - grades to siltstone in part and has areas of siltstone interbedding 180.0-183.0 coaly arg. mush 190.0-198.3 carbonaceous mush.		good	90-95%
198.3-203.5	5.2	COAL SEAM 4L (2) 198.3-200.0 soft shiny coal 200.0-200.4 soft clayey coal 200.4-201.0 soft brittle, bright, tr marcasite 201.0-201.8 dull soft 201.8-203.0 bright brittle coal (clarovitrain) 203.0-203.5 soft clayey coal Full Recovery			95%
203.5-213	9.5	SHALE - very highly wthrd & fractured - dk gy to black - carbonaceous - very soft & brecciated throughout.			90%
213.0-244.0	31	SANDSTONE - silty mudstone grading by 215 to fine grained salt & pepper ss. - finely laminated with carbonaceous lenticles - cove is moderately sound with rubbly areas - fractures pred along bedding, laminae tend to be irregular - sub vertical frac 1 per 5'	70°		
244.0-251.2	7.2	MUDSTONE - gradational contact - severely broken & brecciated - open 45° fractures with slickensiding developed on ss. Interbeds from 244-246.5		poor	80%

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	CAT. REC.
244-251.2	7.2	MUDSTONE (cont'd) 248.0-249.5 broken, rubble 249.5-251.2 competent appearance but highly fractured.			
251.2-253.5	2.3	COAL - argillaceous durain & clarain		good	>95%
253.5-254.2	0.7	MUDSTONE - dk gy to black - carbonaceous - severely fractured		good	
254.2-256.4	2.2	COAL - durain & vitrain		good	>95%
256.4-269.3	12.9	MUDSTONE - dk gy to black - carbonaceous - coal str @ 260.8-261, 261.8-263, 265.2-265.4, 267.8-268, 268.3-268.5.		good	
269.3-273	3.7	COAL - durain & clarain with thin vit. interbeds		good	>95%
273 - 290	17	MUDSTONE - dk gy to blk - carbonaceous - coal str at 273.7-273.8, 276.9-277.2, 277.9-280, 287.9-288.	75°-80°		
290 - 303	13	SANDSTONE - gradational contact from siltstone @ 290' to fine grained salt & pepper ss by 291' - moderately sound core - vertical fracturing predominate @ fracturing along bedding @ 75°.	75°	moderately sound	
303 - 322.9	19.9	MUDSTONE - dk gy - silty, micaceous - finely laminated with abundant carb. plant remains on bedding surfaces - coal bands or stringers @ 307-308, 309-309.9, 314 (bright vitrain) - highly fractured @ 30° & 45°	75°		
322.9-325.3	2.6	COAL - durain & clarain		good	>95%

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	LOST REC.
325.3-328.6'	3.3	MUDSTONE - black - carbonaceous - coaly		good	
328.6-330.2	1.6	COAL 328.6-328.9 clarovitrain 328.9-329.2 durain & carbarg. 329.2-330.2 soft mushy clarain			
330.2-340.4	10.2	MUDSTONE - interlaminated with siltstone - competent but split by sub vertical fractures.			
340.4-375.8	35.4	COAL SEAM 5		good	97%
		340.4-341.6 durain, thin clarain bands 341.6-342.4 clarain 342.4-343.0 no core 343.0-344.3 clarain and durain 344.3-346.9 thin clarain and durain interbedded 346.9-348.0 durain with thin clarain interbeds 348.0-348.1 durain 348.1-349.1 clarovitrain 349.1-349.5 mudstone 349.5-349.7 clarovitrain 349.7-349.9 mudstone 349.9-350.5 no core 350.5-351.7 mudstone 351.7-352.3 -Bright coal probably contaminated. 352.3-353.4 -Coaly mudstone. 353.4-353.7 -Carbargillite. 353.7-355.0 -Bright crumbled coal. 355.0-356.0 -Carbargillite with thin clarain stringers. 356.0-357.3 -Mudstone 357.3-358.4 -Soft argillaceous coal. 358.4-359.0 -Durain 359.0-361.0 -Carbargillite & durain. 361.0-363.0 -Thinly interbedded clarain and durain. 363.0-375.8 -Soft fissile clarain minor durain stringers. Recoveries 338.0-343.0 4.4/5 343.0-348.0 5/5 348.0-350.5 1.9/2.5 350.5-355.0 4.5/4.5 355.0-359.0 4/4 359.0-363.0 4/4 363.0-368.0 5/5 368.0-373.0 5/5 373.0-378.0 5/5			
375.8-388	12.2	SANDSTONE (Basal) - typical basal sandstone - very rubbly core - low angle fracturing predominate.			
T.D.	388'				

Drill Hole Sample Intervals and
Sample Weights in Grams

Hole No: 75D-32

Interval	Weight (Grams)
198.3-200	2124
200-202	2004
202-203.5	1194
251.2-253.5	2100
253.5-254.2	1762
254.2-256.4	2297
269.3-271	2232
271-273	2570
322.9-324.2	1507
324-325.3	1897
325.3-328.6	5908
328.6-330.2	2342
340-342	2244
343-345	2200
345-347	2540
347-348	1596
348-349.7	2185
349.7-351.7	2585
351.7-352.3	837
352.3-353.7	2040
353.7-355	1356
355-356.3	1460
356.3-357.3	2780
357.3-359	1443
359-361	3670
361-363	2025
363-365	2970
365-367	2870
368-370	2455
370-372	2688
372-373	1120
373-374	1300
374-375	1760

DIAMOND DRILL RECORD

Hole No.: 75U-01

Property: Sage Creek Coal

Location: South Hill
17,848,115 N
583,474 E

Elevation: 4726' asl.

Contractor: Connors Drilling

Hole Size: NQ

Rig No.: Underground Rig No. BBU-2

Date Commenced Drilling: October 12, 1975

Date Finished Drilling: October 24, 1975

Date Hole Completed: October 24, 1975

Logged By: J. Mitchell

Date: October 24, 1975

Probed By: Not probed

Date:

Total Depth Drillers: 140 feet

Depth of Overburden:

Total Depth Logger: 140 feet

Water Level:

Bit Record

No.	Size	Make and Serial No.	R.P.M.	[illegible]	[illegible]	Footage	Hrs.	Time

Surface Casing:
Total Drilling Time: 119 hours
Total Down Time:
Total Footage Chargeable: 140 feet
Total Hourly Contact:

Standby Time for Logging:
Other Standby Time:
Total Chargeable Standby Time:
Actual Moving Time Between Holes: 48 hours
Chargeable Moving Time Between Holes: 40 hrs
Quantity of Mud Used:
CC 16 1 bag
Quik Gel 4 bags
Quik Trol 4 bags

Remarks:-

Probe Report:

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	

Interval	Unit Thickness	Description	Angle to Core Axis	Core Condition	Recovery
		CRETACEOUS - KOOTENAY FORMATION			
0 - 28	28'	Carbonaceous Mudstone		Poor	50%
		0-6 -Broken, coaly mudstone			
		6-10 -Coal and carbonaceous mudstone		Rubble	
		10-13 -Coal mush and mudstone		Rubble	
		13-18 -Coal and carbonaceous mudstone		Mud,rubble	
		18-20 -Coal, soft dull argillaceous with mudstone rubble.		Rubble	
		20-23 -Mudstone and mudstone mush slickensided			
		23-26 -Brownish mudstone, slickensided		Mush	
		26-28 -Coal mush			
28-32.5	4.5'	Sandstone			
		Fine grained, salt & pepper	15°	Rubble	50%
32.5-37	4.5'	Mudstone			
		Mudstone rubble and mush			22%
37-43	6'	Breccia Zone			
		Mudstone, angular fragments in silty clay matrix			66%
43-92	49'	Siltstone			
		Interlaminated siltstone to v fine grained sandstone & mudstone			90%
		48-58 -Rubble	25°-30°		
		58-75 -Fracturing 30° & 45°		Rubble	
		65-66	35°-40°		
		72-75	45°		
		75-80 -Frac @ 30°-45°, parting @ 90°	30°	Good	
		80-85 -Frac @ 30° & 45°	30°	Good	
		81.7-82.8 -Broken, brecciated			
		83.2-84 -Shattered			
		85-90 -Frac 30°, 45° & 70° (rare)	30°	Good	
		88-89 -Shattered			
		90-91 -Ironstained			
92-140	48'	Sandstone			
		Fine to med grained, salt & pepper poorly sorted, bedded, poorly defined @ 30°. 20% fracture surfaces are ironstained, marc on frac surfaces. Tends to coarsen basally, med grained pred by 120 feet.	30°	Good	95%+
		133-140 -Thin carbonaceous partings (rare)			
		Jointing @ 70° and 50° to C/A 2 sets	40°-50° 60°-70°		
TD	140'				

ROTARY DRILL RECORD

Hole No.: 75R-15

Property: Sage Creek Coal

Location: South Hill
17,843,087 N
578,028 E

Elevation: 6063' asl

Contractor: Becker Drills

Hole Size: 6"

Rig No.: 4520

Date Commenced Drilling: October 11, 1975

Date Finished Drilling: October 15, 1975

Date Hole Completed: October 15, 1975

Logged By: Not logged

Date:

Probed By: Not probed

Date:

Total Depth Drillers: 103 feet

Depth of Overburden: 0

Total Depth Logger:

Water Level:

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time

Surface Casing: 16 feet
Total Drilling Time:
Total Down Time:
Total Footage Chargeable: 0
Total Hourly Contact: 42.5

Standby Time for Logging: 0
Other Standby Time: 54
Total Chargeable Standby Time: 54
Actual Moving Time Between Holes: 16
Chargeable Moving Time Between Holes: 16
Quantity of Mud Used:

Quik Gel	97
Quik Seal	37
Caustic	1
Cement	10
CaCl	1

Remarks:-

Probe Report:

Not probed.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Possible horizon picked from geolograph	84 - 93	9'		

ROTARY DRILL RECORD

Hole No.: 75R-15A

Property: Sage Creek Coal

Location: South Hill
17,843,091 N
578,046 E

Elevation: 6063' asl.

Contractor: Aqua Drilling

Hole Size: 6"

Rig No.:

Date Commenced Drilling: December 13, 1975

Date Finished Drilling: December 14, 1975

Date Hole Completed:

Logged By: Warren Boyd

Date: December 14, 1976

Probed By: Roke Oil Enterprises

Date: December 14, 1976

Total Depth Drillers: 298 feet

Depth of Overburden:

Total Depth Logger: 281 feet

Water Level:

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time

Surface Casing:
Total Drilling Time:
Total Down Time:
Total Footage Chargeable:
Total Hourly Contact:

Standby Time for Logging:
Other Standby Time:
Total Chargeable Standby Time:
Actual Moving Time Between Holes:
Chargeable Moving Time Between Holes:
Quantity of Mud Used:

Remarks:-

Faulted into Fernie @ ≈126' - 130'

Probe Report:

Gamma Ray/Neutron --------- 281 feet

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam	0 - 11'	11'	0 - 10'	10'
Coal Horizon	110 - 120			

INTERVAL	UNIT THICKNESS	DESCRIPTION
		Cretaceous - Kootenay Formation
0 - 11	11'	Coal
11 - 20	9'	Shale
		Rusty partings, slickensides, some med grain sandstone
20 - 110	90'	Sandstone
		Med grain, red staining, quartzose very fine grain in basal 15'
110 - 120	10'	Shale and Siltstone
		Coal, hard shiny, very fine grain sandstone
120 - 135	15'	Siltstone
		Interbedded sandstone, trace coal
		Jurassic - Fernie Group
135 - 155	20'	Siltstone and Shale
		In fault contact with overlying sediments, glauconite
155 - 298	43'	Limestone
		Glauconitic shale 160 - 165'
TD	298'	

RIO TINTO CANADIAN EXPLORATION LIMITED

ROTARY DRILL RECORD

Hole No.: 75R-16

Property: Sage Creek Coal

Location: South Hill
17,843,074 N
580,400 E

Elevation: 5669'

Contractor: Becker Drills Ltd.

Hole Size: 4 7/8 - 5 5/8

Rig No.: 45-20

Date Commenced Drilling: October 16, 1975.

Date Finished Drilling: October 20, 1975.

Date Hole Completed: October 21, 1975.

Logged By: James Mitchell

Date: October 21, 1975.

Probed By: Roke Oil Enterprises

Date: October 20, 21, 1975.

Total Depth Drillers: 693'

Depth of Overburden: 3'

Total Depth Logger: 693'

Water Level: 1 '

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time
1	5 5/8	TM 5 5/8		0	197	197'	
2	5 5/8	TM 5 5/8 019590		197	385	1[illegible]8'	
3	5 5/8	TM 5 5/8 019786		385	496	111'	
4	5 5/8	TM 5 5/8 032325		496	624	1[illegible]8'	
5	5 5/8	TM II		624	693	69'	

Surface Casing: 3'
Total Drilling Time: 105
Total Down Time: 0
Total Footage Chargeable: 0
Total Hourly Contact: 80 hours

Standby Time for Logging: 5
Other Standby Time: 20
Total Chargeable Standby Time: 25
Actual Moving Time Between Holes: 13
Chargeable Moving Time " " : 13

Remarks:- Bad ground. Lost circulation throughout hole. Fault @ 300' below Seam 4U displacing the lower part of the Kootenay Formation.

Quantity of Mud Used:
Quik Gel - 130 bags
Cement - 6 bags
Bran - 6 bags

Probe Report:

690-0.....Gamma Ray/Neutron.....Through Double Wall Pipe.
350-0.....Density.....Open Hole.
350-0.....Caliper.....Open Hole.
350-44.....S-Log.....Open Hole.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam #2	68 - 86	18'	66 -74 75.5-77	8' 1.5'
Seam #4U	264 -300	36'	262 -290	28'

INTERVAL	UNIT THICKNESS	DESCRIPTION
0 - 10	10'	Overburden - Till and highly weathered and broken rock.
		Cretaceous Kootenay Formation
10 - 30	20'	Conglomerate and Conglomeratic Sandstone - Highly weathered and friable. - Ang. pbls of chert.
30 - 61	31'	Sandstone - Salt & Pepper. - Quartz & chert. - Coarse grained basally fining upwards to med. gr. - Ironstained basally (50'-61')
61 - 66	5'	Mudstone - Black. - Carbonaceous. - Appears fractured, soft.
66 - 76	10'	COAL - Seam 2 - Claro-vitrain predominate. - Mudstone band @ 74'-75'.
76 - 108	32'	Mudstone & Siltstone - Black. - Carbonaceous. - Micaceous. - Mudstone pred. 76'-90'. - Siltstone pred. 90'-108'. - Interbedded throughout unit.
108 - 148	40'	Sandstone - Dk grey to black. - Chert predominate. - Med. to very coarse grained. - Coarser basally. - Poor sorting. - High to severe ironstain 110'-130'. - Very porous in this interval.
148 - 177	29'	Siltstone - Grades to f. gr. sandstone basally. - Dk grey to black. - Micro-micaceous. - Tr. vitrain banding. - Ironstained 170'-177'.
177 - 207	30'	Sandstone - Salt and pepper. - Coarse grained basally fining up to med. gr. - Poorly sorted. - Ironstained (limonitic).
207 - 218	11'	Mudstone & Siltstone - Interbedded. - Black. - Micaceous. - Carbonaceous.
218 - 234	16'	Sandstone - Salt and pepper and black. - Med-coarse grained fining up to fine gr. - Obscured by uphole debris.
234 - 262	28'	Mudstone - Black. - Carbonaceous. - Micaceous. - Coal band 248'-250'. - Probably interbedded with siltstone. - Obscured by uphole debris and lost circulation material.

INTERVAL	UNIT THICKNESS	DESCRIPTION
262 - 290	28'	COAL - Seam 4U - Clarain and fusain predominate.
290 - 300	10'	Mudstone - Black. - Carbonaceous. - Grading to siltst. FAULT
		Jurassic Fernie Group
300 - 556	256'	Siltstone (Passage beds) - Grades to vf gr. SS. - Black. - Micaceous. - Tr. marcasite throughout. - Ironstained in part. - Glauconitic basally.
556 - 693	137'	Limestone - Fernie Group (Grey beds) - Lt grey. - Fine xtalline. - Silty. - Micaceous.
	693'	Total Depth

ROTARY DRILL RECORD

Hole No.: 75R-17A

Property: Sage Creek Coal

Location: South Hill
17,844,649 N
580,341 E

Elevation: 5653' asl.

Contractor: Aqua Drilling

Hole Size: 6"

Rig No.:

Date Commenced Drilling: December 9, 1975

Date Finished Drilling: December 11, 1975

Date Hole Completed: December 11, 1975

Logged By: Warren Boyd

Date: December 12, 1975

Probed By: Roke Oil Enterprises

Date: December 11, 1975

Total Depth Drillers: 380 feet

Depth of Overburden: < 5'

Total Depth Logger: 312 feet

Water Level: 180 feet

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time

Surface Casing: 8" to 100 '
Total Drilling Time: 6" to depth
Total Down Time:
Total Footage Chargeable:
Total Hourly Contact:

Standby Time for Logging:
Other Standby Time:
Total Chargeable Standby Time:
Actual Moving Time Between Holes:
Chargeable Moving Time Between Holes:
Quantity of Mud Used:

Remarks:-

Faulted into Fernie

Probe Report:

Gamma Ray/Neutron ---------- 312 feet
Density ---------- 310 feet
Caliper ---------- 310 feet

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 2	80 - 100 '	20'	75-83 86-90	8'] 12' 4']

INTERVAL	UNIT THICKNESS	DESCRIPTION
0 - 5	5'	Overburden
		Cretaceous - Kootenay Formation
5 - 25	20'	Sandstone
		M-c grained, sub-ang, p sorting frosted quartz grains, rusty cement
25 - 35	10'	Shale
		No silt.
35 - 40	5'	Coal
40 - 80	40'	Sandstone
		f-m grain, interbedded, poorly sorted coaly & shaly in basal 5'
80 - 100	20'	Coal Seam 2
		40 - 50% sandstone
100 - 145	45'	Shale & Siltstone
		Interbedded f-m grain sandstone coaly in upper 15'
145 - 235	90'	Sandstone (Basal) Interpreted fault removes at top of sst. f -m grain, p sorted, sub-ang, chert frags silty 195-205' shaly 215,220,225 and 230 feet
		JURASSIC - FERNIE GROUP
235 - 255	20'	Shale
		Sandstone interbeds
255 - 270	15'	Sandstone
		Shaly in the top, v dark grains
270 - 305	35'	Shale and Siltstone
		Sandstone pred in top 10 feet fine grain sandstone interbedded thru-out calcite veins, pyr. xls
305 - 380	75'	Sandstone and Shale
TD	380'	

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ROTARY DRILL RECORD

Hole No.: 75R-18

Property: Sage Creek Coal

Location: South Hill

17,844,673 N
578,783 E

Elevation: 5972' asl.

Contractor: Becker Drills Ltd.

Hole Size: 5 5/8 - 4 7/8

Rig No.: 45-20

Date Commenced Drilling: October 22, 1975.

Date Finished Drilling: October 25, 1975.

Date Hole Completed: October 25, 1975.

Logged By: James Mitchell

Date: October 25, 1975.

Probed By: Roke Oil Enterprises

Date: October 25, 1975.

Total Depth Drillers: 371'

Depth of Overburden: < 5'

Total Depth Logger: 356'

Water Level: 4.'

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time

Surface Casing: 15'
Total Drilling Time:
Total Down Time:
Total Footage Chargeable: 0'
Total Hourly Contact:

Standby Time for Logging:
Other Standby Time:
Total Chargeable Standby Time:
Actual Moving Time Between Holes:
Chargeable Moving Time " " :
Quantity of Mud Used:

Remarks:- Lost circulation @ 96'. Switched to air @ 110', lost circ., bit plugging, logged hole @ 154'. No samples 96'-124'. Regained circ. with air @ 124'. Probable fault at 230' displacing lower Tootsemy formation.

Probe Report:

136-0.....Gamma Ray/Neutron.....Logged through double wall.
354-0.....Gamma Ray/Neutron.....Logged through double wall.
154-0.....Density.....Logged Open Hole.
152-0.....Caliper.....Logged Open Hole.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam #2			107 - 112	5'
Seam #4U	184 - 189 192 - 196 199 - 212	5' 4' 13'	194 - 211	17'
Seam #4L	223 - 230	7'	224 - 230	6'

INTERVAL	UNIT THICKNESS	DESCRIPTION
0 - 44	44'	Sandstone - Severely ironstained. - Med. to granular. - Poorly sorted. - Conglomeratic.
44 - 68	24'	Siltstone and Mudstone - No apparent samples.
68 - 102	34'	Sandstone - Salt & pepper. - Med. to coarse grained. - Severely ironstained on frac. surfaces. - Tr. coal.
102 - 107.5	5.5'	Mudstone - No samples.
107.5 - 112	4.5'	COAL - Seam 2 - No samples.
112 - 128	16'	Siltstone and Mudstone - No samples.
128 - 144	16'	Sandstone - No samples.
144 - 174	30'	Siltstone to Sandstone - No samples.
174 - 181	7'	Mudstone - No samples.
181 - 194	13'	Siltstone - No samples.
194 - 211	17'	COAL - Seam 4U - Clarain predominate.
211 - 224	13'	Mudstone - Black. - Carbonaceous. - Tr. coal.
223 - 230	7'	COAL - Seam 4L - High ash. - Durain, fusain pred. FAULT
		Jurassic Fernie Group
230 - 233	3'	Siltstone (Passage Beds) - Black. - Micaceous. - Abundant glauconite.
233 - 371	138'	Limestone - Fernie Group (Grey Beds) - Fine xtalline, lt grey. - Silty. - Micaceous. - Tr. vein calcite. - Mottled dk grey to lt grey 350'-360'
	371'	Total Depth

ROTARY DRILL RECORD

Hole No.: 75R-17

Property: Sage Creek Coal

Location: South Hill
17,884,684 N
580,390 E

Elevation: 5650' asl.

Contractor: Becker Drills

Hole Size: 6"

Rig No.: 4520

Date Commenced Drilling: October 21, 1975

Date Finished Drilling: October 22, 1975

Date Hole Completed: Abandoned

Logged By: Not logged

Date:

Probed By: Not probed

Date:

Total Depth Drillers: 36 feet

Depth of Overburden:

Total Depth Logger:

Water Level:

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time

Surface Casing: 12 feet
Total Drilling Time: 32 hours
Total Down Time: 0
Total Footage Chargeable: 0
Total Hourly Contact: 12 hours

Standby Time for Logging: 0
Other Standby Time: 15
Total Chargeable Standby Time: 15
Actual Moving Time Between Holes: 4
Chargeable Moving Time Between Holes: 4
Quantity of Mud Used:

Quik Gel	20
Quik Seal	4
Barite	5

Remarks:- Moved off hole after encountering severe lost circulation problems.

Probe Report:

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	

K- SAGE CREEK 75(3)D-1

K- SAGE CREEK 75(3)D-1

SAGE CREEK COAL LIMITED

DRILL HOLES - NORTH HILL

OPEN FILE

GEOLOGICAL BRANCH
ASSESSMENT REPORT

00 369 (2)

RIO TINTO CANADIAN EXPLORATION LIMITED

SAND CREEK COAL

1975 EXPLORATION PROGRAM

FINAL SURVEY CO-ORDINATES AND ELEVATIONS

DRILL HOLES - NORTH HILL

Hole No.	Elev.	Northings	Eastings
75R-01	4366	17,851,062	586,803
75R-02	4406	17,852,659	587,560
75R-02A	4406	17,852,675	587,535
75R-02B	4406	17,852,662	587,557
75R-03	4411	17,854,251	587,558
75R-04	4539	17,856,995	586,733
75R-05	4749	17,856,244	586,359
75R-06	4752	17,857,869	585,782
75R-11	4416	17,853,469	587,599
75R-12	4459	17,851,053	585,997
75G-02	4348	17,855,057	588,403
75G-02A	4347	17,855,065	588,422
75G-04	4360	17,857,454	587,587
75G-07	4374	17,850,256	586,000
75G-08	4338	17,856,687	588,418
75G-08A	4338	17,856,669	588,403
75G-09	4366	17,858,150	587,565
75G-09A	4366	17,858,148	587,596
75G-10	4368	17,851,924	588,003
75D-01	4483	17,851,852	586,797
75D-02	5244	17,853,830	584,790
75D-03	4562	17,852,657	586,158
75D-03A	4563	17,852,622	586,159
75D-04	5088	17,856,213	584,769

not within

Hole No.	Elev.	Northings	Eastings
75D-05	4376	17,856,236	587,611
75D-06	4617	17,854,209	586,718
75D-07	4749	17,856,321	586,353
75D-11	5319	17,855,189	584,081
75D-13	5323	17,855,114	584,199
75D-15	5287	17,855,154	583,392
75D-17	5293	17,854,205	583,953
75D-19	5294	17,854,297	583,469
75D-20	5324	17,855,013	584,492
75D-20A	5324	17,855,013	584,492
75D-23	5217	17,853,434	583,790
75D-26	5194	17,852,864	584,156
75D-29	5112	17,857,288	584,602
75D-31	5050	17,856,737	585,576
75D-33	5072	17,857,095	584,752
75D-34	-	-	-
75D-35	5047	17,856,961	584,930
75D-35A	5047	17,856,961	584,930

RIO TINTO CANADIAN EXPLORATION LIMITED

ROTARY DRILL RECORD

Hole No.: 75R-01

Property: Sage Creek Coal

Location: North Hill
17,851,062N
586,803E

Elevation: 4,366' est.

Contractor: Becker Drills Ltd.

Hole Size: 5 5/8 - 5 1/8

Rig No.: 45-20

Date Commenced Drilling: July 9, 1975

Date Finished Drilling: July 17, 1975

Date Hole Completed: July 17, 1975

Logged By: James Mitchell

Date: July 17, 1975

Probed By: Roke Oil Enterprises Ltd.

Date: July 17, 1975

Total Depth Drillers: 1166

Depth of Overburden: 31'

Total Depth Logger: 1166

Water Level: Flowing

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Ti
1	5 5/8	XM#1 C70795'	40	23	196	173	14 Hours
2	5 5/8	XM#IT C74122	40	196	360	164	19.5 Hours
3	5 5/8	XM#1 770941	40	360	478	118	1[illegible].5 Hours
4	5 5/8	HUGHES #IT PW213	40	478	579	101	23.5 Hours
5	5 5/8	XM#IT C74125	40	579	668	89	1[illegible].5 Hours
6	5 5/8	XM#1 C70940	40	668	770	102	22 Hours
7	5 1/8	XM..	40	770	1000	230	16 Hours
8	5 1/8	XM 13226	40	1000	1166	166	16 Hours

Surface Casing: 55'
Total Drilling Time: 175 Hrs.
Total Down Time: -
Total Footage Chargeable: 977
Total Hourly Contact: 39 Hours

Standby Time for Logging: 4
Other Standby Time: 6
Total Chargeable Standby Time: 10
Actual Moving Time Between Holes: 5 H
Chargeable Moving Time " " : "

Remarks:- Hole making water @ completion of 20 gals./min. Dropped off to about 1 gal./min. Attempted to seal with Pizanti Plug, however, water pressure proved too great.

Quantity of Mud Used:
Barite - 136 bags
Bentonite - 256 bags
Caustic - 1½ bags @ 50 lb.
Bran - 2 bags

Probe Report: 1166-0 ------ Gamma Ray/Neutron ---- Thru double wall pipe.
232-0 ------ Caliper ---------- Open hole.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam #2	539 - 564	25'	538 - 549	11'
Seam 4U	782 - 836	54'	784 - 798	14'
			801.5-822.5	21'
4L			801.5-822.5	5.5'
Seam 5U	1076 - 1136	60'	1072 - 1076	4'
			1081 - 1102.5	21.5
5L			1110 - 1129	19'

INTERVAL	UNIT THICKNESS	DESCRIPTION
0-31	31'	Overburden Fill and Glacial Till and outwash material.
		Tertiary - Kishenehn Fm.
31-200	169'	Clay - Lt. blue grey - plasticine texture - marly in part - lithologically homogeneous over interv
200-310	110'	Gravels & Sand Indurated with Clay - small pebbles indurated with varicolou clay - sandstone unit @ 290-310 qtz ss poorly cemented cream-coloured prob interbedded with clay and gravel.
		Kootenay Fm.
310-340	30'	Shale & Argillaceous Siltstone - blk shale - tr. micro muscovite - tr. marcasite
340-360	20'	Conglomerate/Sandstone - chert, pebble conglomerate - m. subrounded pbls. - interbedded with sandstone - "salt and pepper" appearance - argillaceous matrix - high porosity - tr hematite - tr marcasite
360-380	20'	Mudstone & Shales - dk. gy. - tr muscovite
380-410	30'	Sandstone - fine - medium grained - fining upwards -iron staining at top; fresh at base - poorly cemented - clr qtz & chert - high porosity
410-430	20'	Sandstone - as above - tr. coal
430-440	10'	Sandstone - med and coarse grained - ironstained - high porosity - poorly cemented
440-470	30'	Shale and Siltstone - tr micro-muscovite - fissile and blocky - tr marcasite
470-530	60'	Sandstone - Blk chert predominate with clr qtz - med-coarse grained - angular - sub-rounded - moderate sorting - well cemented - low porosity
530-539	9'	Shale - dk. gy. to blk. - tr. micro-muscovite - bituminous
539-564	25'	Coal - Seam 2 - high in shale content
564-580	16'	Shale - dk grey to black - micaceous - fissile

INTERVAL	UNIT THICKNESS	DESCRIPTION
580-610	30'	Sandstone - med grey - fine - coarse grained - fines upward over interval - moderately sorted - well cemented - "salt and pepper" appearance
610-664	54'	Shale - dk grey to blk - tr micaceous - poorly fissile
664-720	56'	Sandstone - fine to med grained - well cemented - fines upward - porosity, matrix, decrease upward
720-782	62'	Shale - dk grey to black - micaceous - bituminous at base
782-836	54'	Coal - Seam 4 - estimated 25% shale over interval
836-1076	260'	Shale and Siltstone - micaceous - fissile and blocky - interbedded through interval
1076-1136	60'	Coal - Seam 5 - 62% shale over interval
1136-1166	30'	Sandstone - basal - "salt and pepper appearance - clear qtz and chert - fine grained - well cemented
TD.	1166'	

ROTARY DRILL RECORD

Hole No.: 75R-02A

Property: Sage Creek Coal

Location: North Hill
17,852,675N
587,535E

Elevation: 4406'

Contractor: Becker Drills Ltd.

Hole Size: 5 5/8 - 4 7/8

Rig No.: 45-20

Date Commenced Drilling: July 17, 1975

Date Finished Drilling: July 26, 1975

Date Hole Completed: ———

Logged By: James Mitchell
Jim Baker

Date: July 26, 1975

Probed By: ———

Date: ———

Total Depth Drillers: 708

Depth of Overburden: 60

Total Depth Logger: ———

Water Level: Flowing

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Ti
#2	5 5/8	TM C62222	40	0	152	152	
#2	5 5/8	TM C62215	40	152	241	89	
#1	5 1/8	TM D4359	40	241	304	63	
#1	5 1/8	TM D4361	40	304	506	202	
#1	5 1/8	TM D4364	40	506	585	79	
#1	5 1/8	TM #44257	40	585	708	123	
#1	4 7/8	TM 54336	40	708	———	———	

Surface Casing: 11'

Total Drilling Time: 136 hrs.

Total Down Time: ———

Total Footage Chargeable: 339'

Total Hourly Contact: 19.5 hrs.

Standby Time for Logging: ———

Other Standby Time: ———

Total Chargeable Standby Time: ———

Actual Moving Time Between Holes:

Chargeable Moving Time " " :

Quantity of Mud Used:
Mud - 29 bags
Bran - 8 bags
Caustic - 50%
Cement - 11 bags

Remarks:- Hole 75R02 was abandoned at 329 ft. due to excessive sloughing. Too small casing set in hole. Hole skidded 30 ft. Drilled to 708' & had to abandon hole bec use of excessive sloughing caused by high water flow. First 339' not chargeable.

Probe Report:

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
No coal was encountered.				

INTERVAL	UNIT THICKNESS	DESCRIPTION
0-60	60'	Overburden - Till and glacial debris - angular qtzite & chert frags pred - some limonite stain
60-400	340'	Tertiary - Kishenehn Fm. Clay, mudstones and siltstones - lt-med gray - fossiliferous in places - 200-210 calcarious med gray shale (iron stained) - tr of silt and extraneous mat. - 350-360 Marl - lt gray brown with iron stained clay and red crypto crystalline, fine grained qtz ss.
400-570	170'	Cretaceous-Blairmore Group Conglomerate - iron stained (Hematite) - Small pebble size (small to med) - quartzites and rounded or flaked chert predominate - calcite cemented - 440-450 Shale - med to dark gray - poorly fissile - 450-480 Sandstone - lt brown - vf grained - well cemented qtzite - v well sorted - fractured - iron stain along frac.
570-620	50'	Cretaceous-Kootenay Fm. Sandstone - lt gray - med grained - chert and qtz - silica cmt (well cmtd) - sub ang - ang - tr pyrite - p sorted minor fe st
620-680	60'	Shale - med gray - micro micaceous - coaly in part - tr pyrite - abd sloughed material present due to loss of circulation - @ 650' siltstone encountered
690-708	8'	Sandstone - yellow colour (Limonite stain) - med grained - qtz and chert in silica cmt - med sorting - sub rounded - frags are rounded probable - fracture zone
TD	708	

RIO TINTO CANADIAN EXPLORATION LIMITED

ROTARY DRILL RECORD

Hole No.: 75R-02B

Property: Sage Creek Coal

Location: North Hill
17,852,661N
587,596E

Elevation: 4406'

Contractor: Becker Drills Ltd.

Hole Size: 5 5/8"

Rig No.: 45-20

Date Commenced Drilling: Sept. 6, 1975

Date Finished Drilling: Sept. 15, 1975

Date Hole Completed: Sept. 16, 1975

Logged By: Jim Baker

Date: Sept. 16, 1975

Probed By: Roke Oil Enterprises

Date: Sept. 16, 1975

Total Depth Drillers: 1250'

Depth of Overburden: 72'

Total Depth Logger: 1250'

Water Level: Flowing

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Ti
#2	5 5/8	[illegible]M	40	312	476	164'	
IT	5 5/8	[illegible]M	40	476	551	75'	
[illegible]D4	5 5/8	Williams	40	551	596	45'	
#1	5 5/8	[illegible]M	40	596	606	10'	
#1	5 5/8	[illegible]M	40	606	692	86'	
#1	5 5/8	[illegible]M	40	692	798	106'	
#1	5 5/8	[illegible]M	40	798	851	53'	
#1	5 5/8	[illegible]M	40	851	918	67'	(see over)

Surface Casing: 132'
Total Drilling Time: 240 hrs.
Total Down Time: ——
Total Footage Chargeable: 1000'
Total Hourly Contact: 122.5

Standby Time for Logging: 15.5 hrs.
Other Standby Time: ——
Total Chargeable Standby Time: ——
Actual Moving Time Between Holes: 7 h
Chargeable Moving Time " " : 7 h
Quantity of Mud Used:
Gel - 101 bags
Barite - 20 bags

Remarks:-

(See Over)

Probe Report:

1248 - 0....Gamma Ray/Neutron..... Thru Dual Wall Drill Stem
1247 - 0....Density & Caliper..... Open Hole
1245 -30....E-Log..... Open Hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam #2	900 - 914	14'	904 - 911	7'
Seam #4 Upper	1148 - 1172	24'	1138.5 - 1170	31.5'
Lower	1202 - 1219	17'	1193.5 - 1217.5	24'

Bit Record - Cont'd

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time
TI	5 5/8	WM	40	918	1007	89'	
#1	5 5/8	WM	40	1007	1063	56'	
#1	5 5/8	WM	40	1063	1250	187'	

Remarks

Hole flowing @ 18 gals./min. @ completion.
Surface casing set by H. & W. Aqua Drilling to 127'. Aqua drilled hole to 312'.
Two previous attempts to drill hole failed - See 75R-02A.
Hole completed after drilling Seam #4. Depth of Seam #4 already below proposed pit level.
Did not require further geological or geotechnical information.

INTERVAL	UNIT THICKNESS	DESCRIPTION
0-72	72'	Overburden - glacial till and outwash material
72-460	388'	Tertiary-Kishenehn Fm. - mudstones, clays, siltstones
460-490	30'	Cretaceous-Blairmore Group Sandstone - fn-crs grained - lt. gry-brown - qtzite & chert - silica cmt - poor-good sorting - round to angular - abnt limonite st thruout, minor hematite
490-570	80'	Conglomerate - multi coloured - pred chert & minor qtzite - silica cmt. - minor lim & hem st - 500-10 conglo, SS, sltst, shale - 560-70 sh, FS, conglo, sltst
570-620	50'	Cretaceous-Kootenay Fm. Sandstone - lt gry - m grained - qtz & chert (silica cmt) - coaly in part - m sort - sub ang - grades coarser & more chert downward
620-700	80'	Shale - dark gry - micaceous - bituminous - minor contamination thruout - 670-672 Coal - clarain (25% durain) blk glossy, somewhat argil. - 680-700 grades to silty & v fn gr SS
700-900	200'	Sandstone - m gry - br yellow - m grained - qtzite & chert, silica cmt - m sort, sub ang - sub rd - minor porosity - abdt lim st. - 750-70 sev. lim stain - prob water zo - 780-90 SS grades m-crs, lim st - 790-800 Shale - dk gy, micaceous - silty - 20% contamination - 880-90 15% slatey coal - 890-900 SS, Sh, sltst.
900-914	14'	Coal - Seam #2 - black, argil, dirty durain - mod hd - shaley (910-12) - 912-14 earthy luster - black
914-1000	86'	Shale - Sltst - Sltst m gy, silica cmt, minor sh - 950-70 SS v fn gr, m gy, qtz & chert, silica cmt, w sort, tr pyrite - 970-74 - sltst - 974-76 - silty sh - dk gy- bl, micaceous, tr coal - Shale 976-1000 - dk gy-bl - micaceous

INTERVAL	UNIT THICKNESS	DESCRIPTION
1000-1070	70'	Sandstone - lt gy - fn-m grained, silica cmt - qtz & chert - sub ang - sub rd - p - m sort - calcitic - tr pyrite - 1040-60 silty & shaley
1070-1148	78'	Shale - m - dk gy - micaceous - coaly in part - somewhat silty - silty towards top
1148-1172	24'	Coal - Seam 4 Upper - Mostly clarain
1172-1202	30'	Shale and Siltstone - silty sh to arg. siltst. - dk gy - carb. in part
1202-1219	17'	Coal - Seam 4 Lower - Mostly clarain
1219-1245	26'	Shale - lt gy - micaceous - somewhat silty
T.D.	1245'	

RIO TINTO CANADIAN EXPLORATION LIMITED

K.N

ROTARY DRILL RECORD

Hole No.: 75R-03

Property: Sage Creek Coal

Location: North Hill
17,854.251N
587.558E

Elevation: 4411' asl.

Contractor: Becker Drills Ltd.

Hole Size: 5 5/8 - 5 1/8

Rig No.: 45-18

Date Commenced Drilling: July 19, 1975

Date Finished Drilling: July 31, 1975

Date Hole Completed: July 31, 1975

Logged By: Jim Baker

Date: July 31, 1975

Probed By: Roke Oil Enterprises

Date: July 31, 1975

Total Depth Drillers: 1140

Depth of Overburden: 50'

Total Depth Logger: 1135

Water Level: Flowing

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time
	5 5/8	AW539	40	0	191	191	
	5 5/8	TL807	40	191	373	182	
	5 5/8	C70708	40	373	478	105	
	5 5/8	Bx172	40	478	639	161	
	5 5/8	[illegible]	40	639	842	203	
	5 5/8	DC832	40	842	995	153	
	5 1/8	Bx867	40	995	1030	35	
	5 1/8	D13244	40	1030	1062	32	
	5 1/8	D9145	40	1062	1140	78	

Surface Casing: 18'
Total Drilling Time: 333 hrs.
Total Down Time: 11
Total Footage Chargeable: 1000'
Total Hourly Contact: 93

Standby Time for Logging: 1.5 hrs.
Other Standby Time: 18.5
Total Chargeable Standby Time:
Actual Moving Time Between Holes: 11
Chargeable Moving Time " " 11

Remarks:- Hole experienced serious aquifer pressures throughout. 1½ core lost @ 995' - caused problems with hole thereafter. Unable to drill below Seam 5. Bridges @ 347, 855, 909.

Quantity of Mud Used:
Gel - 195 bags. Barite - 150 b
Cement - 19 bags. Caustic - 4
Jujk Seal - 11 bgs. K-Pool- 10
Calcium Chloride - 1

Probe Report:
Gamma ray neutron - 1135-0. Logged thru double-walled drill pipes.
Caliper - 119'-0

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam #2	556-568	12'	550-568	8'
Seam #4 upper	736-764	28'	731-761	30'
lower	804-816	12'	802-819	17'
Seam #5	1104-1126	22'	1105.5-1113	7.5' }
			1115.5-1133	17.5 }

INTERVAL	UNIT THICKNESS	DESCRIPTION
0 - 50	50'	Overburden - glacial till - boulders & sand/clay
50 - 200	150'	Tertiary - Kishenehn Fm. - gravels, sandstones & mudstones - generally coarse material indurated with clay
200 - 300	100'	Cretaceous - Kootenay Fm. Sandstone - med grained - light gray - qtz and chert - silica cmt - med sorting sub-rounded - minor Fe stain present - overburden from 210-240
300 - 360	60'	Silty Shale - dark gray - micaceous (also micro muscovite) - coaly in top part of section - silty throughout
360 - 510	150'	Sandstone - fn - med grained - qtz and chert - silica cmt - sub-rounded - med sorting - minor porosity - limonite stain - 400-410 shale 430-460 shale
510 - 556	46'	Shale - dark gray - micro micaceous - coaly in part
556 - 568	12'	Coal - Seam #2
		- tr marcasite - shaley in part
568 - 600	32'	Shale - med gray - micaceous - somewhat silty
610 - 660	50'	Sandstone - med gray - med grained - qtz and chert - silica cmt - med sorting - sub angular - tr pyrite and calcite
660 - 736	76'	Shale - med gray - micro micaceous - coaly in part - 710-720 - siltstone
736 - 764	28'	Coal - Seam #4 upper
		- appears to have high shale content
764 - 804	40'	Shale and Siltstone - dk gray - arg. sitst to slty sh - minor tr. coal
804 - 816	12'	Coal - Seam 4 lower
816 - 850	34'	Shale - lt gray - micro micaceous - silty thruout

INTERVAL	UNIT THICKNESS	DESCRIPTION
850 - 960	110'	Sandstone - lt med gray - fn-med grained - chert & qtz - silica cmt - sub-rounded - poor-med sorting - minor coal & shale present - tr pyrite
960 - 1104	144'	Siltstone - lt gray - silica cmt - micaceous - @ 1000' qtz veinlets evidenced @ 1020' ss 1030' - shale : 1070'- 1130'
1104 - 1126	22'	Coal - Seam #5 - black - fairly clean - shiney - lost circulation mat present
1126 - 1140	14'	Sandstone Basal - lt gray white - qtzite - silica cmt - well sorted - med grained - sub rd - rd - tr pyrite - 25% sloughed coal

RIO TINTO CANADIAN EXPLORATION LIMITED

ROTARY DRILL RECORD

Hole No.: 75R-04

Property: Sage Creek Coal

Location: North Hill
17,856,992N
586,735E

Elevation: 4539' asl.

Contractor: Becker Drills Ltd.

Hole Size: 5 5/8

Rig No.: 45-20

Date Commenced Drilling: July 26, 1975

Date Finished Drilling: July 30, 1975

Date Hole Completed: July 31, 1975

Logged By: James Mitchell and Jim Baker

Date: July 31, 1975

Probed By: Roke Oil Enterprises

Date: July 31, 1975

Total Depth Drillers: 696'

Depth of Overburden: Nil

Total Depth Logger: 696'

Water Level: 4'

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Ti
1	5 5/8		40	10	196	186	
2	5 5/8	WM#2 C62214	40	196	296	100	
3	5 5/8	WM#1 C	40	296	438	142	
4	5 5/8	WM#1 C14175	40	438	556	118	
5	5 5/8	WM#1 C70739	40	556	696	140	

Surface Casing: 7'
Total Drilling Time: 121 hours
Total Down Time: 11 hours
Total Footage Chargeable: 696'
Total Hourly Contact: 6 hours

Standby Time for Logging: 4 hours
Other Standby Time: 2.5
Total Chargeable Standby Time: 6.5 hr
Actual Moving Time Between Holes: 7
Chargeable Moving Time " " : 6
Quantity of Mud Used:
46 bags Bentonite

Remarks:- Fault intersected @ 390 ft. Appears to displace approx. 240' of stratigraphy.

Probe Report:

696-0....Gamma Ray-Neutron....Thru Double Wall Drill Pipe
696-28...E-Log.....Open Hole
696-0....Density, Caliper.....Open Hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 2	261-285 290-296	24' 6'	298.5-278	19.5
Seam 4U	344-364	20'	342 -359	17'
Seam 5L	393-416	23'	392-406 408-414	14') 6') -22'

INTERVAL	UNIT THICKNESS	DESCRIPTION
0-17	17'	SANDSTONE - lt-med gry -qtz & chert - silica cmt - m sorted - sub-rounded - limonite staining (minor)
17-78	61'	SHALE and SILTSTONE
17-21	4'	Coal and bituminous shale - tr marcasite
21-33	12'	Siltstone - lt grey - micro micaceous - shales out basally
33-34	1'	Coal - shin y hard - tr marcasite
34-78	44'	Shale - lt gry micaceous - tr coal pyrite - grades to siltstone basally
78-132	54'	SANDSTONE - fine grained - lt gray - chert & qtz - silica cmt - m-good sorting - sub-rounded Grades to basally - med-cs grained - lt-m gray - chert - qtz - silica cmt - poor sorting - angular - brecciated and fractured
132-164	32'	SHALE - dk gray - micaceous - in part silty at top
164-182	18'	SANDSTONE - med grained - "salt and pepper" appearance - qtz and chert - silica cmt - moderate sorting - sub-rounded to sub-angular
182-258	76'	SHALE - dk gry - black - micaceous - coal stringers @ 213-221 - silty in part 225-258
258-278	20'	COAL - Seam 2 - blk vitreous fissile - ash 5-15% - abundant marcasite 265-267
278-342	64'	SHALE - med gry - micaceous - coal stringers @ 281, 290 - silty in part
342-359	17'	COAL - Seam 4 upper - dull black - ash 10-15%

INTERVAL	UNIT THICKNESS	DESCRIPTION
359-390	31'	SHALE - med gray - fissile - micaceous - sl carbonaceous
@ 390'		Possible fault
390-414	24'	COAL - Seam 5 - dull granular - ash 10-20% - shaly hard at base
414-478	64'	SANDSTONE - basal - fine grained - angular - moderately sorted - white silica cmt - chert greater than qtz - dk gr to blk
478-696	218'	JURASSIC - FERNIE GROUP SILTSTONE AND SHALE
478-504	26'	- Interbedded sandstones vf grained - siltstones - shales
504-512	8'	- Sandstone - vf grained - argillaceous
512-610	98'	- Interbedded shales, siltstones - SS stringer @ 570 - micaceous
610-696	86'	- Shale - blk - micaceous - fissile

RIO TINTO CANADIAN EXPLORATION LIMITED

ROTARY DRILL RECORD

Hole No.: 75R-05

Property: Sage Creek Coal

Location: North Hill
17,856,261N
586,359E

Elevation: 4752' asl.

Contractor: Becker Drills Ltd.

Hole Size: 5 5/8

Rig No.: 45-20

Date Commenced Drilling: July 31, 1975

Date Finished Drilling: Aug. 5, 1975

Date Hole Completed: Abandoned hole Aug. 5, 1975

Logged By: James Mitchell

Date: Aug. 5, 1975

Probed By: -

Date:

Total Depth Drillers: 476'

Depth of Overburden: 8'

Total Depth Logger:

Water Level:

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Ti:
1	5 5/8	WM#2 B61664	40	21	76		
2	5 5/8	WM#2 -4362	40	76	236		
3	5 5/8	WM#2 49736	40	236	476		

Surface Casing: 16'

Total Drilling Time: 141 hours

Total Down Time: 13 hours

Total Footage Chargeable: 476'

Total Hourly Contact: 54.5 hours

Standby Time for Logging: -

Other Standby Time: 10.5

Total Chargeable Standby Time: 10.5

Actual Moving Time Between Holes: 7.

Chargeable Moving Time " " : 6.

Quantity of Mud Used: 38 Gel
1 Caustic (
5 Bran
25 Cement

Remarks:-Lost circulation at 30'..Regained in 2 hrs. Cemented casing. Total loss of circulation @ 76'switched to air. Bit kept plugging during trips. @ 476' Circ. lost again due to blue. tried to regain with foam. Partially successful, but hole had to be abandoned. Moved and hole left for coring at suggestion of F. Sedord.

Probe Report: Hole Abandoned, not probed.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
#2	180-186	6'		
#4 U	249-279	30'		
L	324-340	16'		

INTERVAL	UNIT THICKNESS	DESCRIPTION
0 - 8	8'	Overburden - Fill and broken rock
8 - 52	44'	Shale - dk grey - blk, micaceous
24-32	8'	Sandstone - vf grained - very highly oxidized - completely hematite stained - very porous
37-43	6'	coal Stringers in blk shale
52 - 153	101'	Sandstone - siltstone - vf grained ss at top - fines upwards - coarse grained basally - blk chert predominate - argillaceous matrix - salt & pepper appearance - very porous locally
113-118	5'	Shale - med gry - micaceous
153 - 180	17'	Shale - dk grey to blk - micaceous - bitumen banding at base
180 - 186	6'	Coal - Seam #2 - vitreous - granular - tr marcasite
186 - 249	63'	Shale - med grey to black - micaceous - bituminous in part
249 - 279	30'	Coal - Seam 4U - shaley at top for 10' - vitreous - blocky - tr marcasite
279 - 324	45'	Shale - dk grey to blk - bituminous - tr coal
324 - 340	16'	Coal - Seam 4 lower - vitreous - blocky - abundant marcasite at top
340 - 403	63'	Shale - med - dk grey - micaceous
403 - 476	73'	Sandstone - gen vf or f grained at top - coarser basally - med-coarse grained - argillaceous matrix - qtz - chert - moderately sorted - ironstained 455-460
TD	476'	Hole abandoned due to extremely bad rock conditions.

RIO TINTO CANADIAN EXPLORATION LIMITED

ROTARY DRILL RECORD

Hole No.: 75R-06

Property: Sage Creek Coal

Location: North Hill
17,857,869N
585,782E

Elevation: 4752' asl.

Contractor: Becker Drills Ltd.

Hole Size: 5 5/8

Rig No.: 45-18

Date Commenced Drilling: August 1, 1975

Date Finished Drilling: August 3, 1975

Date Hole Completed: August 3, 1975

Logged By: Jim Baker

Date: August 3, 1975

Probed By: Roke Oil Enterprises

Date: August 3, 1975

Total Depth Drillers: 200'

Depth of Overburden: None

Total Depth Logger: 200'

Water Level: Full - mud.

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Ti
1	5 5/8	2C74119	40	0	200	200'	

Surface Casing: 10
Total Drilling Time: 48 hrs.
Total Down Time: ——
Total Footage Chargeable: 200'
Total Hourly Contact: 2 hrs.

Standby Time for Logging: 1.5
Other Standby Time: 3.5
Total Chargeable Standby Time: 3.5
Actual Moving Time Between Holes: 1
Chargeable Moving Time " " 1

Remarks:- Seam 5 located at north end of North Hill - however, is considerably thinner than usual.

Quantity of Mud Used:
10 - Gel
1 - Barite
3 - Cement
1 - Caustic

Probe Report:

195-0.....Gamma Ray/Neutron.....Open Hole.
195-0.....Sidewall Density.....Open Hole.
195-0.....Caliper.....Open Hole.
195-28.....E-Log.....Open Hole.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 5L	116-128	12'	113'-117' 119.5'-129'	4')- 16' 9.5')

INTERVAL	UNIT THICKNESS	DESCRIPTION
0-115	115'	Shale - dark gray - micaceous - tr pyrite - 18'-25' siltstone - 40'-60' siltstone - minor coal
116-128	12'	Coal - Seam #5 - shaley throughout - black, shiney, hard, clean
128-200	72'	Sandstone Basal - fn-med grained - light gray - qtz and chert - silica cmt - p-m sorting - sub angular - tr pyrite & coal

RIO TINTO CANADIAN EXPLORATION LIMITED

ROTARY DRILL RECORD

Hole No.: 75R-11

Property: Sage Creek Coal

Location: North Hill
17,853,469N
587,599E

Elevation: 4416' asl.

Contractor: Becker Drills Ltd.

Hole Size: 6¼ - 5 5/8 - 5 1/8

Rig No.: 45-20

Date Commenced Drilling: Aug. 17, 1975

Date Finished Drilling: Sept. 5, 1975

Date Hole Completed: Sept. 5, 1975

Logged By: James Mitchell

Date: Sept. 5, 1975

Probed By: Roke Oil Enterprises Ltd.

Date: Sept. 5, 1975

Total Depth Drillers: 1392'

Depth of Overburden: 55'

Total Depth Logger: 1392'

Water Level: Flowing

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Ti
#1	6¼	Kenrock	40	203	436	133	
	5 5/8	Walker MacDonald		436	597	161	
				597	690	93	
				690	821	131	
				821	907	86	
				907	1056	149	
				1056	1118	62	
				1118	1163	45	
				1163	1205	42	
				1205	1243	38	
				1243	1304	61	
	5 1/8			1304	1392	88	

Surface Casing: 14'

Total Drilling Time: 372 hours

Total Down Time: 84 hours

Total Footage Chargeable: 1000'

Total Hourly Contact: 63.5 hrs.

Standby Time for Logging: 11.5

Other Standby Time: ———

Total Chargeable Standby Time: 9 hrs.

Actual Moving Time Between Holes: 1 h

Chargeable Moving Time " " 5 h

Remarks:-

Quantity of Mud Used:
Gel - 216 bags
Caustic - 200
Barite - 72 bars

Probe Report:

1389 - 0.....Gamma Ray/Neutron.....Thru Dual Wall Pipe
1050 - 0.....Sidewall Density.....Open Hole
1050 - 0.....Caliper.....Open Hole
1050 - 29....E-Log.....Open Hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam #2	761 - 771	10'	746.5 - 754 760 - 762.5 765 - 766	7.5'] 2.5'] -1 1']
Seam #4 Upper	915 - 949	34'	912 - 942.5	30.5'
Lower	994 - 1010	16'	988 - 1008	20'
Seam #5	1310 - 1330	20'	1309.5 -1325.5 1330.5 -1336	16'] 6'] 26.

INTERVAL	UNIT THICKNESS	DESCRIPTION
0-55	55'	Overburden - gravel imbedded in clay - probably glacial till
55-340	285'	Tertiary-Kishenehn Fm. Clay (Tertiary) - blue, white - large rounded pebbles - iron stained pebbles (yellow-br) colour - 270-80 Sandstone - qtz - med gr. - v porous - argil matrix
340-360	20'	Gravel - well sorted, v crs sand - mod well rounded
360-520	160'	Cretaceous Blairmore Gp. Conglomerate SS - chert pebbles - multi coloured - cream white - Fe st (lim st) thruout - p. cmtd clasts
520-580	60'	Cretaceous Kootenay Fm. Shale - black - micaceous - fissile - bituminous in part
580-761	181'	Sandstone - fn-med grained - chert pred with qtz - argil matrix - silica cmt - 750-61 Siltstone - black - micaceous - with bituminous shale
761-771	10'	Coal - Seam #2 - vitreous - glossy - uphole contamination
771-800	29'	Shale - bituminous - dark gray to black - fissile - micaceous
800-880	80'	Sandstone - lt gray - white speckled - qtz & chert - argil matrix - silica cmt, well sorted
880-915	35'	Shale - black - dk gray - bituminous
915-949	34'	Coal - Seam #4 Upper - vitrain & clro vitrain - glossy

INTERVAL	UNIT THICKNESS	DESCRIPTION
949-994	45'	Shale/SS/Siltst -uphole contamination - dk gy, in part carb, m gy f gr SS frags
994-1010	16'	Coal - Seam #4 Lower - vitrain prev. - some clarain - slickenside noted
1010-1240	230'	Sandstone - 1010-1030 Bituminous Shale - v fn gr - lt gray - w sorted - grades to m-crs gr @ 1010' - Slight argil matrix - minor siltst & marcasite
1240-1310	70'	Shale - micaceous - lt grey - tr marcasite - abd uphole contamination cnt. here (SS siltst, etc.) - minor SS present
1310-1330	20'	Coal - Seam #5 - black vitreous - shiny luster - conchoidal frac. - claro-vit present near bottom
1330-1390	60'	Sandstone Basal - lt gray - fn-med gr. - qtzite - silica cnt. - sub ang. - p-m sorting - minor hlm & lim st - tr plant fossil on SS frag.
T.D.	1392'	

RIO TINTO CANADIAN EXPLORATION LIMITED

ROTARY DRILL RECORD

Hole No.: 75R-12

Property: Sage Creek Coal

Location: North Hill
17,851,053N
585,997E

Elevation: 4459'

Contractor: Becker Drills Ltd.
Connors Drilling Ltd.

Hole Size: 0'-880' - 5 5/8"
880'-947' - 4.

Rig No.: 45-20 (Becker)
Rig #2 (Connors)

Date Commenced Drilling: September 19, 1975. (Becker)
November 2, 1975. (Connors)

Date Finished Drilling: October 1, 1975. (Becker)
November 6, 1975. (Connors)

Date Hole Completed: November 6, 1975.

Logged By: J. Mitchell
E. Wilson

Date: October 1, 1975.
November 4, 1975.

Probed By: Koke Oil Enterprises

Date: October 1, 1975.
November 4, 1975.

Total Depth Drillers: 947'

Depth of Overburden: 30'

Total Depth Logger: 947'

Water Level: Missing

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Ti
1	6 ¾	TH2		0	36	36'	
2	5 5/8	TH2		36	69	33'	
3	5 5/8	TH IT		69	109	40'	
4	6 ¾	TH2		0	94	94'	
5	5 5/8	TH		94	108	14'	
6	5 5/8	TH		108	136	10'	
7	5 5/8	TH		136	176	40'	
		(See Over)					

Surface Casing: 50' of 7", 880' of 4".

Total Drilling Time: Becker 28 hrs.

Standby Time for Logging: 5 hrs.

Total Down Time: ——

Other Standby Time:

Total Footage Chargeable: 880'

Total Chargeable Standby Time:

Total Hourly Contact: 34 hrs. (Becker)

Actual Moving Time Between Holes:

Chargeable Moving Time " " :

Remarks:- @ 918' to 920' water inflow @ 18 gpm in badly broken basal sandstone.
880' of 4" well casing left in hole.
Note: Hole cored from 880' to 947'.
(See Over)

Quantity of Mud Used:
Bulk Gel - 104 bags.
Barite - 5 bags.
Pron - 2 bags.

Probe Report:

946-0.....Gamma Ray/Neutron.....Through Drill Rods.
940-0.....Sidewall Density.....Open Hole.
940-0.....Caliper.....Open Hole.
874-50.....S-Log.....Open Hole.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks		
Seam #2	494 -506	12'	494-495.6 497.5-505.8	1.6'] 8.6']	11.
Seam #4U	768 -810	42'	767.25-810 814-831	42.5' 17'	
#4L	814 -831 843 -845.5 847.5-848.5	17' 2.5' 1.0'	843-845.5 847.2-848.1 865.5-876	2.5'] 0.9'] 10.5'+	5.
Seam #5	862 -880	18'			

Bit Record Continued

No.	Size	Make and Serial No.	On	Off	Footage
8	5 5/8	WM	176	304	128'
9	5 5/8	WM	304	328	24'
10	5 5/8	WM	328	431	103'
11	5 5/8	WM	431	472	41'
12	5 5/8	WM	472	546	74'
13	5 5/8	WM	546	583	37'
14	5 5/8	WM	583	662	79'
15	5 5/8	WM	662	800	138'

Remarks Continued

Hole was deepened to 947' for geotechnical purposes and in an attempt to core fault. Fault came in slightly earlier than anticipated at 859' to 860'. Approximately 250 feet of stratigraphy is displaced.

Two attempts were made to install a pneumatic anchor piezometer in this hole, however, both failed. 270' of 4" well casing was left in the hole which will act as a standpipe piezometer.

Footage 128' 54'

Hole 75R-12 PAGE NUMBER 2

INTERVAL	UNIT THICKNESS	DESCRIPTION
0 - 30	30'	Overburden - Glacial till and fill.
		Cretaceous-Blairmore Group
30 - 65	35'	Conglomerate and Conglomeratic SS - SS blk, chert predominate. - Fine to med. gr. grading to coarse. - Silica cmt. - Conglomerate is ironstained, rounded chert pebbles.
65 - 157	92'	Siltstone to vf gr SS grading to Conglomerate 65-80 - Siltstone and med. gr. SS. - Tr. coal. - Micaceous. - Black. 80-157 - SS and conglomerate. - Ironstained, generally porous, & Partially decemented in upper 40'. - Dk gy to blk chert predominate, massive and tight 136'-157'.
		Cretaceous - Kootenay Formation
157 - 205	48'	Sandstone - Med. grained. - Carbonaceous. - Salt and pepper appearance. - Tr. vitrain. - Ironstained 180'-190'.
205 - 279	74'	Silty Mudstone - Dk grey to black. - With carbonaceous mudstone. - Tr. marcasite and vitrain. - Coal stringers at 221', 226', 244', 247'.
279 - 356	77'	Sandstone - Med. grained. - Carbonaceous. - Salt and pepper appearance. - Intense ironstain and high porosity 279'-300'. - Small interbeds of carb. mudstone with tr. vitrain.
356 - 387	31'	Siltstone to Sandstone - Siltstone grading basally to sandstone. - Dk grey to black. - Chert predominate. - Tr. coal @ 360'. - SS @ 370' is med. grained, highly ironstained, porous.
387 - 423	36'	Mudstone and Siltstone - Coal stringer @ 387'-388'. - Mudstone black carbonaceous. - Siltstone, med. gy.
423 - 485	62'	Sandstone - Coarse grained and conglomeratic. - Ironstained in part. - Fractured throughout. - Carbonaceous. - Tr. vitrain. - Dk grey to black.
485 - 494	9'	Mudstone - Black carbonaceous. - Coal stringer @ 487'. - Silty in part.
494 - 506	12'	COAL - Seam 2 - Clarain and vitrain predominate.

INTERVAL	UNIT THICKNESS	DESCRIPTION
506 - 540	34'	Mudstone - Black carbonaceous. - Silty in part. - Vitrain banding. - Coal stringer @ 516'.
540 - 586	46'	Sandstone - Med. to coarse grained. - Salt and pepper appearance. - Fractured throughout.
586 - 593	7'	Mudstone - Black carbonaceous. - Vitrain banding. - Dirty coal stringer 587'-590'.
593 - 699	106'	Siltstone to Sandstone - Siltstone and vf gr. SS grading basally to coarse grained SS. - Lt grey, carbonaceous. - Salt and pepper appearance.
699 - 763	64'	Siltstone - Med. gy. - Carbonaceous, micro-micaceous. - Tr. marcasite, coal.
763 - 768	5'	Mudstone - Black, carbonaceous. - Vitrain banding. - Trace marcasite.
768 - 810	42'	COAL - Seam 4U - Tr. carb. mudstone. - Clarain predominate.
810 - 814	4'	Mudstone - Black, carbonaceous. - Tr. vitrain.
814 - 831	17'	COAL - Seam 4L - Clarain predominates.
831 - 862	31'	Mudstone - Black, carbonaceous. - Tr. vitrain banding. 843-845.5 - Coal - lower bench of Seam 4L. 847.5-848.5 - Coal - as above.
862 - 880	18'	COAL - Seam 5 - Predominately clarain with abundant shale. 863-866 - Shale with coal partings. NOTE: Probable Fault in mudstone unit between 850' and 860'.

ERVAL	UNIT THICKNESS	DESCRIPTION	< OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		NOTE: 880'-947' - Cored Interval			
880 - 939	59'	Sandstone Basal Unit - Typical basal sandstone. - Med. to dk gy. - Massive S & P. - Scattered fine carb. str. - Badly jointed and broken thruout. - Strong jtg parallel to core. Core is very badly broken by low angle 0-15° jointing, giving splinters, also 60° jtg. Low angle jtg continuous. 918-920 - heavy water inflow, 13 gpm. 932 - Sandstone more intact, but heavily jointed by 20° jts. Recoveries 831-836 - Rec. 4.0/5.0. 896-898 - Rec. .3/2.0. 903-908 - Rec. 1.0/5.0. 908-913 - Rec. 2.0/5.0. 913-917 - Rec. 2/5.0. 919-922 - Rec. 2/3.0.	J 0-15° J 60° J 20°		70%
		Jurassic Fernie Group			
939 - 943	8'	Siltstone & Shale Ribboned - Ribboned brn bl. silty shale & brn siltstone. - Shale lams are bit. & fol. - Core intact, parts along fol.	75°		
943 - 947	4'	Siltstone - Brn bl. - Carb. - Massive. - Broken.			
	947'	Total Depth			

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND
~~RXXXXXX~~ DRILL RECORD

Hole No.: 75G-02A

Property: Sage Creek Coal

Location: North Hill
17,855,065N
588,422E

Elevation: 4347' asl.

Contractor: H. & W. Aqua Drilling
Connors Drilling Ltd.
Rig No.: Connors Rig #2.

Hole Size: 6" to 160'
HQ 160' to T.D.

Date Commenced Drilling: October 6, 1975 (Aqua)
October 18, 1975 (Connors)

Date Finished Drilling: October 6, 1975 (Aqua)
October 29, 1975 (Connors)

Date Hole Completed:

Logged By: J. Mitchell &
E. Wilson

Date: To October 30, 1975.

Probed By: Roke Oil Enterprises

Date: October 29, 1975.

Total Depth Drillers: 640'

Depth of Overburden: 142.5'

Total Depth Logger: 628'

Water Level: Flowing
Approx. 2 gals./min. at completion of hole.

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time

Surface Casing: 6" to 160'

Total Drilling Time:
Total Down Time:
Total Footage Chargeable:
Total Hourly Contact:

Standby Time for Logging:
Other Standby Time:
Total Chargeable Standby Time:
Actual Moving Time Between Holes:
Chargeable Moving Time " " :
Quantity of Mud Used:

Remarks:- Hole cased to 160' by Aqua Drilling. Deepened to Kootenay contact by Connors diamond drill. Coal completed a few feet premature due to lost bit down the hole.

Probe Report:

626-0.....Gamma Ray/Neutron.....Thru HQ Drill Rods.
427-200.....E-Log.....Open Hole.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	

.VAL	UNIT THICKNESS	DESCRIPTION	< OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
0 -142.5	142.5'	Overburden - Glacial till - sands, silts & gravels. - Gravels indurated with clays.			
		Tertiary-Kishenehn Formation			
142.5-160	17.5'	Shale - M. gy, clay texture. Note: Commenced coring @ 160'.			
160 -241	81'	Claystone - gy green, compact, firm, sl. sandy & silty. 168-170 - Fine Gravel, sdy, slty clay matrix. Remainder is silty to sandy, rusty patches. No fracs. 176-197 - Generally sandy, few scat. granules: Breaks normal to core. Section continues as dk gy-gn silty clay. 205-208 - Congl., v. fine pebbles & granules, multi-coloured, few mm in size, sdy clayey matrix. Core is intact. 209 - Claystone - soft, lt gn-gy, soft mushy, sl. silty throughout. Core is intact but friable, disintegrates to lt gy clay. Section v. uniform, gradually becomes siltier & sdy towards base. 222-225 -ss lt gy gn. vfg silt,clayey v soft disintegrates 225=241 -Claystone-lt gy gn v dense scattered sections at sh to lt gy hard brittle clay-conc frac. Core is massive and intact no foliation		Soft but intact. "	100% 100%
241 -265	24'	Sandstone - V. lt gy-gr., lacks conesiveness, soft mushy, clayey & silty. Vague jtng @ 20° - rec intact. At base gr. to vcg. 259-262 - Fine pebble congl. scattered 60° j. Most breaks normal.			100%
265 -291	26'	Siltstone - Gen. lt gy-gr. to darker gy and also bands of dense v. lt gy, gen. v. clayey. 265-268 - Clay, dk gy, soft friable, breaks easily. Sltst. is sl. foliated @ near normal to core. Carb. streaks.			
291 -343	52'	Claystone - Gy and v. lt bl-gy dense, tends to exfoliate, very soft, only sl. silty. Breaks are near vertical, slight suggestion of 30° jointing. 313-319 - V. dk gy, friable, 315.3 is very sandy. 319-327 - Claystone, very hard, dense, firm. Lt bl-gy. Occ. 30° jt.		Good core. J 30°	

VAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		327-342 - Claystone, lt gy-bl. silty, soft, broken & friable first 2 feet.			
343 -354	11'	Sandstone - Lt gy, v-f gr. to near silty, sl. clayey, weak. Noticeably well laminated with fine carb. ptgs. 55°-60° friable. Last 3 ft. is gr. to cg SS and from 353-354 is med. pebble congl. Core is quite compact.	55°-60°		
354 -379.4	25.4'	Claystone - Dk gy, friable, gr. to silty claystone, generally hard & compact. 364-367 - Sandy granules. 368-375 - Claystone, dk gy-grn waxy lustre, gen. hard compact, some wh. calcite spks., calc. throughout. Intbd. w. S & M pebbles. 375-377 - v. hd pseudo-conc. frac. when struck.			
379.4-393	13.6'	Conglomerate - Rd pebbles in gn clay matrix. - Thinly bedded with gn clay & siltstone. - Pebbles pred. as cut & fill in clay.	57°		
393 -424	31'	Claystone - dk gy-gn as before, hard. 397.4 - Pebbley lenses. 397.8-398 - Congl. dk gy-gn. - dk intbds throughout, pebbley basally, abrupt contact @ 404.8' with med. blue-gy typ. Kishenehn clay, sl. silty, gen. soft, weak. 417.7-424 - becomes siltier.			
424 -449	25'	Conglomerate - multi-coloured well rd. pebbles. 434.3 - Congl. with matrix of sltst, gr. to v-f gr. SS which is dk grn. Mod. well cemented. 436-439 - Lt gn hard slty. 439-442.2 - Congltic clay, dk gn boulders. 442.2 - Becoming vfs matrix, mod. well cemented, low angle jtg. 445.7 - Sml pbl. congl. weak, poor cement, very rubbley-unconsol. 449 - Abrupt contact.		420' J 45° J 15°-20°	
449 -464.6	15.6'	Claystone - silty, med-dk gn-gy. - congl. in part. - Appears homog. but has numerous pbly zones & some irreg. calcite infill, @ 455', 456' & 458' - congltic. 459.3 & 459.7 - pbl. bands @ 60°. 461-462 - slty, mod. hard. 464-470 - Rec. 5.2/6.0.	60°		

.VAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
464.6-478.1	13.5'	Claystone & Congl. Intbds. 464.6-467 - Congl. sml to med. pbls, carb., firm. 467 - gn slty clay, abnt. coarse carb. ptgs & white specks., occ. cut & fill with rd pbls. 475.4 - Clay, lt gn homo. pebbl y, weak.			
478.1-495.8	17.7'	Conglomerate - large boulders & sml & med. pbls, clay matrix.			
495.8-534.5	38.7'	Claystone - Bright waxy gn, silty, pebbley, weak. 507 - start mottled hem. red & gn pebbley. 507-512 - sl. cemented, friable 512 - weak. - Continuing mottled, red, white, yellow. 518 - Sandstone lenses. 524-524.5 - slightly siltier, better cement basally.	45°		
534.5-548	13.5'	Sandstone - Lt ochre, earthy coloured. - vfg, patches of m terial as above and pebbles. Compact, hard. - No bedding apparent, silty.			
548 -590	42'	Claystone - Med. gy. - Slightly silty. - Massive, hard, bdg. traces @ 60°. 553 - Mottled, carb. waxy frac. surfaces, blocky frac. 563 - Mottled dk purple, red & gn, waxy blocky hard to ext. hard, has cemented sections. 588-590 - heavily oxized. 590-596.6 - R 5.0/6.6.	60°	J 90°	95%
590 -598	8'	Siltstone - Extremely hard, silicified, rock-like. - Very brittle & badly frac. - Grey. - Heavy horiz. jointing & 60° jts. Freq. of jtg. 5/5' sec. 596.6-598 - Loose unconsol. gravel.			
598 -604	6'	Claystone - gy, silty, dries ext. hard. - Mottled red. 600-604 - Deep red, tr. lam @ 45° scattered 75° jts. tt.	45°	J 75°	
604 -640	36'	Siltstone - Very rusty. - V. badly broken to end of hole. - All material is basal tertiary siltstone. Jointed, 60° jts 4/1' sec. 20° jts 4/1' sec. 633-640 - Loose gravel of red & bl. pebbles & clay frags.		J 60° J 20°	

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE INTVAL.	[illegible] REC.
		Hole did not terminate in bedrock			
		606.8-612 - Rec. 1.5/5.2		Badly broken.	
		612 -616 - Rec. 1.0/4.0			
		616 -619 - Rec. .5/3.0			
		619 -623 - Rec. .5/4.0			
		623 -626 - Rec. 1.0/3.0			27
		626 -629 - Rec. .75/3.0			
		629 -631 - Rec. .75/2.0			
		631 -633 - No Rec.			
		633 -640 - Rec. 3.0/7.0			
	640'	TOTAL DEPTH.			

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND
~~ROTARY~~ DRILL RECORD

Hole No.: 75G-04

Property: Sage Creek Coal

Location: North Hill
17,857,454N
587,587E

Elevation: 4360' asl.

Contractor: Becker Drills Limited
Connors Drilling Limited

Hole Size: 6 7/8" to 119'
HQ 119' to 704'.

Rig No.: 40-05 (Becker)
#1 (Connors)

Date Commenced Drilling: August 14, 1975. (Becker)
September 17, 1975. (Connors)

Date Finished Drilling: August 15, 1975. (Becker)
September 23, 1975. (Connors)

Date Hole Completed: September 25, 1975.

Logged By: James Mitchell, Jim Baker and Ed Wilson

Date: September 24, 1975.

Probed By: Roke Oil Enterprises

Date: September 23, 24, 1975.

Total Depth Drillers: 704'

Depth of Overburden: 117'

Total Depth Logger: 702'

Water Level: Flowing at completion.

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time
		Carbide Insert Diamond.					

Surface Casing: 40' of 7" - 130' of HW.
Total Drilling Time:
Total Down Time: 0
Total Footage Chargeable: 704'
Total Hourly Contact: 36 man
18 drill

Standby Time for Logging: 32 man
16 drill
Other Standby Time: 24 - piezometer
Total Chargeable Standby Time: 32 man
16 drill
Actual Moving Time Between Holes:
Chargeable Moving Time " " "

Remarks:- Predrilled by Becker Hammer Rig to 119' and 7" casing set to 40'. Two pneumatic packer piezometers installed @ 615' and 300'.

Quantity of Mud Used:
Quik Gel - 74 bags
Kwik Trol - 75 bags
CC16 - 2 bags

Probe Report:

682-0.....Gamma Ray/Neutron.....Through HQ Drill Rods.
680-0.....Sidewall Density.....Through HQ Drill Rods.
602-0.....Sidewall Density.....Open Hole.
602-0.....Caliper.....Open Hole.
695-100.....E-Log.....Open Hole.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 2	145.2-158.6	13.4'	143-156	13. '
Seam 4U	269.1-285.4	16.3'	267 -282.5	15.5
4L	322.5-334	11.5'	320.2-332.2	12'
Seam 5U	550.3-562	11.7'	549-560	11'
5L	571.2-601.5	30.3'	568.5-599	30.5'

ERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
0 -117	117'	Overburden - Pebble to boulder till. - Sand and silt predominate. - Imbedded in m. brn clay.			
		Cretaceous - Kootenay Formation			
117 -145.2	28.2'	Shale - M. gy brn. - Finely laminated. - Silty. - Bituminous in part. - Fractures @ 135' and 136'-137'. 143-144.5 - Dk gy sh., brec. 144.5-144.8 - Coal part.	70° to C/A	Frac. thruout 20°-25° to C/A.	Poor 25%
145.2-162.7	17.5'	COAL - Seam 2 - Vitreous to dull. - Hd & brittle. - Some dull, soft fine coal: 145.2-145.4 - Dull, prbly durain. 145.4-146.2 - Clarain. 146.2-148.1 - Dull, soft, fine. 148.1-153 - Clarain / durain. 153-153.9 - Soft, fine, mushy. 153.9-159.9 - Claro-vitrain, bright to vitreous. 159.9-161.7 - Dull, soft, fine & mushy, appears arg. 161.7-161.9 - Siltstone str. 161.9-162.7 - Dull, arg., silty. 143-148 3.3/5.0 148-153 4/5 153-158 5/5 158-163 4.2/5		Gen. soft & friable.	82% 66% 80% 100% 84%
162.7-168.9	6.2'	Shale - M. gy brn. - V. slty, hd. - Bit. in part. - Grades downwards to siltstone. - Fractures @ 163.6', 164' & 168' more pr ominent.		Frac. thruout. 20° to C/A. 20° to C/A.	
168.9-171	2.1'	COAL - Generally vitreous to dull. 169-169.5 - Dull, soft, arg. 169.5-170.5 - Dull, lead gy, prbly durain. 170.5-171 - Mostly durain.			Good >97%
171 -265.4	94.4'	Shale - Light to medium gray. - Finely laminated. - Silty in part. - Random & scattered coal ptgs. - Prominent fractures @ 173.5', 175.5' & 178.5'. - Abundant fractures - irregular & random angles 180'-184'. 177.2-178 - Carb. sh./coal ptgs. 179.9-180.2 - Coal ptg. 185-186 - Coal, arg. 188-190 - Core badly broken. 190.5 - Coal ptg. 199.7-200 - Coal ptg. 202.5-205.5 - Badly broken core 206-207 - Numerous bright vitrain coal ptgs. 214.3-216.2 - Brecciated. 219-221 - Core is broken, con-	60° to C/A.	Frac. @ 15° to C/A.	98%

VAL	UNIT THICKNESS	DESCRIPTION	< OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		tains coal along breaks, vf gr. SS. 223.4 - 231-232 - Core is badly broken. 233-234.5 - Core is broken. 234.5-236 - Brecciated. 240-241 - Brecciated. 241 - Coal ptg. 241-243 - Soft & brec. 243-245 - Clayey gouge zone. Contains coal ptcls. 251-252 - Fracture zone, some calcite infilling. 257.5-258 - Broken / some infill. 258-265.4 - Becoming silty - fractured throughout / minor coal ptgs. Some clay gouge along fractures.	60° to C/A	Frac. @ 25° to C/A. 25° to C/A to vert.	
265.4-269.1	3.7'	Shale - Carb. to coaly (dull). - Highly broken. - Brecciated / some clay gouge. - Soft mushy texture.			
269.1-287	17.9'	COAL - Seam 4U 269.1-274.1 - Clarain, soft, fine high moist. content. 274.1-278 - Clarain, soft, somewhat arg. 278-279 - Claro-vitrain. 279-280.3 - Clarain. 280.3-280.9 - Coal dull, possibly / high ash content. 280.9-283 - Mostly clarain / minor dull arg. coal. 283-283.5 - Clarain. 283.5-285.4 - Dull, arg. appearance. 285.4-286.1 - Dull, possibly arg., hrd, prbly durain. 286.1-287 - Clarain, soft, fine ptgs of carbargillite nr. base.		Soft and friable.	>97%
287 -322.5	35.5'	Shale - Dk gy, hem. stn in part. - In part carb. - In part silty. - Numerous hairline fractures. 287-288 - Brec. 296-298 - Numerous frac., calcite along fracture surfaces. 307.8-308.8 - Brec. 310.5-312 - Brec. 315.3-315.8 - Highly frac., moist, soft. 316-316.4 - Sltst.	60°	Mod. sd. with high deg. of frac. @ 60° to C/A to 45° to C/A.	98%
322.5-335	12.5'	COAL - Seam 4L 322.5-323 - Claro-vitrain, bright, hd. 323-325.4 - Clarain / minor fusain or arg. material. 325.4-325.7 - Dull, arg. appearance. 325.7-329 - Dull to vitreous, mostly clarain & possibly some fusain. 329-331 - Clarain. Rec. .5/2. 331-332.4 - Clarain. } Rec 2/3 332.4-334 - soft, mushy, prbly clarain. } Rec 2/3		Soft and friable.	80% 25% 67%

...VAL	UNIT THICKNESS	DESCRIPTION	< OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		334-335 - Dull, massive, light wt., prbly durain.			
335 -383	48'	Shale - Dk gy to blk. - Bituminous in part. - Highly slickensided at top of unit. - Grades to v.f.gr. SS basally. - Core brecciated thruout. 344-345 - Weathered zone - possible water course. 349-359 - Highly brecciated. 352-353.3 - Coaly sh. 354-354.1 - Gouge zone. 355.6-356.1 - Soft, coaly in part. 362.3 - Fracture / calcite infilling. 373-374.7 - Water zone, soft, broken, wthrd. 376.6-378 - Brec. zone, coal ptg. at top. 379.9 - Coal ptg. 380.3 - Coal ptg.		Core is mod. sd / fracs. moderately spaced. 20° to C/A.	90%
383 -402	19'	Brecciated Shale / Sandstone - Interlaminated shale / sltst / SS & intermixed. - Soft sediment deform. 391-398.2 - Prob. water zone, partial decementation. 398.2-402 - Silty mudstone / abnt. marcasite.		Brec. thruout.	89%
402 -456.8	54.8'	Sandstone - Lt to m. gy. - Salt & pepper. - Silica cmt. - Qtz & chert grains, m-c gr., a-r. - Foliation or banding at - Silty & arg. toward base. 400.8-403 - Badly frac. into 2" pieces - low angle. 403.7-403.8 - Coal ptg. 403.8-404.4 - V. slty. 404.4-406.5 - Soft, in part decemented. 417-421.3 - Sltst., brn gy, arg., approaches v.f. gr. SS. 423-424 - Coal on bdg. plane. 427-428.5 - Badly fractured. 429-429.4 - Soft, in part decemented, possible water zone. 436-437.4 - SS is soft mushy & in part decemented. Fractures @ 405', 406', 408', 432' & 447' @ Fractures @ 404', 410'-412', & 422' @ 456-456.4 - Breccia zone filled with sandy clay gouge.	80°	15°-20° to C/A. Frac. @ 45° to C/A. 15°-20° to C/A. 45° to C/A.	>95%
456.8-468.4	11.6'	Siltstone - Dk gy, arg. and sdy in part.			>97%
468.4-532	63.6'	Shale - M. to dk gy. - In part carb. to coaly. - Slty to arg. sltst. bnds. 468.4-468.9 - Coaly shale.	60°	Core is mod. sd. but brec. thruout.	>95%

∝VAL	UNIT THICKNESS	DESCRIPTION	< OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		- Numerous fractures @ low angles to C/A. Minor calcite on fracture surfaces. 486-494.7 - High degree of frac., gouge on fracture surfaces. 499-516 - V. carb. / abnt. coal ptgs. Coal ptgs. @ 501', 506', 507.2', 508.5', 511.6', 512. 514-515 - Numerous carb. ptgs, sks. 516.7-517 - Soft coaly zone. 517-519.2 - Breccia zone, sdy sh. 520-523 - Micro-mica. sh. 523-528 - Bit. sh., high degree of fracturing. 529 - Frac. @		@ 516.3' a frac. @ 45° to C/A. Frac. @ 20° to C/A. 20° to C/A.	
532 -548.5	16.5'	Siltstone - M. gy, finely lam., arg.		Core is sd / numerous bdg. plane fracs.	
548.5-550.3	1.8'	Shale - Dk gy to blk. - Carb. - Soft.			
550.3-601.5	51.2'	COAL - Seam 5			85%
		550.3-551.4 - Claro-vitrain. 551.4-551.6 - Soft, mushy intvl. 551.6-553.7 - Claro-vitrain. 553.7-554.3 - Soft, mushy, arg. in part. 554.3-554.4 - Hd, blk carb. sh. strgs. 554.4-555.6 - Clarain. 555.6-557 - Soft, claro-vitrain. 557-558.5 - Clarain, vitreous. 558.5-559.6 - Dull, arg. 559.6-561 - Claro-vitrain. 561-562 - Durain, dull, arg. 562-564.2 - Carb. mudstone /vit. bnd. 564.2-565 - Dull, arg., minor durain. 565-566.3 - Dull to vitreous, clarain / arg. fusain. 566.3-566.7 - Dull, arg. poss. durain. 566.7-566.9 - Dull to vitreous, mostly clarain. 566.9-567.1 - Shale. 567.1-567.4 - Dull, dense, some vitreous clarain, mostly durain & sh. 567.4-567.9 - Shale / bnds of durain. 567.9-568.6 - Dull to vitreous, clarain / durain. 568.6-570 - Dull to vitreous, durain & clarain, tr. marcasite. 570-571.2 - Soft, dull to vitreous clarain, arg.		Soft & friable & in pt. mushy.	552'-557' 4.5/5 561'-565' 3.6/4 510'-574' 3.6/4

ERVAL	UNIT THICKNESS	DESCRIPTION	< OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		571.2-571.6 - Dull, arg. shale / durain. 571.6-572.5 - Coal, vitreous to bright clarain / vitrain. 572.5-572.7 - Dull, mostly fusain ptgs in sh. 572.7-572.9 - Dull to vitreous, clarain / fus in ptgs. 572.9-574 - Dull to vitreous clarain / arg. ptg. 574-575.5 - Dull to vitreous clarain / some arg. material. 575.5-580.7 - Vitreous, mostly clarain. 580.7-581 - Dull to vitreous, arg. clarain. 581-581.3 - Claro-vitrain. 581.3-581.4 - Dull, arg. coal. 581.4-581.6 - Shale. 581.6-590 - Vitreous / dull ptgs. mostly clarain / thin durain ptgs.			574' - 579' .6/5
		590-592.4 - Carb. mudstone / vitrain banding. 592.4-595.8 - Vitreous to bright clarain / vitrain bnds.			590'- 595' 4.5/5
		595.8-596 - Mudstone. 596-597.4 - Clarain & vitrain. 597.4-600 - Clarain & vitrain. 600-600.4 - Mostly clarain. 600.4-601.5 - Mostly clarain.			595'- 600' 7.3/5 600'- 603' 2.3/5
601.5-605.5	4'	Shale - Dk gy, carb. - Micro-mica. - Could be water course.		Highly frac.	50% 603'- 608' 3.8/5
605.5-687.8	82.3'	Sandstone - Basal unit. - M. gy, f. gr., well cmt. - In part dk gy, high chert content. - Numerous coal ptgs. - Tr. marcasite along frac. - Core generally broken. 625-626 - Partial decementation, possible water zone, clay gouge material. 629-643 - Core extremely broken. @ 631.8 - Clay gouge. 643-660 - 660-677 - @ 654' fracture / abnt. marcasite. 672 - disagg., poss. water zone. 677-687.8 - Core is v. sound. 677 - Fracture / calcite infilling. 682.5 - Shale str.		Severely frac. thruout, tends to break along bdg. Core Sound. Core broken. 45° to C/A 80° to C/A	90%
		Jurassic - Fernie Group			
687.8-704	16.2'	Interbedded Sandstone, Siltstone & Shale - Passage Beds. - M. to dk gy. - Slt to v.f. gr. SS. - Slty sh. to arg. sltst. - In part carb. / thin coal ptgs.			>90%

ERVAL	UNIT THICKNESS	DESCRIPTION	< OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		687.8-688 - Thin bdd, dk gy, carb. sh. 692.5 -Slickenside in fracture 695-704 - Massive, f. gr. SS, micaceous, competent.	@	45° to C/A	
	704'	Total Depth.			

RIO TINTO CANADIAN EXPLORATION LIMITED

HAY R
XXXXXXXDRILL RECORD

Hole No.: 750-07

Property: Sixe Creek Coal

Location: North Hill
17,350,296N
586,008E

Elevation: 4274' asl.

Contractor: Becker Drills Limited

Hole Size: 7"

Rig No.: 4005

Date Commenced Drilling: August 19, 1975

Date Finished Drilling: August 20, 1975

Date Hole Completed: August 20, 1975

Logged By: A. Scenor, Dames & Moore.

Date: August 20, 1975

Probed By: ——

Date: ——

Total Depth Drillers: 59'

Depth of Overburden: 59'

Total Depth Logger: ——

Water Level:

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling T.

Surface Casing: 49'

Total Drilling Time:

Total Down Time:

Total Footage Chargeable:

Total Hourly Contact:

Standby Time for Logging:

Other Standby Time:

Total Chargeable Standby Time:

Actual Moving Time Between Holes:

Chargeable Moving Time " " :

Quantity of Mud Used:

Remarks:-

Probe Report:

Hole not probed.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	

Hole 7-6-07

INTERVAL	UNIT THICKNESS	DESCRIPTION
0 - 39	39'	Overburden - glacial till. - dk. brn. clay. - occasional cobbles and boulders. 11.7'-23.5' - gy to brn., silty, m. sd., some cobbles & gravel.
		Cretaceous-Blairmore Group
39 - 50	11'	Conglomerate - vari-colour chips of chert, quartz and s.s. gr., m. cy ss. - conglomerate chips.
	50'	Total Depth

ROTARY DRILL RECORD

Hole No.: 79?-10

Property: Sage Creek Coal

Location: North Hill
17,851,929 N
588,003 E

Elevation: 4368' asl.

Contractor: F. & T. Lane Drilling
Connors Drilling Ltd.

Hole Size: 8" to 120'
N. 120' to 717'

Rig No.: Connors #1

Date Commenced Drilling: October 5, 1979. (Lane)
October 7, 1979. (Connors)

Date Finished Drilling: October 5, 1979. (Lane)
October 10, 1979. (Connors)

Date Hole Completed: October 10, 1979.

Logged By: A. Wilson
J. Mitchell

Date: October 18, 1979.

Probed By: Lake Oil Enterprises

Date: October 19, 1979.

Total Depth Drillers: 717'

Depth of Overburden:

Total Depth Logger: 706'

Water Level: Nil

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Ti

Surface Casing: 120' of 8"

Total Drilling Time:

Total Down Time:

Total Footage Chargeable:

Total Hourly Contact:

Standby Time for Logging:

Other Standby Time:

Total Chargeable Standby Time:

Actual Moving Time Between Holes:

Chargeable Moving Time " " :

Quantity of Mud Used:

Remarks:-

Probe Report:

804-0.....Gamma Ray/Neutron.....Thru Sidehill Holes.
797-120.....Z-Log.....Open Hole.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	

ERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
0 - 104	104'	Overburden - Glacial till. - Sands, silts and clays with cobbles and boulders.			
		Tertiary - Kishenehn Formation			
104 - 120	16'	Sandstone - Chip fragments of gy-green SS. NOTE: Commenced coring @ 120'.			
120 - 129	9'	Sandstone - Lt gy gn, well consol, silty matrix, no clay, m to cg, well sorted & well rd, scattered carb. flecks & faint lams nr // to core. 127.5 - Carb. or bit. str.			100%
129 - 143	14'	Siltstone - V. lt gy, sl. sdy. From top gr. to less slty, that is consol. & v. firm. This sltst is trans. with claystone or is clayey sltst. 135-141 - Well lam. bedding @ 60°, sltst. is variably sandy & clayey. Quite lt coloured to 136' then dk gy gn with carb. lams. @ 60° abnt at base.	60°		100%
143 - 147	4'	Conglomerate - Pebbles are multi-coloured up to 50 mm, fairly well rd., sandy cg matrix, well consol. colour variably gy gn. 147-149 - SS stringer very dirty, clayey grades to silty mudstone.			100%
147 - 162	15'	Mudstone → Siltstone - Dk gy, very silty & contains stringer. Essent. sltst. 159.5-162 - Very sandy, dirty well consol.			100%
162 - 175	13'	Siltstone - Lt gn-gy, clayey uniform section, well consol., @ 175' grades impercep. to a very lt gy dense mudstone.			
175 - 202	27'	Mudstone - Lt gy, sl. gn, v. dense & consol. @ 174' a 6" band of limonite stn and also @ 189'. Grades gradually thru silt to vfg SS by 202'.			
202 - 212	10'	Sandstone Gr. to Siltstone - Gy gn slty & clayey, grades to sandy silty clay. In SS are limonitic lams @ 60°. 205-212 - Gn gy slty, partly gr. to similar coloured SS. Carb. str. @ 210'.	60°		
212 - 222	10'	Mudstone - Silty, gy gn, soft, some core lost. 212-217 - R 3.5/5.0. 217-222 - R 4.5/5.0.			80%

ERVAL	UNIT THICKNESS	DESCRIPTION	< OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
222 - 232	10'	Sandstone - Dk gy gn, finely lam. @ 65° - 70°. Is vfg, silty & clayey, gr. to cg SS by 232'. Scattered carb., remains consol.	65°-70°		
232 - 242	10'	Claystone - Dk gy, sl. slty, compact, appears brittle, gen. dk gy gn with rusty patches. Well consol.		Solid.	
242 - 287	45'	Claystone - Lt gy gn, faintly lam. @ 60°, hard competent. Some sections darker gy, but on whole v. uniform. Grades grad. into clayey siltstone, consol.	60°		
287 - 296	13'	Siltstone - Lt gy, v. clayey and sections are sandy (vfg) which are med. to lt gy gn, uniform, compact. Sltst. gr. to SS by 296'.			
296 - 303	7'	Sandstone - Dk gy, vfg-mg, clayey. 297 - Cosly str. @ 55°-60° in vfg to sdy section.			
303 - 311	8'	Claystone - Dk gy gn, gr. to lt gy gn by 305'. Is slty gr. to SS by 311'.			100%
311 - 320	9'	Sandstone - Med. gy gn, slty & clayey, well consol. @ 314' fol. 48°.	48°		
320-328	8'	Claystone-lt gy gn dense consol, hard, grades to clayey sltst by 328			
- 334 328	6'	Siltstone - Med. gy gn, very clayey, gradually becomes sandy. Firm.			
334 - 353	19'	Sandstone - F to mg, slty with tr. clay. At 349.5' thin carb. lams @ 58° & core splits along bdg. (N.B. Core tends to mech. break @ 90°.) Gr. to fine slty sand by 353'. 358-363 - R 0/5 (Mech. loss).	58°		100%
353 - 370	17'	Siltstone - Sandstone - Gy, as above, firm, consol.			
370 - 375	5'	Claystone - Lt gy, hard, brittle concoidal frac., normal to core.	J 90°		
375 - 462	87'	Silty Claystone - Med to dk gy, slight rusty blotches. When dry exfoliates. Hairline carb. laminations. Contains random sandy sections. 417-417.3 - Fine pebbles in core to 10 mm. Clay continues as above, vary sl. in colour. 420-424 - Brownish cast, quite silty & sdy. 432-434 - Conglomerate, small well rd multi-col. pbls. clay & silt matrix. Gen. soft, parts easily. Claystone continues as dk gy to gn gy, gen. slty. Breaks are 90° mech. Well consol. compact			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
462 - 465	3'	Conglomerate - Brn gy, fine-med. pebble congl, cg sdy gr. to slt matrix. Pebbles well rd, max. 15 mm. with occ. large pebble.			
465 - 475	10'	Claystone - Scattered thin bands of vcg sandy sect.			
475 - 479	4'	Conglomerate - Small to med. pebbles.			
479 - 553	74'	Claystone - Sl. slty & sandy with granules scattered thin bands with well rd granules. Core is very intact. No breaks. Generally sandy. 503-507 - Vcg. sandy to gran. sized with carb. parting @ 75° & 45°. 509-514 - Very sandy. 517-519 - Sec. with granules to small pebbley sections, sandy matrix. 519-530 - Claystone is intact, well consol. Claystone continues as dk gy, silty & sdy. Few scattered ang. coal frags to 10 mm. 537-537.5 - Large boulder (150 mm). Joint tends 60°. Vague fol. @ 60°. 542-543 - Sdy & granule size section. 543-553 - Claystone continues, silty, consol.	60°	J60°	100%
553 - 557	4'	Conglomerate - Granule to vfg pebbles and fine coal frags.			
557 - 575	18'	Sandstone - V. clayey & slty, well lam. @ 50° by carb. str. interlam with clay bands & slty clay. Abnt hard coal frags. 568-569 - Fine pbl congl. (10 mm). Frac. along 50° fol. planes, but core is sound.	50°	J50°	100%
575 - 580	5'	Claystone - Dk gy slty, broken & brec. at top (primary texture). Frac. along fol. @ 50°.	50°		
580 - 588	8'	Conglomerate - Silty bands and fine gravel in sandy, silty matrix with clay bands.			
588 - 618	30'	Claystone - Lt gy brn, slty. Vague jointing tendency (1 jt 15' core @ 30°). Core generally well consol. & sound. 608-618 - Claystone as above interb. with multi-coloured fine pebbley gravel bands and clayey silt to 613'. 613-618 - Claystone.	J 30°		
618 - 632	14'	Conglomerate - Coarse bouldery multi-coloured			

ERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		pebbles to boulders. Coarse sandy matrix with clay. Matrix parts from boulders. Soft sections, weak. 626-628 - Sandy silty sections with few coarse pebbley bands. 628-632 - Sandy cg to granule sized in clayey silty matrix.			
632 - 642	10'	Claystone - Dk gy, sl. slty, gr. to gy brn, very silty to fine gravelly, sandy & slty clay. Core is compact, sound.			
642 - 654	12'	NO CORE Recovered.			
654 - 661	7'	Sandstone - Gy brn, cg with silty clayey matrix. Scattered granules & few sections of fine pebbley gravel.			
661 - 679	18'	Claystone - Gy brn soft, washes away while drilling. Generally variably sandy with scat. granules. 666-667 - Gravelly section, s-med. pebbles. Clay matrix. Generally core is mech bkn @ 90°. Few jts @ 60°. Congl. section. 668 - 75 mm cobble. 673-676 - Core broken. Falls apart in gravel sections. Jointing @ 75°. Section becomes increasingly sdy & silty.	J 60° J 75°		
679 - 683	4'	Claystone - Gy brn silty. 681-683 - Rusty oxidized patches, soft muddy. (Minor oxidization).			
683 - 708	25'	Conglomerate - Lt gy brn congl. with sandy & silty matrix. Most pebbles are 15 mm, large number black, however matrix is soft & clayey & still Tertiary. Core is firm, but pebbles break easily from matrix and falls apart. 691.5-695 - In large pebble congl. are cg brn sdy bands 50-75 mm wide & silty that suggest foliation to be 50°. Pbls are well rd. Core is weak & pbls break from matrix easily. 696 - Boulder, 200 mm. Congl. grades into silty sdy clay.	50°	Soft, drilled & held well in core.	100%
708 - 740	32'	Claystone - Silty dense clay J 75°. Slight rustiness on surfaces. Is gy brn, in part sandy & granules dispersed. 708-711 - Quite silty, jts @ 75°.	J 75°		

ERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		725 - Few rusty stks. 728-732.5 - Soft, weak, disintegrates, sl. slty, few red streaks. 732.5-736.5 - Firm, oxid. 736.5-740 - Few pebbles, last foot heavily oxid. to red-purple. Joint tend. 30°.	J 20° J 30°		100%
740 - 743	3'	Conglomerate - Course bouldery, well rd. - Silty sandy matrix stained red. - Core weak, falls apart readily. - Very weak.			
743 - 753	10'	Claystone - Lt gy gn, mottled red. - Fol. bands @ 60° are oxidized. - Brecciated, fractured. - Very weak.	60°		
753 - 757	4'	Siltstone - Lt gy gn. - Frac, rust along frac. - Joints @ 60° & 30°. - Firm to hard.		J60° J30°	
757 - 770	13'	Claystone - Mottled red, bl. bluish. - Badly frac., rust along jts. - Intact, firm.			
770 - 778	8'	Siltstone - Gy-brn to dk. gy gn, mottled red. - Fractured, crumbley. - Jointing @ 40° & about 60°.		J40° J60°	
778 - 788	10'	Claystone - Very rusty, gougey. - Silty. - Broken, breaks up easily. - Jointing.		J60°	
788 - 811	23'	Siltstone - Hard, rocklike. - Siliceous. - Badly fractured & brecciated. - Rusty along frac. & jointing. 793-803 - Complete rubble, red hematitle on frac. surfaces. 803-806 - Brec, gougy and sandy infilling, soft, decemented. 806-811 - Clay gouge in breccia.		Good	100%
		Cretaceous - Blairmore Group			
811 - 817	6'	Conglomerate - Typical Blairmore. - Bl. cht & wh. qtz pebbles, sub A. - Pbls to 15 mm. - Silica cement. 815-817 - Gougey, broken, clayey, rusty, decemented. jts @ 30°, open gouge filled. Water course.		Broken but Intact. J30°	100%
	817'	Total Depth			

DIAMOND
~~PERMANENT~~ DRILL RECORD

Hole No.: 75D-01

Property: Sage Creek Coal

Location: North Hill
17,891,852N
586,797E

Elevation: 4483' asl

Contractor: Connors Drilling

Hole Size: HQ to 1201'
NQ 1201' - TD

Rig No.: #1

Date Commenced Drilling: July 19, 1975

Date Finished Drilling: Aug. 13, 1975

Date Hole Completed: Aug. 13, 1975

Logged By: Jim Baker and James Mitchell

Date: Aug. 13, 1975

Probed By: Roke Oil Enterprises

Date: Aug. 13, 1975

Total Depth Drillers: 1329'

Depth of Overburden: 64'

Total Depth Logger: 1310'

Water Level: Flowing

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Hr
1	NQ	K6MC002		105	209	104	
2	HQ	K66K002		209	273	64	
3	HQ	K560325		273	313	40	
4	HQ	K560326		313	359	46	
5	HQ	K560327		359	569	210	
6	HQ	K560330		569	735	166	
7	HQ	K560329		735	745	10	
8	HQ	K560333		745	770	25	(See over)

Surface Casing: 105'
Total Drilling Time: 500 hrs.
Total Down Time: 23 hrs.
Total Footage Chargeable: 1329'
Total Hourly ~~xxxxxx~~: Drill 53
Man 106

Standby Time for Logging: 5 hrs.
Other Standby Time: 10 hrs.
Total Chargeable Standby Time: 15 hr
Actual Moving Time Between Holes 44
Chargeable Moving Time " " 36

Remarks:- Rods stuck at 1201' - Reduced to NQ. - Had to blast rods to free. Hole flowing @ 11 gals./min. @ completion with up to 32 psi recorded.

Quantity of Mud Used:
129 bags Quik Gel
116 Bags Kwik Trol
1 bag CC16

Probe Report:
1310-1100.....Gamma Ray/Neutron.....Thru NQ drill rods.
1190- 00 .....Gamma Ray/Neutron.....Thru HQ drill rods.
1310-1100.....Sidewall Density.....Thru NQ drill rods.
1190- 000.....Sidewall Density.....Thru HQ drill rods.
354- 000.....Caliper.....Open Hole.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam #2	635-640	5'	635.5-638.5	3'
Seam #4 Upper	838.2-857.1	18.9'	838.5-860	21.5'
Seam #4 Lower	883-903.8	20.8'	885-900	15 '
Seam 5 Upper	1167-1228.5	61.5'	1169-1213	44'] 58'
5 Lower			1217.5-1227	9.5']

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time
9	HQ	K560329		770	963	193	
10	HQ	K510114		963	1202	239	
11	NQ	N614370		1202	1209	7	
12	NQ	N661392		1209	1329	120	

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	REC. %
0- 64	64'	OVERBURDEN - unsorted gravels - some carbonate material present - glacial till & outwash material		Triconed to 104'	
		TERTIARY - KISSIMMEE FM. - clays, mudstones & clay indurated gravels			
64 - 273	209	MUDSTONE - mainly Kissimmee - tertiary clay, lim & hem st. - earthy luster 126-127.5 SS grey green, m gr., silica cmt, m sort, sub ang-sub rd 146-170 Siltstone hematitic st. & limonite st, argil cmt 189-194 Shale med grey, silty in part, argilant 207.25 - 60° to C/A 208.6 - 60° to C/A 209-211 - fractured zone 222.5-228 - No core recovery 228-243 - Mudstone seems to be better cemented 243-245 - Mudstone - very crumbly 245-263 - Mudstone & Clay - lt blue grey, hematite & limonite st, cemented in part, interbedded with clay. 245-246 - very well cemented 263-266 - Silty Mudstone - bk-dk grey, silty nature very soft 266-269.5 Shale - dk grey 266.5 - 60° to C/A 267 - 45° to C/A 269.5-271.6 - Lost core 271.6-273 Mudstone lt grey green, well cmtd, glauconitic, silicous cmt.	60° 60°	Fair Frac. 45° to C/A	90%-100%
		CRETACEOUS - PLAINVIEW GROUP			
273- 275	2'	SANDSTONE - lt grey, f grained, p cmt, sub rd, med sorting, mainly qtzite, numerous frac. approx 45° to C/A			
275-276	1'	No recovery			
276- 315	39'	SS - med grained, qtzite, silica cmt, sub rounded, g sorting, p porosity 285-290 - Conglomerate, very large pebbles of chert in above SS, poorly cmt in places 290-295 - minor chert pebbles scat thruout 297 - Scat chert 302-304 - conglomerate (AA) 301.5-310 - No core recovery 310.5-313 - No core recovery 313-315 - Conglo. (AA)	60°-50°	Broken Severe frac @ 45° to C/A	75%
315- 338	23'	SS - med grey, md gr, mainly chert, qtz, silica cmt, sub ang-ang, p. sorted 316-318 - No core	60°	Severe frac.	65%

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF INT TO CORE AXIS	CORE EVAL.	% REC.
		320-323 - No core 326-327 - No core 331-332 - No core 318-320 - Congl. - p. cmt, large pct of chert, p. consolid. 323-326 - SS - v soft, poorly cmtd. 333-334 - Shale - dk grey, coal in part, slickenside evid.	50%	Severe frac. Broken	
		CRETACEOUS - KOOTENAY FM.			
338- 345	7'	SHALE - med-dk grey, v clean frac parallel to bedding thruout "Some plant frags"	60%	Broken	100
345- 375	30'	SS - med-dk grey, mainly chert - qtz, poorly cmt, poorly sorted, angular, almost breccated. 350-351 - No core recovery 355-365 - SS v soft - crumbles 368-369 - No core recovery 369-372.5 - Conglomerate - almost brecciated, crumbly.	———	Severe frac.	9[illegible]
375- 432	57'	Shale - lt-med grey, tends to be broken throughout. 375.5-376 - Coal stringer 377 - break here with lim st 392 394 - Coal stringer 394-398.5 - severe frac. 398.5-399.75 - coal stringer 402-407 - Coaly in part 411.5 - frac. 414.3-415 - Coal stringer 416 - Coal stringer 417-423 - Coal stringers thruout 424.7 - fracture 426.5-427 - No core 431-432 - Severely frac.	60%	Broken thruout 40° to C/A 40° to C/A 55° to C/A	9[illegible]
432- 463	31'	Sandstone - v. fn gr-fn gr, qtz & chert, sub rd, m sorting, essentially no cement, very soft 432.3-435 - SS cemented bott r 435-437 - Severely frac. v. soft 450-451 - severely frac. 457-463 - severely frac. also weathered, mod-high weathered, brecciated.		Broken thruout	95[illegible]-10[illegible]
463- 482	19'	Shale - lt-med grey, micaceous, minor coal present 478-478.6 - SS, med gr, lt grey, chert & qtz, silica cmt (sand lens) 463-471 - Core good shape 471-482 - fragmented moderate & broken, numerous hairline frac thruout.	60%	Broken	100%
482- 498.5	16.5'	SS - fine grained, med grey, mainly chert & qtz, silica cmt, med sorting, sub rd. 482-484.5 - sound good cmt, mod sound 482.5 - 30° frac - numerous hairline frac, limonite st. 484.5-487.5 - mod-high frac. cmt. good	Average 60°	Broken	100%

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FRAC TO CORE AXIS	COAL EVAL.	EST. RECOV.
		487.5-488.5 - severe frac, no cmt, lim st. 488.5-498.5 - mod-high weathering, lim st. thruout Soundness - mod friable 494-495 - vert frac evidenced			
498.5- 503	4.5'	Shale - med grey, micaceous, core is mod sound, minor weathering Most frac are approx 45° 502.5		Mod snd frac 45° to C/A	
503 - 523.5	20.5'	Sandstone - med gr, lt gr, qtz & chert, silica cmt, s-med sort, sub angular 503-508 - SS is silty, v fn gr, core is sound - minor weathering 508-523.5 - SS core thruout, well cemented with limonite staining on fracture planes. Frac occur v freq. from 50°-vert Some calcite evidenced in rock. 521 - .1 meter coal stringer in SS.			
523.5- 558	34.5'	Shale - lt-med grey, micaceous. Core tends to be quite sound. Minor limonite stain on frac. Lt to mod fracturing. 524-524.5 - Coal stringer 550-558 - Shale tends to be silty.		Sound 40°-50° to C/A	
558- 631	73'	SS - lt-med grey, med grained, pred chert, qtz, silica cmt, mod sorted, sub angular Core tends to be mod sound - friable. There is a mod-high degree of weathering. Fractures range from 30°-almost vert. Limonite staining on fractures. 567-591 - SS exhibits a high to severe degree of frac. Frac planes approx 30°. Tends to have a high degree of weathering. 591-612 - SS tends to be finer grained towards top of this section. Fractures tend from 35°-40° Core tends to be quite sound Minor weathering, etc (BS) 604.5-604.7 - minor coal stringer, blocky vitreous 608-609.5 - Shale - lt grey, Micaceous, somewhat silty 612-616 - SS dark gy poor argil cmt, calcitic in part, fn gr. 616-631 - As @ 591-612 Frac from 30°- 45° Core is sound, minor weathering.			10[illegible]
631- 635	4'	Shale - dk grey, micaceous, conly in part			
635- 640	5'	COAL - Seam 2 - trace marcasite 635-635.7 - Bituminous mudst.		Fair	1[illegible]

RQD

482- 487	35/60
487- 491	38/60
491- 494	22/60
494- 497	11/60
497- 502	44/60
502- 507	44/60
507- 512.5	19/60
512.5-518	25/60
518- 523	21/60
523- 528	28/60
528- 532	46/60
532- 533	12/60
533- 538	50/60
538- 542.5	30/60
542.5-546	30/60
546- 551	51/60
551-554.6	22/60
554- 558	31/60
558- 562	20/60
562- 567	20/60
567- 569	0/24
569- 573	0/48
573- 578	30/60
578- 580	0/24
580- 585	4/60
585- 590	8/60
590-595	30/60
595- 600	34/60
600- 605	12/60
605- 610	40/60
610- 615	15/60
615- 620	32/60
620- 625	36/60
625- 630	40/60
630- 635	18/60
635- 640	——
640- 645	30/60
645- 650	40/60

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	REC.
640- 659	19'	Shale - med grey, micaceous, mod weathering, fairly sound, argil in fill in joints, tr marcasite. Shale 640-641.5 - poorly cmt, not sound, soft, bituminous. 650-651.5 - Coal (650.9-651.2 - shale stringer) 657.8-658 - Coal stringer 658.3-658.4 - Coal stringer	——	Fair	100
659- 686	27'	Sandstone - lt grey, med gr, mainly chert, qtz, silica cmt, p-m sorting, sub ang-ang. The core is mod sound. There is mod-high weathering of the cmt. Core itself is sound except it's broken thruout. Numerous frac @ 60 some vert	Average 50°	Broken	95
686- 688.5	2.5'	Coal - black, hard, shiney, in part quite clean, tr marcasite. 687-687.4 - Shale band. (Remnants of Seam 3)	——	Good	100
688.5-726	37.5'	Shale - lt grey, micaceous, calcite in fill in fractures. The core tends from being quite sound with lt weathering and grades to being v soft with a high degree weathering to almost friable. 688.5-692 - Coal-Shale mixture, v. soft. 700-701 - Coal stringer, tr marcasite	45°	Broken	99
726- 770	44'	Sandstone - med-crs grained, qtz & chert, silica cmt, p sorted, sub ang-angular. The core is v. broken thruout. It tends to be friable and in places there is a high to severe degree of weathering. There is abd calcite in frac. - also cross bedding noticed. 727.6-730.6 - SS is v. soft & friable - looks like water zone. 740.0 - v. minor coal stringer. 741.6-743 - Almost no core recovery. 757-758.5 - v. soft - water zone - high-severe weathered. 766-768 - No core recovery.	——	Friable	87-
770-792	22'	Shale - lt-med grey, micaceous. 770-772 - Shale is brecciated, high degree of weathering noted. 775-776 - AA 779.5-783 - AA Remainder of this sequence is mod sound with a mod degree of weathering. 779-779.5 - No core recovery. 785-790 - Siltstone - micaceous silica cmt, devious bedding.		Fair	9
792- 805.5	13.5'	Sandstone - Dk grey, v fn-fn gr, qtz & chert, silica, m sort, sub ang-subrd.		Fair	100

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF LED TO CORE AXIS	CORE EVAL.	[illegible]
		Calcite in filling at frac of 30° & 45°. Noticeable bedding in part. 794.5-795 - Shale - highly brecciated. Fracture along bed (30°) and frac ⊥ 90° to bed at 30°			
805.5- 811	5.5'	Shale - med grey, micaceous, abd muscovite, bituminous Core is quite sound with minor weathering.	50°-55°	Good	100
811 - 815	4'	Sandstone - v fn gr, med grey, qtz & chert, silica cmt, m sort, sub rd-sub ang, calcite along frac. - abd bed and cross bed showing - fractures - frac along bed		Good 45°-60° to C/A 90° to C/A	10
815- 838.2	23.2'	Shale - med-dk grey, micaceous, tr marcasite on breaks. Core is reasonably sound, minor weathering. 823.8-823.9 - Minor coal stringer. 829.5-830 - Coal stringer (soft) 833.5-835 - Coal - v hard, brittle. The shale becomes bituminous towards bottom of section.	60°	Good	10
838.2- 857.1	18.9'	COAL - Seam 4 Upper - black - vitreous luster 838.2-840 - Coal tends to be harder and brittle, abd marcasite along frac. 839-839.1 - Shale stringer. 854.1-854.6 - Shale stringer.			1
857.1- 883	25.9'	Shale - med-dk grey, micaceous, abrupt contact fractures @ 30° and 45° to C/A 864-864.8 - brecciated 866.7 - Minor coal stringer 870.3-872.7 - Highly fractured zone. 877-878.7 - Brecciated. 882.5-883 - Brecciated.		Good	1
883- 903.8	20.8'	COAL - Seam 4 Lower - black, vitreous luster 883-885 - argillaceous 885-885.5 - hard friable vitreous 885.5-885.6 - shale, blk, bituminous. 885.6-885.7 - hard blocky 887.7 - Marcasite abd. 887.7-888 - AA 888-888.5 - Shaley coal. 888.5-889.5 - Coal, hard, blocky. 889.5-889.8 - shaley. 889.8-891 - coal, soft, blk. 891-891.1 - shale. 891.1-902 - Coal AA. 902-902.5 - Coal shaling out @ base. 902.5-903 - Shale. 903-903.8 - Shaley coal.		Good	1

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF LED TO CORE AXIS	CORE EVAL.	EST. RQD.
903.8-1028.7	124.9'	Shale - red-dk grey, micaceous. 904 - Coal stringer. 905.2 - Coal stringer. 906-907 - Badly frac - broken. 907.2-908.2 - Interlaminated with x bedded qtz siltstone, hows soft sed loading effects. 909-910.5 - Badly fractured. 910.5-915.4 - Excellent core, some bedding barely noticeable. 915.4-915.6 - Badly frac (hairline). 915.6-916.1 - Laminated siltst-shale - numerous hairline infilled with calcite. Note - abrupt contact. 916.1-920 - Shale, mod sound. 920-922 - Mudstone, lt grey, somewhat calcareous 927.1-927.2 - Coal stringer. 932.2-932.4 - Coal stringer. 933.2-934.0 - dirty coal stringer. 934.5-935.3 - coal stringer. 935.3-940.3 - Shale, v sound, thinly laminated with siltst. 940.3-941.3 - shale, friable with severe weathering. 941.3-941.4 - Coal stringer. 941.4-941.6 - Shale. 941.6-941.7 - Coal. 941.7-942.2 - Shale, fairly sound. 945-948 - Shale. brecciated. 948-954.6 - Shale, highly frac. 954.5-956 - Highly fractured. 956 - 967.3 - Core is sound. Minor frac. 967.3-967.4 - Coal stringer. 968.7-969.2 - Dirty coal stringer. 972.2-973.3 - Broken beyond recognition. 975.0-976.0 - Brecciated Shale. 981-981.6 - Interlaminated siltstone partings. 981.6-985.7 - Brecciated and reinfilled with argil cmt. 985.7-986.4 - Interlaminated siltst. 986.4-998 - Brecciated with infilling of argil cmt. 998-1004 - Good sound core. 1004-1005 - Coaly shale - argil v. soft. 1007-1008.4 - Brecciated shale. 1012.7-1013.7 - Brecciated zone to 55° contact, calcite infill on fracture. 1013.7-1028.7 - Shale with very thin laminae showing X bed in places. Somewhat brecciated towards end of section.	60°	Broken	100%
1028.7-1041.6	12.9'	Siltstone - finely laminated, abd X bed, bituminous sortings, calc well cemented, frac from bedding thruout. Frac at 70°. 1040-1041.6 - Badly frac.			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF LED TO CORE AXIS	CORE EVAL.	RECOV.
1041.6-1106	64.4'	Shale - m-dk grey, micaceous, occasional lamination, calcite infill. 1049-1052 - Siltstone. 1052-1058 - v fn gr SS, qtz & chert, silica cmt, w-sorted, sub ang, m. grey, bituminous. 1058-1058.9 - Shale - abrupt contact to v fn gr SS with calcite on frac. 1058.9-1060 - v fn gr SS, grades into shale. 1063.7-1064 - Interlaminated siltst - X bed. 1064.8-1066.3 - Brecciated shale. 1068 - Bedding @ 50° with fractures. 1069.1-1070.3 - Siltstone. 1070.3-1081 - Brecciated shale. 1081.25-1081.33 - Shale. 1081.33-1081.58 - Coal. 1081.58-1081.75 - Shale. 1081.75-1081.83 - Coal. 1081.83-1082 - Shale. 1082-1082.17 - Coal. 1082.17-1082.25 - Shale. 1082.25-1082.41 - Coal. 1082.41-1082.83 - Shale. 1082.83- 1083.08 - Coal 1083.08-1083.25 - Shale 1083.25-1083.41 - Coal. 1083.41-1083.58 - Shale. 1083.58-1083.83 - Coal. 1083.83-1084.5 - Shale. 1084.5-1084.66 - Coal. 1086-1086.8 - Brecciated shale. 1091-1092 - Brecciated shale. 1092-1096 - Shale - frac infilled with calcite. 1096-1096.3 - Coal stringer - blk shiney hard. 1096.3-1106 - Interbedded siltstones and shales. 1096.5 - Bituminous parting. 1098-1098.1 - Coal parting. 1098.5-1098.8 - Anril coal parting. 1099.5 - Bituminous parting. 1101.8 - Bituminous parting on 45° frac-slickenside. 1103 - fault and displacement noted .1 ft. 1105.7 - Bituminous parting.			
1106-1167	61'	Shale - m-dk grey, micaceous. Core in this interval is mod sound with weathering on frac & brecciated areas. 1113.3-1114 - Lamination due to silty mat. frac infilled with calcite. 1114.8 - Bituminous parting. 1116-1126 - Shale is somewhat silty in several areas. Severely frac. Lamination evidenced, calcite infill in frac. 1127 - Coal parting. 1132.6 - Coal parting.		Broken Vert Fracture	95%

INTERVAL	UNIT THICKNESS	DESCRIPTION	< OF LAD TO CORE AXIS	CORE EVAL.	REC.
		1138.9-1139 - Coal parting - argil. 1142.7-1142.8 - Coal parting. 1148.9 - Coal parting. 1149.3 - Coal parting. 1156.7 - Coal parting. 1157.6 - Coal parting. 1160.9 - Coal parting. 1161.5 - Coal parting. 1162.2 - Coal parting. 1163 - Coal parting. 1163-1167 - Bituminous shale, coaly in part.			
1167-1228.5	61.5'	COAL - Seam #5		1167-1202	100 rec.
		Black, shiney hard, brittle, tr marcasite thruout. 1167-1167.1 - Shale. 1167.5-1168.2 - Shale. 1168.4-1168.5 - Shale. 1169.6-1170.3 - Shale. 1176-1178 - Coal is much softer and seems argil and dirty. 1182-1182.1 - Shale - bituminous. * 1197-1202 - Last portion of coal with HQ size rod. At this point rods stuck in hole. Reduced to NQ size. 1202-1228.5 - Lost bottom 26.6' of Seam #5 due to rods being stuck.			26
1228.5-1315.5	87'	Sandstone Basal. lt-med grey, sub-angular-sub rd, m-sorting, mainly qtzite with some chert and coaly in part, silica cmt, minor chert. The core is moderate sound to highly frac in places. There are areas of high weathering. The rock is frac thruout indicating abd water travel thru the rock. Frac vary from vert to ——— →		60° & 45° to C/A	
		1243.6-1245 - No core. 1248 - Coal parting. 1248-1254 - Highly frac. 1254-1267 - Frac have weathered mat. 1266 - Coal parting. 1267 - Coal parting. 1269 - Coal parting. 1270-1270.5 - Severe frac. 1270.5-1275 - No core. 1275-1276.5 - Severe frac. 1276.5-1280 - No core. 1280-1281 - Severe frac (broken) 1281-1282 - No core. 1282-1284 - Severe frac. 1284-1286 - No core. 1286-1288 - Severe frac. 1288-1289 - No core. 1289-1294 - Core is weathered. There is very little cementation left - water passage. 1294-1298 Sandstone - v cherty, - less qtz. High degree of weathering. Severe frac. &			

INTERVAL	UNIT THICKNESS	DESCRIPTION	< OF FRAC TO CORE AXIS	FORM EVAL.	[illegible] NOTE.
		brecciated thruout. No cement. Mech frac at 30-45° Inherent frac run vert. 1298-1299 - No core. Drillers said v soft possibly coal. 1299-1302 - Core is severely frac but there is good cementing, abd vert frac. 1302-1309.5 - Good sound core. Fractures range ——→ 1307-1308.4 - Very broken. 1310.1-1310.2 - Argil in fill in core. 1310.2 -1315.5 - No core. 1314.6-1315 - Core is broken thruout but there is good cmt.		60° to 45° to C/A	
1315.5-1329.6	14.1'	JURASSIC - [illegible] GROU[illegible] [illegible] - Sh slt - [illegible]. Core reasonably sound. Frac occur along contacts between units. Interlaminated thruout. 1315.5-1316.8 - SS unit, brecciated at top part. 1316.8-1316.9 - Coal parting. 1317.3 - Coal parting. 1318.2 - Coal parting. Frac @ 30°. Slickenside. 1319.4 - Minor fault @ 55°. 1320-1320.1 - Coal parting, slickenside. 1320.3-1320.8 - Almost vert minor fault. 1323 - Frac @ 85°. 1323.8-1324 - Fault with minor displacement. 1324.8 - Coal parting, slickenside, Frac here approx 10°. 1326.3 - Frac area - slickenside evidenced. 1327.3-1328.3 - SS unit. Solid core. 1328.3-1329.5 - Broken interlaminated slt and shale.			

Drill Hole Sample Intervals and

Sample Weights in Grams

Hole No: 75D-01

Interval	Weight (Grams)
398.7-399.8	1045
650-651.2	1705
685.8-687	1820
687-689	2710
689-691	2300
751.1-754	985
754-756	2005
833-835	1780
856-858	1835
858-860	1975
860-861	1225

[illegible]

DIAMOND
~~XXXXXX~~ DRILL RECORD

Hole No.: 75D-02

Property: Sage Creek Coal

Location: North Hill
17,853,830 N
584,790 E

Elevation: 5244' asl.

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: #1

Date Commenced Drilling: August 15, 1975

Date Finished Drilling: August 27, 1975

Date Hole Completed: August 27, 1975

Logged By: James Mitchell and Jim Baker

Date: August 27, 1975

Probed By: Roke Oil Enterprises

Date: August 27, 1975

Total Depth Drillers: 863'

Depth of Overburden: 5'

Total Depth Logger: 860'

Water Level: 5121' asl.

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Ti
		No Bit Record					

Surface Casing: 11'
Total Drilling Time: 312
Total Down Time: 0
Total Footage Chargeable: 863'
Total Hourly Contact: 70 Drill Hrs.
160 Man Hrs.

Standby Time for Logging: 17 Drill H. 41 Man Hrs.
Other Standby Time: 0
Total Chargeable Standby Time: 13 Dri 41 [illegible]
Actual Moving Time Between Holes: [illegible]
Chargeable Moving Time " " : " [illegible]

Remarks:- Lost Circulation @ 35', 56', 276', 632', and 758'.

Quantity of Mud Used:
Quik Gel - 145 Bags
Kwik Trol- 145 Bags
CC16 - 2 bags
Quik Seal - 1 bag
Barite - 2 b
Asbestos - 400 lbs.

Probe Report:

849-0.....Gamma Ray/Neutron.....Logged through HQ Drill Rods
845-0.....Sidewall Density.....Logged through HQ Drill Rods
854-0.....Sidewall Density.....Open Hole
845-0.....Caliper.....Open Hole
854-147.....E-Log.....Open Hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam #1	57.3- 61.6	4.3'	57.5-60.5	2.7'
Seam #2	247.3-273	25.7'	247.75-269.75	22'
Seam #4 Upper	413.5-444.2	30.7'	412 - 442.5	30.5'
Lower	472-484.5	12.5'	471 - 483	12'
Seam #5	713 -732.3'	19.3'	714 - 732.5	18.5'
	743.6-763	19.4'	743 - 761	18'

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF INCL TO CORE AXIS	CORE INTAC.	REC.
0 - 11	11'	Overburden - No samples - Soil & broken rock.			
		Cretaceous - Kootenay Formation			
11 - 26.9	15.9'	Sandstone - m. gy, med. gr., mod. sorted, massive frac. - severely wthrd with lim. stn. - Fe stn thruout along frac. & in porosity. 11-25.2 - massive, occas. frac. 25.2-26.9 - brecciated with bitumen lam., highly wthrd, ironstained.	60° & 50°	Good	99
26.9- 57.3	30.4'	Shale - dk. gy, interbedded with coal thruout, brecciated and/or highly wthrd intervals particularly in assoc. with coal laminae or beds. 26.9 - contact highly wthrd but abrupt 26.9-27.6 -Unbroken shale 27.6-28.5 - broken & brec. coal partings abnt. 28.5-29 - argil. coal 29-31.2 - shale 31.2-33.3 - sh. interlam. with coal, highly frac., wthrd. 33.3-34.2 - shale. 34.2-34.4 - brecciated. 34.4-34.9 - shale. 34.9-35.4 - brecciated. 35.4-35.8 - shale. 35.8-36.1 - brecciated. 36.1-36.8 - shale. 36.8-37.5 - No core. 37.5-40.6 - Massive shale. 40.6-41.1 - Coaly shale. Unconsolidated. 41.1-41.3 - Coal. 41.3-41.4 - Shale stringer. 41.4-42.5 - Coal. 42.5-44.1 - Shale, frac., bit. part., thin bed. 44.1-45.1 - Shale, interlam. with x-bed. sltst. 45.1-45.2 - Bit. sh., thinly bed. 45.2-49 - Sh. with interlam. sltst. 49-51.8 - Shale. 51.8-55 - Shale, badly frac., soft fissile. 55-56 - No Core. 56-56.9 - Shale. 56.9-57.3 - Shale, frac., soft fissile.		Poor to Good	97
57.3-61.6	4.3'	COAL - Seam #1 - abrupt upper contact, gradual lower contact. - generally bright & vitreous. 57.3-57.9 - soft, friable. 57.9-58.4 - hd, fissile, abnt. marc. 58.4-58.8 - hrd. fissile. 58.8 - sh. str. 58.8-59.8 - hd friable. 59.8-60.3 - hd fissile.		Good	100

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF PED TO CORE AXIS	CORE EVAL.	[illegible]
		60.3-61 - soft dirty. 61-61.6 - argillaceous coal.			
61.6- 86.8	25.2'	<u>Shale</u> - dk gy, micaceous, fn. gr., m. sorting. 61.6-62 - fissile. 62-62.2 - brecciated. 62.2-62.9 - fissile. 62.9-64.6 - brecciated. 64.6-66.3 - massive. 66.3-67.7 - h. brec. with coal. 67.7-68.8 - massive. 68.8-71 - No core. 71-72.9 - Massive. 72.9-73.4 - brecciated. 73.4-74 - massive. 74-76 - soft, frac. 76-76.1 - coal stringer. 76.1-78 - h. frac., tr. coal. 78-78.3 - soft, fissile. 78.8-81 - massive. 81-83 - soft, brec. 83-84.6 - hard, fissile. 84.6-86.8 - soft, brecciated.		Good	
86.8-148.2	61.4'	<u>Sandstone</u> - massive, dk gy, fractures infilled with limonite & hematite, surfaces mod.-sev. wthr., fn. gr., slightly micaceous, qtz & chert, argillaceous matrix, w. cmt. fining upwards from very crs. gr. 88-88.2 - gouge zone. 90-90.2 - gouge zone. 90.2-93 - m. gr. qtz & chert, w. cmt. 93-98 - bedded with severely wthrd frac. surfaces. 102.8-103 - Sh. & uncons'd & p. cmt. SS. 103-107.2 - SS fn. gr. dk gy, bed. 107.2-110 - Sh. & oxidized SS. (109 - red sh. - ab. wthrd contact) 110-115 - SS, dk gy, v. fn. gr. highly oxidized, grades to sh. @ 111.5. 115-115.5 - SS, med. gr. white "salt & pepper", massive. 115.5-117 - Shale. 117-148.2 - SS, m. gr., fining upwards from v. crs. gr., sev. wthr. on frac. 145-148.2 - Sh. interclasts abnt., coal lam. thruout, SS frac. along stringers, erosional contact at base of interval, coal stringer.	60°- 45°	Good	
148.2-182.5	34.3'	<u>Shale</u> - dk gy-blk, fissile, micaceous. 148.2-149.2 - shale. 149.2-149.6 - SS, w. sorted, cmt. 149.6-150 - brecciated. 150-157.5 -Shale 153.5 -Coal str. 154.3 -Coal str. 156.7 -Coal str.		Poor to Good	

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	RECOV. REC.
		157.5-158 - Frac. sh. & coal. 158-160 - Shale. 160.1 - Coal str. 160-181.5 - Brec. highly frac. 181.5-182.5 - Shale.			
182.5-208.7	26.2'	Siltstone - interlaminated & x-bedded with shale, core v. hard, relatively competent unit, sedimentary struc. thruout. 204.5-208.5 - tends to shale, frac. @ 60° and 45° to C/A	60° & 45°	Good	
208.7-239.6	30.9'	Sandstone - speckled white & blk, poorly bedded, homogeneous, under contact abrupt, lower cont. erosion surface. Frac. surfaces sev. wthr. ironstain. Core is round - frac. every 6".	60° & 45°	Good	9[illegible]
239.6-247.3	7.7'	Shale - blk., fissile, bituminous. 239.6-239.9 - brec. with coal. 239.9-242.9 - highly frac., bit. partings. 242.[illegible]-243.3 - coal. 243.3-244.8 - interlam. sltst. 244.8-247.3 - h. frac., brec. @ 246.6.			
247.3-273.0	25.7'	COAL - Seam #2 - hard, glossy at top, soft at base, marcasite abnt. grad. contacts. 247.3-248.2 - coal, brec. 248.2-248.5 - Sh., brec. & frac. 248.5-255.3 - coal, hd, hi vit abnt marc. 253.8 - Sh. str. 255.3 - Sh. str. 255.3-256.1 - coal, soft, brec. 256.1-258.5 - coal, hard, hi vit 258.5-259.7 - coal, soft, brec. 259.7-263 - coal, hd, hi vit 263-269 - coal, hd, fissile. 269-271.5 - coal, hd, hi vit mod. fissile. 271.5-271.8 - Sh., bit. blk. 271.8-273 - coal, brec., part missing.		Good	1[illegible]
273.0-411.5	138.5'	Shale - blk., fissile, bituminous, highly brec. in part, lost circulation & no recovery 276-278, calcite infills frac. 274-274.3 - Coaly int. 275.5 - Coal str. 275.7-275.9 - Coal str. 276-278 - No core. 281.5-282.5 - mod. sound core. 283-291 - Sh., mod. sound. 296.5-297.5 - Coaly int. 302-305 - brec. bit. sh. & coal 305-306 - No core.		Poor	9[illegible]

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF LED TO CORE AXIS	CORE EVAL.	EST. REC.
		306-306.5 - brec. bit. sh. & coal. 309.3-310.3 - h. frac. & brec. sh. & coal. 314-314.8 - h. frac. 317-319.5 - coal & sh., frac. & brec. 320.5-320.7 - interlam. sltst. 321.5-322.5 - h. frac. 324.3-324.4 - interlam. sltst. 324.5-325 - brec. coal & sh. 326-330.5 - h. frac., p. rec. 337-338.5 - brec. 341.5-343 - brec. coal & sh. 346.6-347.3 - High frac. 350-362 - h. frac., brec. 353-353.4 - coal, argil. 368-374 - interlam. sltst. sh. 374.6-375 - h. frac. 375-378 - No core. 378-411.5 - h. frac. & brec.	30°		
411.5-444.2	32.7'	COAL - Seam #4Upper		Mol.	
		411.5-411.7 - brec. coal. 411.7-411.9 - shale. 411.9-412.1 - bit. partings. 412.1-412.4 - hd. bit. bl. sh. 412.4-418.7 - friable vit. coal. 418.7-423.3 - v. soft muddy coal. 423.3-424.5 -no core 424.5-428 -coal, as above. 428-428.5 -no core 428.5-432 -coal, as above. 432-432.5 -coal v hard fissile 432.5-433 - bit., bl., shale. 433-434 - argil. part. in coal. 434-435 - v. soft mud. , partly missing 435-435.5 - no core. 435.5-443 - coal, hard, fissile. 443-444.2 - coal, hd., fissile.	30°		
444.2-470.2	26'	Shale - m-dk gy, micaceous 444.2-450 - wthrd frac. surfaces, bit. partings. Competent core - frac. thruout - no pattern. 450-470.2 - highly broken, brec., soft argil.			
470.2-486.8	16.6'	COAL - Seam #4Lower			100
		470.2-475.7 - coal hd. fissile, abnt. marcasite, high vit. 475.7-484.5 - coal soft argil. low vitrain. 484.5-485.1 - sh. bit. mica. 485.1-485.6 - coaly sh. 485.6-485.7 - sh. 485.7-486.0 - argil. coaly sh. 486.0-486.1 - sh. 486.1-486.3 - sh. vit. banding. 486.3-486.8 -coal hd fissile			
486.8-586.8	100'	Shale - m-dk gy, micaceous. 492.2-493 - brec. 494-497 - high-sev. frac. 500 - coal part. 509.4 - coal part. 510.5-510.7 - brec. zone. 510.7-513 - frag. zone.			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE INTERVAL	[illegible]
		513-514.5 - bit. sh. v. coaly hard. 515-515.3 - coal, argil. dirty soft. 520.5-520.7 - sev. frac. 526.3-528 - h. frac. 528-538 - slt t. lamin. 530 - vert. frac. 538-541.1 - sltst. sed. minor band of sh. thruout, v. competent core. 540.6 - 45° frac. surface. 541.1-543 - sound core. 543-545.5 - frac. vert. invasion / mud. 546.6 - twig fossil on break. 546.6-557 - silty sh., banding evident. Core is mod. snd. 557-562 - brec. silty sh. (560.5 - conc. of marc.) 562-565.9 - sltst., v. fn gr. SS evid., extreme soft sed. deposition. 565.9-569 - sltst., v. soft, brec. (watergoss.). 569-569.8 - v. fn gr. SS. 573.5-574.3 - calcite xls., water passage. 574.3-575.5 - interbed. v. fn gr. SS & sltst., show soft sed. dep., minor fault .05" 575.5-582 - interbed. v. fn gr. SS. 580.5-582 - brec. zone. 582-582.5 - v. fn gr. SS. Sh. laminae. 582.5-584 - sev. frac. zone, frac angle - 70°, contact has gouge mat. Sev. wthr. water zone. 584-586.8 - sound core. 586.5 - 60° frac., slickenside, silica infill assoc. with fault zone.		20°	
586.8-652.2	65.4'	<u>Sandstone</u> - lt gy, fn-m. gr., m. sort, sub. rd.-sub. ang., silica cmt., generally thin bed, but core is massive, occas., x-bed, mod. sound but vert. & near vert. frac. thruout. Top part of section evid of bit. part. 586.8-589.4 - SS, brec. zone, extreme wthr. zone, 25% high frac., no cmt., soft fissile. 591.5-592.9 - vitrain parting thruout - sh. and interlam sltst. 594.2 - coal part. 594.7 - coal part., sev. frac. 595 - coal part. 595-597 - frac. sh. to interlam sltst. & v. fn gr. SS. 597-602 - partial rec. of one foot - shaley SS. 602-603.7 - SS, AA mod.-h. frac. 602.4 - coal part. 603.7-605.1 - interlam. bl. sh. & sltst., soft sed. dep. 605.1-605.9 - SS, AA. 605.9-606.7 - Interlam. sltst. & sh.			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FSD TO CORE AXIS	CORE EVAL.	EST. REC.
		606.9-608 - SS, AA. 608-608.5 - Interlam. sltst. & sh. 610 - 45° frac. minor fold evid. 612-612.5 - part. of sh. & sltst. 614.8-616 - sev. frac. SS 616-618 - part rec. 621.9 -coal part. 625.2-625.4 - bit. part. (sh.) 625.4-647.8 - core is mod. sound, minor vert frac., minor x-bed., sh. chips toward bottom of sec. 634.5-635 - no cmt., sev. wthrd water passage. 647.8-650.3 - SS, mod. frac. 650.3 - coal parting. 650.9 - coal parting. 651.4 - coal parting.		Vert. frac.	
652.2-706.7	54.5'	Siltstone - interlaminated, lt gy, mica, g. sorting, qtzite. The core is mod. sound with frac. running from vert.-bed (60°), hairline frac. thruout. 652.5-653.5 - interlam. sltst., v. fn gr. SS. 654-655 - sev. frac., brec. sltst. 656.5 - coal parting. 657.5-652 - brec., no cmt., water pass. sltst. 663.5-663.3 - sev. frac. 663.9-664.8 - sev. frac. 664.7 - frac @ 70°. 672.1 - coal part. 675.6 - coal part. 683.9-684.8 - brec. zone, gouge mat., water tr vol. 687.8 - coal part. 690.1-690.3 - bit. sh. part. 694.1-694.4 - brec. bit. sh. 704.5-706.7 - brec. sh.	60° 70°		
706.7-713	6.3'	Shale - bituminous, black, argil, v. soft.			
713 -763	50'	COAL - Seam #5 713-714.1 - mod. hd.hi vit 714.1-714.7 - v. hd., abnt. marc., hi vit 714.7-715 - soft argil. 715-716.2 - mod. soft argil. 716.2-717 - v. soft, argil. 717-719 - No core. 719-721.2 - mod. hd. hi vit 721.2-721.3 - shale, bl. 721.3-721.8 - mod. hd.hi vit 721.8-721.9 - sh. 721.9-722.7 - mod.soft. 722.7-723 - No core. 723-727 - mod. hd.hi vit 727-730.1 - interlam. sh. & coal, v. hd., bit. 730.1-732.3 -mod hd hi vit 732.3-733 -Shale, hd 733-733.9 -no core 733.9-734.1 -shale 734.1-734.6 -coal fissile			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.
		734.6-734.7 - bit. sh. 734.7-735.3 - soft coal. 735.3-736.5 - shale. 736.5-737 - No core. 737-738 - sh. 738-739 - mod. soft argil. bl. 739-740 - No core. 740-740.1 - Sh. 740.1-742 - v. soft mushy. argil. (water). 742-743.6 - No core. 743.6-744 - mod. soft, fissile. 744-745 - v. soft mushy. 745-746.3 - mod. soft fissile 746.3-748 - v. soft. 748-758 - No core. 758-760.1 - v. soft. 760.1-763 - mod. soft, fissile.		
763 -839.2	76.2'	Sandstone (Basal) - lt gy, qtzite, silica cmt., w. rd, m. sort., minor coal in sort. 763-764 - No core. Contact not def. 764-793 - severe frac. 764.7 - rouge mat. on frac. - sev. frac. 765.5-765.8 - bit. part at top, hd sh. 765.9-770 - gouge zone, argil, soft, water. 770.5 - rouge zone, AA. 772.6 - argil. infill on frac. 772.7 - No cmt., frac. 775.8 - sev. wthr., frac. on bed, water course. 777.5 - partial decmtation on frac. 784 - gouge zone on frac. 785 - frac. 70°, decmt., argil infill, wthr. on frac. surfaces, high frac. 793-805 - Core sound, mod. frac. & wthr. 805-806.5 - mod. sound. 806.5-808 - h. frac., decmt., water zone. 810-812.5 - h. frac., partial decmt., water. 812.5-813 - No core. 813-828 - SS, sev. frac. thruout. 813-815.7 - decmt. water passage. 816-817 - AA 817.2 - Frac. 215°. 819-820 - decmt., water passage. 826-828 - No core. 828-838 - Core is mod. sound, grades fn gr. 838-839.2 - good.		
		Jurassic - Fernie Group		
839.2-86[illegible]	238'	Passage Beds abrupt contact wthrd/brec zone bl shale, thin bed with sltst to v fine gr ss grading		

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	SPEC. REC.
		into siltstone to v. fn. gr. SS, v. well cmt. and competent, micaceous.			
		842-843 - breccia. 845.8-846.1 - breccia. 846.4-846.9 - breccia. 849.3-850.3 - breccia. 848-851 - sev. frac., mod. decmt. 852-853 - sev. frac.			
	863'	Total Depth.			

Drill Hole Sample Intervals and
Sample Weights in Grams

Hole No: 75D-02

Interval	Weight (Grams)
57.5-59.5	2075
59.5-60.5	1180

[illegible]

DIAMOND
~~XXXXXXXX~~ DRILL RECORD

Hole No.: 79D-03

Property: Sage Creek Coal

Location: North Hill
17,852,657N
586,158E

Elevation: 4562' asl.

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: #2

Date Commenced Drilling: August 24, 1975

Date Finished Drilling: September 6, 1975

Date Hole Completed: Abandoned September 6, 1975

Logged By: J. Baker and J. Mitchell

Date: September 6, 1975

Probed By: Not Probed

Date: ——

Total Depth Drillers: 337'

Depth of Overburden:

Total Depth Logger:

Water Level: Flowing

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time
		N/A					

Surface Casing: 154' (left in hole)
Total Drilling Time: 262 hrs.
Total Down Time: 3 hrs.
Total Footage Chargeable: 337'
Total Hourly Contact: 134 hrs.

Standby Time for Logging: Nil
Other Standby Time: 17 hrs.
Total Chargeable Standby Time: 17 hr.
Actual Moving Time Between Holes 34 h
Chargeable Moving Time " " 34 h

Remarks:- Flow at 337' measured @ greater than 200 gals./min. Water first encountered @ 117' @ approx. 10 gals./min.

Quantity of Mud Used:
Quik Gel - 137 bags
Kwik Trol- 47 bags
CC16 - 2 bags
Cement - 5 bags
Asbestos - 1
Diesel - 8 g
Kwik Seal - 50 lb.

Probe Report:

Not Probed.
Hole abandoned @ 337' due to extreme artisian water pressure.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
No Coal.				

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FED TO CORE AXIS	CORE EVAL.	ESTR. REC.
0 - 57	57'	Overburden - glacial till - possibly some Tertiary clay indurated gravels from 30' to 57'.			
		Cretaceous - Blairmore Group			
57 - 78	21'	Siltstone - lt. gy., micaceous, silica cmt., mod. sound core. 58-58.7 - vert. frac., hem. st on frag. 59.6 - 45° frac. 62.5-68.7 - frac. zone, conglo in nature, minor bit. part. thruout. 65.6 - coal parting. 66.3 - w. cmt. 68.7-73 - good core, sound 73-73.6 - v. fn. gr. SS, argil matrix, hem. st., water passage. 73.6-75.7 - AA better cmt. 75.7-78 - Sound core.		Mod. Sound	
78 - 111	33'	Conglomerate - lt. gy. (multi-coloured chert qtzite peb.), sil. cmt., p. sorting, matrix of fn.-crs. gr. SS, peb. of chert & qtz. Wea. r.-sub rd, compt. minor 83.5-84.2 - Br. v. soft bit. SS. 86.5 - Frac. hem. st., soft argil., water. 87-88.3 - crs. SS grades downward to conglo. 87.9 - Bit. part. 98.5-99.5 - Frac. brec. hem. st., water zone.	60° & 45°	Mod. Sound	
111 - 138	27'	Sandstone - v. fn. gr.-crs., qtz. & chert, conglo. in part., silica cmt., m. sorting. 111-111.2 - Shale, soft 111.2-113.5 - Compt. sh. 113.5-114.1 - Soft SS, br. argil. 117.3-118.7 - Frac. zone, hem. st. partial de cmt., abnt. Fe st. 127-130.5 - Sev. frac., brec., fault? 131.5-132.5 - Frac. zone 133-135.5 - Argil.SS, bit. part. 137.2 - Fault, gouge mat.			
138 - 170	32'	Conglomerate - AA mod.-h. degree of wthr., marcasite thruout, clay gouge mat. 143.4-143.7 - Coal part. 144.3 - SS contact. 144.3-145 - Shaley 145 - Abrupt contact, gouge mat. to compt. SS AA Frac. 45° vert.	60°		

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF TED TO CORE AXIS	CORE EVAL.	[illegible]
		148.3-153.8 - Conglo., short peb., silica cmt., p. sorted, marcasite. 153.8-157.3 - Shale, bl., abnt. plant fossils. 158.3-158.6 - Shale AA 158.6-161.1 - Poor rec., core shattered, p. cmt., Fe st. (lim.)			
		Cretaceous - Kootenay Formation			
170 - 217	47'	Sandstone - fn.-c. gr., X-bed., carb., m. gy. 179-185.7 - Shale, dk. gy.-bl. Fissile. 180.6-181 - soft sed.def. / fn. SS slumps. 184.7-184.7 - interbedded with SS below. 185.7-194.7 - SS, v. crs. gr. basally, grades to fn. gr. carb. mass x-bed. / coal, mod.-w. cmt. 194.7-200.4 - Sh., m-dk. GY., silty in part, slightly fissile, SS def. with slumped crs. SS, shale frags. 199-200. 200.4-217.4 - SS thinly lam., x-bed., conglo. basally, gen. med. gr., m-dk. GY., tr. mica., silica cmt. 200.4-201.7 - Slumped sh. chips, m-crs. gr. 201.7-202.3 - Coaly, soft argil. 211.7-212.7 - Coal str. 212.7 - Base Conglo. carb., mod. cmt.			
217 - 316	99'	Shale - dk. br.-bl., bit., abnt. plant fossils, marcasite thruout. 221-224 - interlam sltst./ sh., tr. marcasite. 224-225 - bl. carb., fissile. 244.4 - slightly silty, macaceous. 251-253 - Mech broken 253-254.3 - soft broken bl. silty sh. 254.3-260 - coal & bit. sh. inter. 260-265.3 - sltst., sh. x-bed., interlam. 276-276.6 - missing. 277.8-279 - claro vit., mod. hd., bright, tr. marc. 279- 82.8 - bl. bit. sh., abnt. marcasite, brec. in part with clay. 282.8-284 - bit. bl. sh. brec. 284-284.6 - soft coal. 284.6-287.1 - bit. bl. sh. 287.1-288 - Coal arg. dirty mod. dull claroin - missing .4 @ bottom. 288-290.1 - bit. bl. sh., vert. frac.			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	REC.
		290.1-290.4 - dk. gy. sh., micaceous. 290.4-300 - bit. bl. sh., tr. marcasite. 300-316.6 - med.-dk gy. sh., micaceous, somewhat silty. 312.6 - frac.' bed. 311-313 - x-bed. interlam. 313 - good contact.			
316 - 337	21'	<u>Sandstone</u> - med. gy, med. gr., qtz. pred. sub rd., silica cmt., mod. sort., mod. sound. Frac. @ 45°, Frac. along bed. bit. part. 322-325 - Carb. 325-327 - Sev. frac. @ 30° Remaining core brec., v. carb., tr. pyrite. mod. sound.	45°		
	337'	Total Depth Hole abandoned due to extreme artesian water pressure.			

DIAMOND DRILL RECORD

Hole No.: 75B-03A

Property: Sage Creek Coal

Location: North Hill
17,894,622N
586,159E

Elevation: 4563' msl.

Contractor: Conners Drilling

Hole Size: BQ

Rig No.: Rig #2

Date Commenced Drilling: September 29, 1975

Date Finished Drilling: October 10, 1975

Date Hole Completed: October 16, 1975

Logged By: E. Wilson

Date: October 10, 1975

Probed By: Roke Oil Enterprises

Date: October 10, 11, 1975

Total Depth Drillers: 978'

Depth of Overburden: 30'

Total Depth Logger: 972'

Water Level: Flowing

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Ti

Surface Casing: 55'
Total Drilling Time: 228 hr.
Total Down Time: 0
Total Footage Chargeable: 978'
Total Hourly Contact: 84

Standby Time for Logging: 17
Other Standby Time: 58 hr.
Total Chargeable Standby Time: 91
Actual Moving Time Between Holes: 1
Chargeable Moving Time " " : 2

Remarks:- Fault intersected @ 393', displaces aprox. 280' of stratigraphy. Hit aquifer at 901' - aprox. 10 gals./min. Attempted to install pneumatic piezometers, but after 5 days abandoned attempt.

Quantity of Mud Used:
Quik Gel - 107 bags
Quik Trol - 107 bags
CCLD - 2

Probe Report:

975-0.....Gamma Ray/Neutron.....Through BQ Drill Rods.
965-0.....Sidewall Density.....Through BQ Drill Rods.
974-0.....Sidewall Density.....Open Hole.
974-0.....Caliper.....Open Hole.
976-46.....E-Log.....Open hole.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam #2	Faulted Out.			
Seam #4B	431.7-454.8	23.1'	431-454.5	23.5'
Seam #4L	491 -522	31'	492.25-520.25	28'
Seam #5	797 -812	15'	796-811	15'
	859 -878.3	19.3'	863 -876.5	13.5'

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE LEVEL	[illegible] DESC.
0 - 55	55	Overburden Fill & till, weathered rock, sand & clay.			
		Cretaceous-Blairmore Group			
55 - 88	33'	Sandstone - vf. to f. gr., bl. cht., well cemented, micromica 55-58.5 - vf. gr. SS, micromica., poor recovery, and soft carb. sandstone. 58.5-62 - Coaglte., highly crushed, part decom., water zone. 62-65 - Sound. frac @ 45°. 66-67 - Highly frac., iron-stained. Sandstone tends to coarsen downward with stringers of granule-sized material throughout. 69 - Fracs. with lim. sly. gouge. 70.6-78 - Sh., dk. gy, silty.	55°	J 45° J 45°	8[illegible] 1[illegible] 4[illegible] rec
88 -156	68'	Sandstone & Conglomerate Intrd. 88-95 - SS-conglte., highly frac. @ 98' is 2" coal str. 95-107 - Congl., typ. Cadomin cgl., part decom from 99-105. 107-114 - Mudstone, carb., tr. py. coal along bedding, splits along bedding. 114-122.6 - SS - dk. gy to bl. Prom. bdg. fracs., mod. broken, congl. in part. 122.6-125 - Coaglte SS, pebbles sml.-med., well cmt.	50° 65°	J 50° J 65° J 25°	9[illegible]
156 -176	20'	Conglomerate - typical Cadomin. - bl. chert pebbles, sub rd. to 15 mm. - well cemented.			
		Cretaceous-Kootenay Fm.			
176 -191	15'	Siltstone - grades to vf. gr. SS, laminated abnt. bdg. frac. @ 55°. 176.5 - Jtg. cuts bedding @ 40° - 1/8" gouge. 187-191 - dk. gy, massive compact, sound.	55°	J 55° J 40°	9[illegible]
191 -223	32'	Sandstone - m.-c. gr., badly broken, prominent low jointing @ 194' soft decom. 199-200.8 - broken, gouge y zone, water course. Overlies clay band. 200.8-204 - Clay, soft, brec. with sandy infilling. N.B. may be fault zone. 217-217.8 - Cgl., broken, decom.		J 20° Core is sound	

INTERVAL	DRIT THICKNESS	DESCRIPTION	∠ OF LED TO CORE AXIS	CORE EVAL.	[illegible]
		219.8-220.4 - soft clay zone, carb. in part, SS tends to become congl. at base.			
223 -316	93'	Shale - dk gy, massive, carb. soft throughout, split by numerous hairline fracs., par. & perpt. bedding. Fracs. readily along bdg. 233-234.5 - silty. 235.6-236.2 - Coal, abnt. marc. 242-242.8 - Coal str. - vitrain. 243.2-243.6 - coal. 247.5 - coal str. 248 - becomes silty, silty to 278'. 278 - sh. is bl. & carb., broken. 282.6-282.9 - Coal. 284.5-285.0 - claro vitrain with marc. 290.7-290.9 - coaly partings, foliation frac. @ 75°. 293-301 - Sh. silty, finely lam. 301-304.5 - Sh. gy to bl., carb., muddy. 302-302.5 - durain. 304.5-316 - Sh., mod. to dk. gy, becomes silty, compact, sound.	60° 75° 60°	@ 25° & [illegible] Sound Core @ 25° @ 25°	[illegible] 24[illegible] 27[illegible] 27[illegible] [illegible]
316 -367	51'	Sandstone - Lt. gy, finely lam. sltst. at top for 4', grades through f.g. SS to c.g., S & P, compact SS. Generally sound throughout. 321-324 - badly frac., fine carb. lam. 340-351 - arg., soft, carb. str decem. from 342-346. 355-357.5 - abnt. fine coal str. 357.5-359.2 - Sh. blk.-brn., massive and cart., brec. with sandy infill. 359.2-367 - KOOTENAY CONGL. bl., S & P, silica cem. pebbles to 10 mm., badly frac. by low ∠ jointing.	60°	@ 25° Sound Core. @ 25°	
367 -431.7	64.7'	Shale - Dk gy to bl. brn silty, lam @ 60°, Jointing @ 25°. Generally broken. Core lost section 381-393. Rec. 10%. 367-369.2 - Siltstone, lt.-med. gy, arg., brec., gougy. 367-367.2 - muddy gouge zone. 369.2 -370.2 - muddy gouge zone. 393-393.6 - Coal, vitrain, high marc. crushed. Below coal grades into broken brec. sh. with coal frags. 393-400 - FAULT ZONE ?? 393.6-400.6 - Breccia, sh., breccia openings mud-filled. Frags are angular, core is intact. 400.6-404 - SS, f-m gr., brec. infilled with mud. 404.6-404.8 - carb. sh. broken.	60°	@ 25° Core broken, gougy	1[illegible] 9[illegible]

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FED TO CORE AXIS	CORE EVAL.	ESS. RES.
		404.8-407 - Sh. bl. brec. w 40% muddy slickensides @ 45° soft.		@ 45°	
		407-431 - Sh. dk gy to bl. Generally f irly sound with low angle jointing, calcite coating joints. 413-414.2 - carb. sh. at base - soft mushy.	75°	@ 25° J f 75°	
431.7-454.8	23.1'	COAL HORIZON - Seam 4U			
		431.7-432 - cl. 432-432.2 - carb. sh., hard, marc. 432.2-433 - cl. fus. abnt. marc. 433-438.3 - clarain with vit. bndg. 438.3-438.5 - sh., hard, carb., marc. & amber sh. frac. 438.5-439.5 - clar. with vit. 439.5-440 - carbarg., brn-bl. v. hard. 440-440.2 - clar. with vit. 440.2-440.9 - carbarg. 440.9-441.2 - clarain & vit. abnt. marc., compact. 441.2-441.3 - carbarg. 441.3-441.5 - clar. hard, compact. 441.5-442.2 - durain, slickenside, compact. 442.2-442.4 - carbarg. 442.4-442.8 - claro. vit. 442.8-445.4 - carbarg. 445.4-445.8 - clar. vit. bndg., marc. 445.8-446.2 - carbarg. to clarain. 446.2-446.8 - clarain, vit. bndg. 446.8-447.5 - carbarg. 447.5-448 - clar., vit. bndg. 448-452 - clar., soft mushy (coal loss) 452-454.8 - soft mushy coal (coal loss). * Recoveries (see overleaf)			Coal. [illegible] 44[illegible] [illegible] 45[illegible]
454.8-491	36.2'	Shale - dk gy blk, gen. sound, compact, finely lam. with silty str. 454.8-455.8 - soft arg. muddy. 457, 458, 458.5 - coal str. 460-461.5 - frac. calcite infill, carb. str., low angle jointing @ 20° @ 461, 462, 474, abnt. bed ing frac. @ 75° becomes silty basally to v-f gr. SS. 473-475 & 476-478 - badly frac. v-f gr. SS at base is very intact, however with numerous hairline fracs. @ 25°.	70° 75°	Broken to sound basally @ 20° @ 75° @ 25°	10[illegible]
491 -522	31'	COAL HORIZON - Seam 4L			
		491-491.3 - Sh. soft carb. & coaly. 491.3-491.8 - Mudstone, bl., carb. vit. bndg., marc. 491.8-492.2 - fusain & durain. 492.2-493 - Mudstone, carb. & fusain.			

Seam 4U

Recoveries

428-433	4/5
448-452	2.5/4
452-454.8	2/2.8

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF PED TO CORE AXIS	CORE INTERVAL	REC.
		493-493.6 - Durdtene, num. vit. str., marc. & sh.			
		493.6-494 - Carbarg. with clar. & vit. bndg.			
		494-494.5 - Durdtene, bl. carb. vit bndg.			
		494.5-495.4 - carbarg. clar. vit. & Marc.			
		495.4-495.8 - claro-vitrain.			
		495.8-496 - carbarg.			
		496-496.1 - vitrain.			
		496.1-496.3 - carbarg. vit. bndg.			
		496.3-497.1 - carbarg. clar-vit. & marc.			
		497.1-497.4 - clar. & fusain.			
		497.4-498 - durain with abnt. vitrain.			
		N.B. Top is very shaley. Clean coal possibly starts @ 497'			
		498-498.8 - Clar.			
		498.8-499.2 - Clar. & durain.			
		499.2-500.4 - Clar. & fusain.			
		500.4-500.5 - amber in coal matrix.			
		@ 500.5 sh. str.			
		500.5-501 - clarain.			
		501-502.4 - clar. & vit.			
		502.4-502.6 - clar. & fusain.			
		@ 502.6 sh. str.			
		502.6 - 503.1 - clar. & fus.			
		503.1-504.5 - clar. & vit.			
		504.5-504.6 - carbarg.			
		504.6-505.6 - claro-vit.			
		505.6-506.6 - clar., vit. bndg. tr. marc.			
		506.6-506.8 - clar. & fus.			
		506.8-507.2 - durain.			
		507.2-508 - dur., vit. bndg.			
		508-509 - clar. & fus.			
		509-509.2 - dur.			
		509.2-509.3 - sh.			
		509.3-509.7 - clar.			
		509.7-509.8 - sh.			
		509.8-512 - clar. vit. & marc.			
		512-516 - fusain.			
		516-518 - clar. vit. & marc.			
		518-518.5 - sh. hard bl.			
		518.5-521 - clar. hard marc.			
		521-521.2 - carbarg.			
		521.2-521.8 - clar.			
		521.8-522 - carbarg.			
		* Recoveries (see overleaf)			
522 -593	71'	<u>Shale</u>			
		- dk gy-bl., massive, compact, low angle frac. @ 25° & also @ 60°		J 25° J 60°	
		525 - coal str.			
		543-544 - v-f gr. SS gr. to sltst.			
		551-553 - Core broken.	60°		
		557 - Coal ptg.			
		558-558.7 - carb., sh. & claro-vitrain.			
		556 - coal str.	60°		
		563-567 - abnt. low angle 25° jtg.		J 25°	
		566 & 572 - Coal str.			100
		Section continues as a rather uniform laminated silty sh. Prominent joint sets orientation @ 25° & 60°.		J 25°	
		60° are gen. foliation planes.		J 60°	

Seam 41

Recoveries

491-493	1.5/2
498-503	4.3/5
503-508	4.5/5

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	[illegible]
		582-587 - Siltstone. This is very dense, brittle, breaks with conc. frac. into frags. up to 50 mm almost chert-like. Towards base becomes grained.			
593 -598	5'	Sandstone - Lam., v-f gr. ↑ top, coarsenin downward. is med. to lt. gy, S & P silica cement, sub a. & well sorted. 595-599 - Frac. along coaly partings.	55°	Con. Sound	1
598 -653	55'	Shale grading to Siltstone - scattered v-f gr. s ndy lenticulen and thin carb. lenses & str. Sh. is med. to dk gy. Variably silty in laminations ∠ 60°. ∴ 596, 597 & 605 coal ptgs. to 5 mm. 598-620 - broken frac. prom. along bedding planes. 607,613,619 - J 25°. 620-624 - Core is intact, consisting of finely lam., highly x-bedded silty sh. Few bedding joints. 644-645 - Brec. with clay infil. 646.5-653 - v-f gr. SS gr. to siltst., lam. low angle jointing.	60°	J 60° J 25° J 60° J 25°	
653 -663	10'	Shale - Dk gy to bl., carb. 654.0-655.6 - Sh & coal intbd. Coal is clar. & vit. bnds. 658.3 Coal str. 659 -660.2 - Coal, hard, carbang with durain & vit. bnds.			
663 -758	95'	Shale Grading to Siltstone - Lt. to med. gy. Generally sound & intact with few L angle joints. 670.1 & 677 - Coal str. 678.3-678.8 - Coal str. 686 - Core is frac. 25° joints. 695 - Low angle frac. Core is broken, muddy. 700.5 - Low angle frac. silty along jts. Poss. water course. 703.9-705.7 - Sh. with soft coal str. Section continues as silty sh., generally intact with minor jointing & calcite coating fracs. 722-723 - Bl. sh. str. with fine coal lams. 724-751 - Jointing ∠ 25° to core. Silty shale is finely laminated ∠ 75°-90°. Core is generally highly mechanically fractured.. 2 joint sets 25° & 60°. 749 - Coal ptg. 50 mm.	75° 75°	J 25° J 25° J 25° J 25° J 60° J 25° J 60°	

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	REC.
758 -763	5'	Mud. tone - V. dk. gy to bl., carb. 759-760.3 - numerous thin coal stgs. Core is badly broken. Grades to silty shale.	75°		
763 -791	28'	Shale Grading to Siltstone - Sh. gr. to sltst. Lt. to med. gy, finely laminated ∠ 75°. Grades to v-f. gr. SS from 763.5 to 766. 763 - calcite infill on frac. 768-769.3 - Bl. sh. with coal str. 774 - Core badly shattered 25° jntg. 773-791 - Sh. dk gy to bl., tr. silty. Quite intact to 785'. 783-788 - sl. silty lam. ∠ 60°-65°.	60°-65°	30°	
791 -812	21'	COAL DESIGN - Seam #5 U 791-791.3 - Clarain. 791.3-792 - Carb. shale. 792-792.4 - Shale. 792.4-793 - Fusain, soft, mushy. 793-794.4 - Shale, hard, bl. calcite filled hairline frac. 793.5'. 794.4-795.7 - Durain, arg., soft mushy. 795.7-796.3 - Shale, bl., carb. fairly hard. 796.3-797.6 - clare-vitrain, durain bndg. 797.6-798.2 - Shale (core lost-sh. frags.). 798.2-800 - Clarain, durain bndg., hard. 800-801.1 - Clarain. 801.1-801.2 - Sh. str., hard. 801.2-803.7 - Durain, seat. vit. bndg. arg. 803.7-803.9 - Shale. 803.9-806.4 - Cl. durain bndg. arg. 806.4-807.8 - Cl. & durain, soft mushy. 807.8-808.2 - Sh. bl. carb., few coal strs., marc. 808.2-810 - Clar. & vit. bndg., fusain & marc. 810-810.2 - Sh or bl. carbarg. 810.2-812 - Fusain, soft, mushy with clarain & some vitrain. Recoveries 789.5-793.0 Rec. 3.0) 793.0-798 Rec. 4.5) Overall Rec. 803.3-808 Rec. 0.9) 808 -812 Rec. 3.5) 90%.		Core Eval. Poor.	90
812 -823	11'	Shale - med. gy silty. Few random hairline white calcite str. up to 3 mm. Sound to 816', then broken to 823. 812-812.9 - Bl. shale. 819.5-820.5 - scattered thin coal lams. & str.		Sound.	

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	COL. EVAL.	EST. REC.
823 -859	36'	Siltstone & Silty Shale - Lt. to med. gy-brn., finely laminated showing x-bdg. At top gr. to v-f. gr. compact SS. Fracs. along bdg. otherwise core is intact. Random hairline calcite frac. from 823.5'-824'. 826.6-828 - Sh. dk brn.-bl., v. carb. with seat. coal str. 831-836 - Sh. bl. carb. easily broken. 848-856.5 - Sh. dk gy-brn. bit. intact, few fracs. long fol. 70° joints 60°. 856.5-857.5 - Soft carb. sh. minor coal str. 857.5-859.4 - Shale, bl. soft mud or gouge from 857'-858.5'.	70° 70°	J 70° J 60°	95
859 -878.3	19.3'	COAL SEAM - Seam #1 859-859.4 - Sh. 859.4-861.1 - Fusain, soft mushy. 861.1-861.4 - Sh., blk. 861.4-863 - Fusain, soft, mushy arg., fetid odor, tr. of clar. bndg. 863-863.3 - Sh. bl., few tiny coal lens. 863.3-869 - Durain & fusain, very soft mushy arg. - core lost, tr. clar. bndg. 869-873 - Coal, very soft mushy. Appears as finely crushed clarain & durain. 873-878.8 - Clarain, str. of vitrain, shaley & durain, more. 878'. Core soft crushed. 878-878.3 - fusain, soft mushy. Recovery 853-863 - Rec. 4.5/5.0 863-867 5 Rec. 2.5/4.5 Water at base of Seam 5 reported 25 GPM.		Core is soft & mushy.	75
878.3-958	79.7'	Sandstone Bowl - Med. gy to v. dark, arg., S & P M. to cg. silica cement. Core is badly shattered. Core is riddled by numerous low angle 30° joints that are often very soft & decemented. Also sets of 60° joints. Driller reports water inflow @ 901'. 878-880.6 - Badly fractured & jointed. 907-948 - Core extremely shattered & all rubble. This may be due to instng. 30° & 60° joints. Individual pieces are sound, not weathered or washed. Recoveries 907-908 - Rec. .2/1.0) 908-912 - Rec.1.5/4.0) 912-917 - Rec.1.5/5.0)	70° 70°	J 30° J 60° Core extremely shattered and broken.	30

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INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FED TO CORE AXIS	CORE EVEL.	[illegible]
		917-921 - Rec. .7/4.0) 921-924 - Rec. .5/3.0) + 30% 924-928 - Rec. .7/4.0) Rec. 928-930 - Rec. .2/2.0) 930-933 - Rec.2.5/3.0) 933-934.5 Rec. .5/1.5) 937-943.5 Rec.1.0/5.5) 943.5-948.5 Rec. 1.5/5.0 948-958.5 - Core continues as med. to dk. gy, arg. SS that is f. to mg., well sorted. Contact round. Few low angle jts.	70°	1 75°	
		Jurassic - Fernie Group.			
958 -967	9'	Shale and Siltstone - Ribboned or laminated (lams. to 1" wide) of dk brn to bl., carb sh. and lt brn-gy arg. siltst. Abnt. fracs. along bedding ∠ 70°. Core is sound, competent although some 1" bands of sh. are very carb. & soft. 964.5-967 - Bl. arg. sh., jts are carb. & soft.	70°	[illegible] und. & 75°	[illegible]
967 -978	11'	Siltstone - dk brn to bl. argillaceous, with very fine hairlike laminations of v. f. gr. SS., gr. siltst. ∠ 70°. Core is sound but 30° & 55°-60° joints well developed & pyritized.	75°	J ° J 75°	
	978'	TOTAL DEPTH			

Drill Hole Sample Intervals and
Sample Weights in Grams

Hole No: 75D-03A

Interval	Weight (Grams)
794-797	3020

DIAMOND
~~XXXXXX~~ DRILL RECORD

Hole No.: 75D-04

Property: Sage Creek Coal

Location: North Hill
17,896,213N
584,769E

Elevation: 5088' asl.

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: #1

Date Commenced Drilling: August 28, 1975

Date Finished Drilling: September 2, 1975

Date Hole Completed: September 2, 1975

Logged By: James Mitchell

Date: September 2, 1975

Probed By: Roke Oil Enterprises

Date: September 2, 1975

Total Depth Drillers: 247'

Depth of Overburden: 45'

Total Depth Logger: 247'

Water Level: Full
(drilling mud)

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Ti
	5⅞	Tri-Cone		0	60	60'	
		HWK Carbide Insert		60	247	187'	

Surface Casing: 65'
Total Drilling Time:
Total Down Time:
Total Footage Chargeable:
Total Hourly Contact:

Standby Time for Logging:
Other Standby Time:
Total Chargeable Standby Time:
Actual Moving Time Between Holes:
Chargeable Moving Time " " :

Remarks:- Triconed to 60 ft.

Quantity of Mud Used:

Probe Report:

230-0.....Gamma Ray/Neutron.....Through HQ rods
240-0.....Sidewall Density.....Through HQ rods
230-0.....Sidewall Density.....Logged Open Hole
230-0.....Caliper.....Logged Open Hole
240-64.....S-log.....Logged Open Hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 5 U	107-150	43'	108-127	19
SL	* 150-153.7 (carb. to coaly shale and shale)		129-149	20

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE INTERVAL	BED.
	45'	Overburden - glacial till & fill - weathered sandstone & shales of Kootenay Formation.			
		Cretaceous - Kootenay Formation			
45 - 107	62'	Siltstone - m. gy, wthrd / Fe stn. - tr. coal. Interlam. Sltst. & Shale 60.4 - frac. 70°, sev. wthr. 61.2-61.6 - bit. sh., v. soft. 63.6-63.9 - AA. 69.9 - bit. sh. & coal (vit.) SS - Sltst. 70-74 - highly frac. interlam. minor fault, sltst. highly wthr. 79 - highly frac., sev. wthr. hematite st. < 45° 80 - coal part. Shale - dk. gy black - micaceous - in part interlam with sltst. 92-93.4 - Breccia 99-99.3 - vitrain band 101-107 - gouge zone		Frac @ 70° to c/a soft mod. sound	
107 - 153.7	46.7'	COAL - Seam 45			
		107-108.6 - Mod. soft claro vit. 108.6-108.9 - Claro vit., tr. marcasite. 108.9-109.1 - Claro vit. 109.1-109.4 - Claro vit., vit. band. 109.4-109.6 - Claro. vit. 109.6-109.8 - Claro vit., vit band. 109.8-110.2 - Claro vit. soft. 110.2-110.6 - Claro vit. (hd.) vit. band. 110.6-111 - Claro vit. soft. 114.5-114.8 - Bit. sh. 114.8-115.2 - Clarain. 115.2-115.6 - Clar. Bit sh. 115.6-117 - Claro vit. 117-122 - Coal, water 122-124 - AA. 127-129 - AA. Soft claro vit. 129-131 - Coal & water. 131-134 - Soft claro vit. 134-136.8 - AA. 136.8-140 - Soft claro vit. 140-148 - Soft claro vit. 148-150 - Soft claro vit. 150-151.9 - Shale. Bit. 151.9-152.9 - Carbargillite. 152.9-153 - Sh. 153-153.6 - Carbargillite. 153.6-153.7 - Bl. bit. sh. * Recoveries (See Overleaf)			
153.7- 221	67.3'	Sandstone (Basal) - lt. gy-wh. (speckled) - fn-med. gr. - frac. thruout 153.7-156.8 - High frac. 156.8-158 - Clay gouge, bit. in part.			

Recoveries

111-117	2.5/6
117-122	2.5/5
122-124	1.5/2
127-129	1.0/2
129-131	1.0/2
131-134	2.5/3
134-140	6.0/6
140-145	4.3/5
145-150	3.7/5
150-153.7	3.7/3.7

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FOLD TO CORE AXIS	CORE DVAL.	CORE REC.
		158-163.7 - h. frac., mud indurated, bit. clay part. thruout.			
		166.9 - Coal part.			
		167.3 - Coal part.			
		170-174 - H. frac., brec., bit. part.			
		174-188 - H. frac., frac. vert.			
		188-195 - No core.			
		195-216 - H. frac., soft & gouged in part. Fresh frac. infill with mud. Frac. vert. (along bed).			
		216-221 - SS. Good Core. marcasite fn.-med. gr.			
		Jurassic - Fernie Group			
221 - 247	26'	Shale			
		- Bl., h. micaceous, fissile, good siltst. v. fn. gr. SS @ 244.7, Bed ∠ 57°	57°		
		Dk gy to black, v. f. gr.			
		- micaceous x/bed. & massive w. cmt., prob. silica.			
		- core very sound.			
		240.5		65°	
		243.5		45°	
	247'	Total Depth.			

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

Hole No.: 75D-05

Property: Sore Creek Coal

Location: North Hill
17,816,250N
587,611E

Elevation: 4376' msl.

Contractor: Connors Drilling Ltd.

Hole Size: BQ

Rig No.: #1

Date Commenced Drilling: September 3, 1975.

Date Finished Drilling: September 15, 1975.

Date Hole Completed: September 16, 1975.

Logged By: Jim Baker and Ed Wilson

Date: September 16, 1975.

Probed By: Roke Oil Enterprises

Date: September 16, 1975.

Total Depth Drillers: 962'

Depth of Overburden: 139'

Total Depth Logger: 934'

Water Level: Flowing
(approx. 4 gals./min.)

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time

Surface Casing: 139'
Total Drilling Time: 312 hrs.
Total Down Time: 39/70 hrs.
Total Footage Chargeable: 962'
Total Hourly Contact: 39/70 hrs.

Standby Time for Logging: 15 hrs.
Other Standby Time: —
Total Chargeable Standby Time: —
Actual Moving Time Between Holes: —
Chargeable Moving Time " " :/

Remarks:- Hole bridged at 261'.
Note: Probable fault @ 490' displacing approx. 180'.

Quantity of Mud Used:
Quik Gel - 182 bags
Kwik Trol - 160 bags
CCLG - 2 bags
Bentonite - 5 bags

Probe Report:

934-0.....Gamma Ray/Neutron.....Thru BQ Drill Rods.
934-0.....Sidewall Density.....Thru BQ Drill Rods.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam #2	Faulted Out.			
Seam #4U	511.5-526.5	15'	511 -525	14'
	544.8-551.5	6.7'	544 -550	6'
	556.5-564	8.5'	556 -562	6.
Seam #4L	569.5-583.5	14'	569 -580	11'
Seam #5	809.3-845.5	36.2'	809 -846.5	37.5'
	851 -863.5	12.5'	851 -862	11'

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
0 -123	123'	Overburden - Glacial cobble and boulder till. - Sand and silt predominate. - Consolidated in part in a m. brn clay.			
123 -183.7	60.7'	Tertiary - Kishenehn Formation Mudstone - Varigated colour / abnt. lmn & hem stn. (purple, red, gy, grn, yel.). - Mod. soft but competent. 146-148 - Better cemented, fracture @ → 150.9 - Fracture @ → 153-154.5 - Siltstone. 156-158 - Siltstone. 161.5-163.7 - SS, v.f. gr. 165.2-168 - Mudstone, silty. 172.8-173 - SS, v.f.gr. 168-183.7 - More compact and better cemented. - silty. - gy colour predominates. - lmn stn abundant. Rec. 178-183 - 3.7/5.		40° to C/A. 45° to C/A.	
183.7-190	6.3'	Cretaceous - Blairmore Group Sandstone - V. fine gr. to silty in part. - Hd and competent. - Abrupt contact / above @ 50° to C/A. - Becomes conglomeratic basally. 190 - Wthrd zone, could be water zone. Rec. 183-188 - 4.6/5. 188-193 - 3/5.	50°		
190 -210	20'	Conglomerate - Vari-coloured pbls., SS matrix. - P. cmt. - Gouge zone, indurating breccia. - Highly wthrd. Rec. 193-195 - 1/2. 195-198 - 2/3. 198-208 - No Rec.		Broken & in part disagg.	Poor.
210 -214	4'	Mudstone - M. dk gy, contains pbls of above.			
214 -232	18'	Conglomeratic Sandstone - SS, m. gr., w. sorted. - Extreme Fe (lmn) stn. - Little to no cmt., v. soft & in part disaggregated. 222-222.7 - Sltst. indurated with clay. Rec. 215-217.5 - 1.6/2.5. 217.5-222 - 2.5/4.5. 222-227.6 - 4.7/5.5. 227.6-232 - 3/4.5.		In part disagg. Blocky & lmn stn	

ERVAL	UNIT THICKNESS	DESCRIPTION	< OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		Cretaceous - Kootenay Formation			
232 -271.5	39.5'	Shale to Mudstone - Dk gy to blk. - Carb. in part. - Abundant pl. fossils. - Soft and in part slty. 235 - Coal ptg. 241-241.2 - Coal bnd. 243.6 - Coal ptg. 258-259 - Coal indurated / clay, appears arg. 263.3 - Coal ptg. 263.3-271.5 - Sh., v. friable & soft. Rec. 234.5-237.5 - 2.2/3. 247.5-252.5 - 4.3/5.			
271.5-306	34.5'	Sandstone - Mr. gy, yellow-brn, wthrg due to lmn stn. - Soft with hd more sound intvls. - V. fn to f. gr. becoming m. gr. towards base. - Silica cmt more prominent basally. - Abundant clay & slt present in upper part of unit. - Carb. ptgs. thruout. 276-277 - Hd, core is sound. 280-280.5 - Hd, sound. 287.2 - Coal ptg. 290-291.4 - V. soft, disagg., coaly thruout. 304.6 - Coal ptg. Rec. 288-293 - 4/5. 293-298 - 4.5/5. 298-303 - 3.4/5. 303-306 - 2/3		Core is gen. soft & friable.	
306 -322.6	16.6'	Shale - Dk gy to blk. - Carb. 307.5 - Fracture @ 30° to C/A. 311.6 - Slickensides 313.6 - Coal ptg. 316.5-316.8 - Coal bnd, arg. 318.1 - Fracture @ 40° to C/A. 319.5-320.5 - Extremely frac. 322-322.6 - Extremely frac. Rec. 308 -310.5 - 2/2.5. 315.5-321 - 5/5.5.		Core is gen. sd / friable sections.	
322.6-364	41.4'	Sandstone 322.6-326 - Gy to yel. brn, lmn stn., mod. to high degree of wthrg. - f. gr., mod. sort, r. - mod. sound core. 326-348 - Lt. gy, m. gr., pred. chert / less than 50% qtz, a, p-m sort. - silica cmt. - mod. to severe frac. / abnt. fracturing along bdg. 325.2-326.9 - soft, disaggregated. Heavily lmn stn, prbl. water zone. Fracture @		Frac. @ 40° to C/A. 40°-50° to C/A. 15° to C/A.	

ERVAL	UNIT THICKNESS	DESCRIPTION	< OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		331.7-334 - Disagg., lmn stn, soft, muddy, possible water zone. 334.6-337.6 - Severe fracturing, badly brec., Fe stn. 348-364 - Congl. sandstone. - Md, m. gr. SS. - Pred. dk gy chert pbls. - In part, disagg. & blocky. 337.6-349 - Core is mod. sound, high degree of closed fractures (possibly // to bdg planes). 348-348.3 - Disagg., wthrd, prble water zone. 353 - Hit heavy water flow. 352.7-357.8 - In part disaggregated, wthrd & highly fractured. 360.3-360.6 - Coal str. Rec. 336 -339.5 - 2.2/3.5. 353 -357 - 3.3/4 357 -363 - 5/6	65° to C/A.	60° to C/A.	
364 -369	5'	Shale - Dk gy, carb. - Brec. 368-369 - Coal band, arg.			
369 -380	11'	Siltstone - Lt. to m. gy. - Sound. - Fractures are generally Fe stn 378.6-380 - Ext. Fe stn. Vertical fracture.		Core is fen sd, frac. @ 45° to C/A.	
380 -408.6	28.6'	Sandstone 380-391.2 - Lt to m. gy, in part with gy brn colour (prbly due to wthrg). 380-383 - Extreme Fe stn & wthrg, prbl. water zone. 385.6-387 - Ext. breccia, yel. brn, water zone. 387-388.8 - Mod. sound, better cmt. 391.2-408.6 - Lt to m. gy, m-c gr., mod. sort, a-r, silica cmt, Fe stn on fracture surfaces. Hairline fractures. 397-398.4 - Brec. zone, abnt Fe stn. 401.5 - Coal ptg. 404.8-405 - Carb. & coal ptgs. 407-407.6 - Bdg plane frac. / coal ptgs.		Soft & friable / partial disagg. Frac. @ 40° to C/A. Core is mod. sd. 60° to C/A.	
408.6-437.5	28.9'	Shale - M. to dk gy. - Sl. mica. - In part carb. to coaly. 408.6-409.6 - Slty sh. 409.6-410.1 - Coal, dull to vitreous. 418.2-419.8 - Coal, vitreous luster, soft, arg. in part, claro-vitrain. 420.8 - Coal ptg. 421-421.3 - Sh, carb. to coaly, pl. fossils. 433.4-434.5 - Numerous coal ptgs. 435.9 - Coal ptg.	65° 60°	Core is mod. sd thruout.	

ERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
437.5-455.6	18.1'	Siltstone - Lt gy. - Micro-mica. - Silica cmt. - Hd, core is sound. - Grades to v.f.gr. SS basally. 452.7-453.6 - Gouge zone / clay. 453.8 - Fracture, lmn stn on surface.		45° to C/A.	
455.6-479.2	23.6'	Sandstone - M. to dk gy. - V. f. to m. gr., coarsens basally. - a-r, mod. to well sort, silica cmt. - Chert > qtz. - Mod. to high degree of fracturing thruout. 455.6-458 - Soft, lmn stn, possible water zone. 460-462 - Brec. 473.3 - Clay gouge zone. 474-475 - Decemented, soft, lmn stn. Contact / underlying shale is sharp at Rec. 460-462 - 1.2/2. 462-467 - 4/5. 467-472 - 4/5.	60°	Core is mod. sd / high degree of frac. 55°-60° to C/A.	
479.2-511.5	32.3'	Shale - Blue-gy, brecciated throughout, abund. lmn stn infilling around breccia. 479-481 - Shale is carb., coaly in part. 485-586 - Sound. 487.3-487.8 - SS str. To end 490' somewhat slatey. 490-491 - High fracture, minor Fe stn. 491-494 - Soft, yellow, arg. shale, water zone. 494-498 - Lt gy, minor Fe stn, mod. to high fracture. 498-511.5 ---- - Dk gy-blk, bit. shale, abnt. plant fossils. Bit. ptgs thruout. 498-501 - Fe stained, mod. soft arg. 501-501.5 - Bit. ptgs @ 10°, Frac. along ptgs. 505 - Coal ptg shaley 505.2-506.5 - coal. Rec. 501-506.5 - 4.6/5.5.			
511.5-526.5	15 '	COAL - Seam 4U 511.5-512.5 - Clarain, bl. shiny 512.5-513 - Clarain, durain, soft arg. 513-515 - Clarain. 515-517 - Mainly clarain, mod. hd, somewhat arg. 517-520 - Clarain, mod. soft, minor vitreous bdg. 520-521.5 - Clarain soft, vitreous towards top. 521.5-522.7 - Mainly durain, soft, argil. 522.7-523 - Mainly clarain.			

ERVAL	UNIT THICKNESS	DESCRIPTION	< OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		523-524.3 - Mainly claro-durain. 524.3-525.8 - Mainly claro-durain. 525.8-526 - Shale. 526-526.5 - Durain. Rec. 511.5-515 - 2.5/3.5. 515 -517 - 1.6/2. 525 -527 - 1.5/2.			
526 -544.8	18.8'	Shale - Mod. to high degree frac. - Dk gy to black. - Bit., abnt. fossils. 528-528.3 - Coal ptg. 529.4-529.5 - Coal ptg. 536.5-537.3 - Shale, & is bx. 539.6 - Coal ptg. & @ 540.4. 543-543.3 - Coal ptg. Clarain. Rec. 527-529.5 - 2/2.5.			
544.8-551.5	6.7'	COAL - Seam 4U 544.8-546.5 - Claro-durain. 546.5-547.7 - Claro-vitrain. 547.7-548 - Durain. 548-549.9 - Claro-durain, soft & mushy. 549.9-551.5 - Clarain, soft.			
551.5-556.5	5'	Shale - Dk gy to bl. - Bit., bx., soft in places. Rec. 551.5-554 - 2/2.5.			
556.5-564	7.5'	COAL - Seam 4U 556.5-557 - Fusain. 557-558.5 - Clarain. 558.5-558.7 - Durain. 558.7-560.7 - Clarain. 560.7-561.8 - Claro-vitrain. 561.8-562.2 - Clarain. 562.2-562.5 - Claro-vitrain. 562.5-562.7 - Durain. 562.7-563.3 - Claro-vitrain. 563.3-563.5 - Fusain. 563.5-564 - Claro-durain.			
564 -569.5	5.5'	Shale - Dk gy-bl., bituminous & bx.			
569.5-583.5	14'	COAL - Seam 4L 569.5-570.8 - Claro-vitrain. 570.8-573 - Mainly clarain. 573-574 - Mainly vitrain, hd, glossy, brittle. 574-576 - Mainly clarain. 576-577.2 - Mainly claro-vitrain. 577.2-577.7 - Mainly durain. 577.7-579.1 - Mainly claro-durain. 579.1-583 - Mainly clarain. 583-583.5 - Mainly durain. Rec. 569.5-573 - 2/3.5.			
583.5-598	14.5'	Shale - Dk gy to bl. - Minor frac. @ low angle to core. - Mostly mech, abnt. calcite on reg. frac.			

ERVAL	UNIT THICKNESS	DESCRIPTION	< OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
598 -618		Abundant Plant Fossils.			
.5- 686	82.5	Shale 603.5-604.5 - Frac., vert.axis 607 - Coal ptg. 609-611.8 - Vert. & horiz. to core. 611.5 - Coal ptg. 614.6 - Clay gouge. 616-618 - High degree of frac. / calcite coating, vert. frac. 642.5-644.3 - High deg. frac. with calcite. 644.3 - Clay gouge on frac., silty thruout. 645-646 - Frac. zone, soft, could be water. Core continues sound. 656.6 - Coal ptg. 657-657.4 - Bk 666.2-667.4 - Vert. frac., calcite on frac. Fractures to end of shale section, nearly parallel to core. 678.8-686 - Bx, silty to v.f. gr. grad. to SS below clay infill, frac., very soft. 679.6-680 - Very wet, water zone.		603' - frac.10° to C/A. 650' - Frac.15° to C/A. 654.2'-45°. 654.8'-45°. 660.6'-25°. 663'-20° all to C/A.	
6 -744	58'	Sandstone - Med. gr., lt gy. - S & P cherty. - silica cement, med. sorted. - Sub R to sub A. 686-691 - silty to vfg, brec. thruout, abnt. gouge. 691 - high degree of weathering, resulting in decem. & soft, brec. thruout. 714.5-719.3 - Siltstone. 731.5-736.6 - Core is sound, well cmt, mod-high deg. of frac., bit. ptg, good bedding 30° to core normal. 735 - Bit. ptg horiz. - Core wet thruout / water passage., high deg. of frac. 741-742 - Water passage. 742.9-743 - Coal ptgs. Rec. 691 -696 - 4/5. 697.5-703 - 3/5.5. 703 -708 - 4.5/5. 722 -723 - .6/1.		732.2'-60° to C/A.	
744 -809.3	65.3'	Shale - Dk gy to black. - Bit. with high degree plant fossils. - Upper section gr. to slty. Core is sound. - Bottom section brec. thruout. - Top & bottom of shale section is coaly. 744-744.2 - Coal. 744.3-744.4 - Coal. 744.4-745 - Coaly shale, arg. mostly durain & fusain.			

ERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		745.4-745.7 - Clarain, coaly ptg @ 745.7.			
		745.7-746.2 - Shale with clarain bands thruout.		748.5'-50° to C/A.	
		750.3 - Coal ptg.			
		751-752.2 - Series of 45° frac., coal on frac. / shale.			
		753.2-753.4 - Coal ptg / soft durain.			
		753.8-754.4-6 - Coal, clarain, durain.		50° to C/A.	
		757-758 - Brec.		> str.-vert.	
		758-777 - Sequence of shale is silty, mod. sound. - mod.-high deg. frac. - abnt. x-bedding.		759'-50° to C/A.	
		758-760 - x-bdg.			
		760.5-760.7 - Coaly sh. ptg.		762-762.5' 20° to C/A.	
		761.2-765 - Very silty.			
		764.2-764.6 - Water travel, gouge on frac.		763'-30° to C/A.	
		768.3-768.5 - Coal, dur.			
		768.5-777 - Very silty, abnt plt. fossils.			
		773-774 - x-bdg, slip faults / calcite on surface.			
		774-774.1 - Coal ptg.			
		775.3-777 - Sev. frac. brec.			
		777 - Bit. shale, brec., High degree of frac, clay infill on frac.		778.3'-60° to C/A.	
		781.4-781.6 - Arg. coal ptg.			
		790.7-791 - Arg., coal mixt, wet.		796' - 60° to C/A.	
		796.7 - Coal ptg, frac.			
		806.3-806.8 - Clay mat.			
		806.8-807 - Coal, durain, soft & wet.		799' - 60° to C/A.	
		807-807.3 - Clay, soft.			
		807.3-808.9 - Bl., bit., sh.			
		808.9-809 - Coal, durain.			
		809-809.3 - Shale.			
		Rec. 752.2-757 - 4.5/4.8; 758 -760.8 - 1.5/2.8; 765.5-768 - .3/2.5			
809.3-863	53.7	COAL - Seam 5			
		809.3-810.1 - Clarain, vitrain.			
		810.5-810.6 - Shale.			
		810.6-812.4 - Claro-vitrain.			
		812.4-812.5 - Shale, bl., bit.			
		814-814.4 - Shale.			
		814.4-817.4 - Coal, mainly vit., minor cl., tr. marc., hd, brittle.			
		817.4-818 - Claro-durain.			
		818-818.3 - Durain.			
		818.3-822 - Cl.-vit, tr. marc.		Mod. firm.	
		822-823 - Durain.			
		823-823.3 - Claro-vitrain.			
		823.3-823.7 - Vitrain.			
		823.7-825.3 - Claro-vitrain.			
		825.3-825.4 - Shale, soft.			
		825.4-828.5 - Claro-vitrain / tr. marc., minor clay infill.			
		828.5-830 - Mainly clarain.			
		830-830.6 - Claro durain.			
		830.6-831.3 - Mainly durain.			
		831.3-833 - No core.			

ERVAL	UNIT THICKNESS	DESCRIPTION	< OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		833-834 - Mainly clarain. 834-834.8 - Mainly claro-durain. 834.8-835.6 - Mainly durain / vitrain bdg. 835.6-836 - SS & clay mixed / fusain. 836-836.5 - Clarain / vitrain bdg. 836.5-836.9 - Mainly durain & fusain. 836.9-837.2 - Claro-vitrain. 838-840 - Vitrain. 840-840.2 - Durain. 840.2-842.3 - Vitrain. 842.3-842.6 - Clarain. 842.6-843.5 - Vitrain. 843.5-845.5 - Claro-vit. 847-847.6 - Shale. 847.6-848.2 - Claro-vit. 848.2-848.4 - Hard, shaley coal. 848.4-849 - Durain, mod. hd. 849-849.3 - Durain. (.7' lost core) 850-850.3 - Shaley coal, durain, hard. 850.3-850.5 - Shaley coal. 850.5-851 - Durain. 851-852 - Claro-durain. 852-852.8 - Claro-durain, soft. 852.8-853.5 - Clarain. 853.5-854.5 - Claro-durain. 854.5-855.2 - Claro-vitrain. 855.2-857 - Clarain, minor durain. 857-858 - Claro-durain. 858-858.5 - Durain, soft. 858.5-860.7 - Claro-vitrain. 860.7-860.9 - Durain. 860.9-861 - Claro-durain. 861.4-863.5 - Mainly clarain, soft with minor durain. Rec. 833 -838 - 4/5. 841.8-845.5 - 3.2/3.7. 845.5-847 - 0/1.5. 847 -850 - 2.3/3. 850 -852 - 1.6/2. 857 -861.4 - 3.9/4.4.			
863.5-873	9.5'	Shale, Siltstone and Sandstone - Grad. chge to basal sandstone. - Coal & coaly sh. ptgs. - Siltstone gr. to vfg sand @ 873'. - Pick-up basal, above 10' is highly frac., soft, tends to break along bedding @ 30°.			
873 -950.5	77.5'	Sandstone (Basal Unit) 873-887 - SS, med to dk gy, mg.; pred. qtzite, minor chert, coaly in part, well sorted, sub-rounded, soft & partial decementation, due to water, frac. range from severe, from 30° to vert., core not sound. 887 - Remainder of SS is gr. to vfg, good silica cmt, sound, hard, low, mod. frac. degree thruout, towards bottom of section grades to vfg. frac. range from 30° to vert. (to the core normal).		888' - 15° to C/A. 890' - 55° to C/A.	

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
		895-897 - High degree of frac. 939.6-940 - Vert. frac. 944.5 - Near vert. frac. with gouge. 946-947 - Frac. with marc. 947-949 - Vert. frac. Rec. 882 -887 - 4.2/5. 937 -942 - 4/5.		Frac. @ 30° to C/A. 937.8'-45°. 942' - 45°.	
		Jurassic Fernie Group			
950 -962	12'	Interbedded Sandstone with Siltstone and Shale "Passage Beds" - M. to dk gy, varies from silt to f. gr. SS. - Fractured along bdg plane thruout. 951-951.2 - Gouge zone. - SS silty to vfg SS. Silica cmt., qtz & chert, primarily well sorted, sub R. - Mod sound, minor frac. 955.8 - Frac. / gouge, poss. water passage. 959 - Brec. frac. zone / gouge on frac. 960.3 - Bit stg @ 35°.	70°	955.8'-45° to C/A. 959.6'-45° to C/A.	
	962'	Total Depth.			

DIAMOND DRILL RECORD

Hole No.: 75D-06

Property: Sage Creek Coal

Location: North Hill
17,854,209 N.
586,718 E.

Elevation: 4637' asl.

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: 2

Date Commenced Drilling: September 6, 1975

Date Finished Drilling: September 23, 1975

Date Hole Completed: September 28, 1975

Logged By: J. Mitchell & J. Baker

Date: To September 24, 1975

Probed By: Roke Oil Enterprises

Date: September 24, 1975

Total Depth Drillers: 993 ft.

Depth of Overburden: NIL

Total Depth Logger: 989 ft.

Water Level: 62' asl.

Bit Record

No.	Size	Make and Serial No.	E.H.O.	On	Off	Footage	Drilling Time
1	HQ	K 6 E 0013		32	136	104	
		K 6C 0396		136	913	777	
		K 66 0395		913	993	80	

Surface Casing: 11' (left in hole)

Total Drilling Time: 17 days

Total Down Time:

Total Footage Chargeable: 993

Total Hourly Contact: 108 drill hrs.

Standby Time for Logging: 17 drill hr

Other Standby Time: 74 hrs.

Total Chargeable Standby Time: 91 hr

Actual Moving Time Between Holes: 17 h

Chargeable Moving Time " " : 7 h

Remarks:- Thinning of stratigraphy between seams 4L & 5 when compared to surrounding holes either stratigraphic or a possible fault.

Quantity of Mud Used:
226 50" Kwik Gel
226 2" Kwik Trol
6 50" CC 16
} 150 lbs. Asbesto

Piezometers installed @ 910'; 660'; 330'

Probe Logged:

982- 0	Gamma Ray & Neutron	Thru HQ drill rods
970- 0	Sidewall Density	Thru HQ drill rods
987- 0	Sidewall Density	Open Hole
987- 0	Caliper	Open Hole
985-76	E-Log	Open Hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
'A' Horizon	(lost core)		152.5 - 153.5	1'
Seam # 1	299.7' - 307.1	7.4'	297.5 - 301.3	3.8'
Seam # 2	447' - 476	29.0'	448' - 468.5'	20.5'
Seam # 4U	595.4' - 628.9'	33.5'	592.5' - 625'	32.5'
# 4L	638' - 644.7'	6.7'	635.2' - 640.9'	5.7'
Seam # 5	857.6' - 864.5'	6.9'	853 - 860'	7'
	870' - 890.2'	20.2'	864 - 886.5	22.5'

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	RQD
0' - 5'	5'	Overburden - soil, fill and broken wthrd. rock. * Triconed to 11 feet			
		Cretaceous Blairmore Group			
5' - 38'	33'	Sandstone - lt. gy., - predomin. qtz., silica cmt, clean; well sorted; r-k; - minor limonitic staining - minor conglomeratic ss. 11-15 Extensive Fe(1mm) stn. on fracture faces. 15-16.2 Cngl. ss - brecciated throughout/Fe (1mm) stn. 16.2-18.2 Clay hd dk gy. abrupt contact with above @ 60° to SS. 18.2-19.2 Brecciated; abndt. Fe stn. 22.2 Severe Fe stn on fracture surface 28-28.9 Congl. SS abndt. Fe stn. 37.8 Fract. chert pbls in SS.	60°	gen sound 0° 25°	95+
38' - 56'	18'	Conglomerate - Basal Blairmore - m.gy., chert pbl. congl. / f-m gr. SS. matrix. hd.; siliceous; - tends to break through pbls. - Extreme Fe stn. on fracture surfaces. - In part disaggregated 43-46 - Friable; highly wthrd, appears brecciated. 48-50.3 - Friable & disagg. 52-56 - Poor recovery friable, disagg.		overall is sound	95+
56 - 68.5	12.5'	Sandstone - m.gy. - qtz. + chert; a; mod. sort; hd; selica cmt; - m-c grained - brecciated throughout. - Severe fracturing thruout. Fe stn on fracture faces. - In part disagg. 65-68.5' Sound core			95

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FRD TO CORE AXIS	CORE EVAL.	U.S. RES.
		Cretaceous - Kootenay Formation			
68.5'-73.2'	4.7'	Mudstone - dk.gy. - silty in part 70'-71.4' - Silty 73.2' - contact @ 45°			
73.2'-86.8'	13.6'	Siltstone - arg., soft; m.gy. / abndt. Fe stn. 75.6'-75.8' fracture; hvly Fe stn. 79.5 - Abndt. Fe stn. on fracture face 82.1'-83' - brecciated 83.5'-86.8'- Severe fracturing sl. bit. Recovery: 78.5-85 Rec.3.5/6.5		60° 80° 20°	9
86.8'-101.4'	14.6'	Sandstone - m.gy. - m-c gr.; chert & qtz; p. sort; a - A; sil. cmt. - In part conglomeratic 83' - Severe 1mm stn. 89.1'-89.8' - Brecciated 93 - 95 brecciated & coaly. in part. 96.3' - clay gouge 97.2'-97.8 - brecciated zone; minor coal ptgs. 99.3' - wthrd. zone; Fe (1mm) stn.; possible water zone.		75° 45°	
101.4'-184	82.6'	Shale/Interbeds of siltstone and Coal Partings and Bands - dk. gy. to blk.; - in part. carb. /coal partings & bands throughout. - Silty towards base of section 101.4-101.6 - Bit.; soft; brecc. 102.5-102.7 - Coal - dull. prbl. durain/vit.bnds. 103.2-104 - Coal mainly durain arg. soft. 104.2-104.7 - Coal hard vitrain tr. marc. 109.1-109.7 - Coal Claro-durain soft mushy 110.2-110.4 - Soft bit. ptg. 111-112.3 - bit. shale. frac @ 60° 112.3-112.5 - durain 113.1-113.6 - hard claro-vitrain. tr. marc.		60°	87

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FSP TO CORE AXIS	COLS EVAL.	% REC.
		113.8-114.2 - bit shale 118.2-118.4 - bit soft mushy shale 121.3-121.6 - fusain 124.3-125.2 - soft, bit shale 124.9-125.1 - Claro-durain.; abund. marc. 125.2-125.5 - durain, somewhat hard 126-130 - silty shale, abund bedding & cross bedding 130-136 - Siltstone & Shale Interlaminated -- med. gray - mic - Sltst. is cemented in silica cement dense, massive throughout - tr. of marc. on frac. surf - core sound - low degree of frac. 136-137.5 - bit ptg. 138.8 - 139.2 - coaly, shale, ptg. 139.2-139.8 - Coal, clarain 139.8-140.2 - Bit,arg. coal 140.2-144 - frac. shale 144-148.5 - sound core 148.5-152 - severe frac. 152-153 - clay gouge 153-156.5 - severe frac. coal ptg. at bottom 156.5-171.5 - good sound core 171.5-184 - Sev. frac. shale 173.4-173.5 - Gouge zone 174.5-175 - Claro-vitrain 176-176.2 - Coaly shale, abun. marc. 178.9-180 - Shaly coal, friable 180-183 - bit. sh. mod. deg.frac. 183.3-184 - Clay gouge.			91
184-205	21'	Siltstone - M. gray silica cement - very hard, massive lam. @ 65° - Micaceous - mod-high deg. mech.frac. - grades to v.f.g. ss Recoveries: 202-208 Rec:4.0/6	65°		95
205-254	49'	Sandstone f.-m. gr. - med. dk.gy. - dom. chert - minor qtz. - good silica cement - medium sorting r-a - sound, hard, high degree, mech.frac. 210-219 - high deg. frac. minor thin coal laminations	55°		

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE INCL.	[illegible]
		219-223.5 good sound core bedding 55°	55°	45°	
		@ 224 ss. is f. to m. gr.			
		- med. to dk. gy.			
		- mostly chert, minor qtz.			
		- good silica cement			
		- bit. ptg. throughout			
		ptg. @ 224.6- 226.7			
		223.5- 233 - bit ptg.			
		232-233 - coal ptg.		58°	
		SS continuing as above.			
		233-238 high deg. frac.			
		238-240.8 severe vert. frac. with calcite on frac. faces.			
		241-242.4 vert. frac. infilled with clay.			
		247-253 - bit ptg. throughout			
		253-254 - Cgl. ss.			
254-298.7	44.7'	Siltstone			
		- gradational to - v.f.gr. SS			
		- silt. is med. gy. mic. hard with very good silica cement			
		- core sound high deg. of frac. with calcite in filling			
		258-260 - severe frac.			
		260-262 - frac. infilled with clay			
		263-264 - vert. frac. gouge path on frac.		85°	
		278.5-279.8 - sev. frac. good bedding @ 65°	65°	25°	
		283-289 - frac. with gouge material			
		290.5-292.5 - Brecciated			
		300.5 - frac. very badly		20°	
298.7-299.7	1'	Mudstone			
		- bl, carbonaceous tr. marc. silty.			
299.7-307.1	7.4'	Coal Horizon 1			
		299.7-300.9 Vitrain abund. marc.			
		300.7-301.5 Shaley coal			
		301.5-302.5 Mainly vitrain			
		302.5-302.9 Mainly clairain, soft			87%
		302.9-303.8 Clara. vitrain, hard			
		303.8-304.2 Durain, soft, mushy			
		304.2-305.3 Vitrain, abund. marc.			
		305.3-306.1 Durain			
		306.1-306.7 Fusain			
		306.7-307.1 Durain			
		Recovery - 301.5-305.3 3.0/3.8			
307.1-399	41.9	Mudstone			
		- med. gray - black			
		- mic. m. part			
		- med-high deg. of frac.			
		307.6; 308.3; 308.4; 308.9		30°	
		309 coal ptg.			
		309.1 - slick, clay gouge minor marc.			
		310.1-310.7 - severe frac.			
		310.7-312 - coal clarain, durain, marc.			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FRAC TO CORE AXIS	CORE EVAL.	[illegible]
		313.5 coal ptg. marc. 314-319.5 - soft coaly, silty shale, slightly plastic 324 - Breec. clay mat'l 331.5-336 - high deg. frac. uniformly 30° 341-344.9 - high deg. frac. gouge & silty mat'l., water zone?? Frac. @ 45 to end section 346.8-347.1-Gouge zone, silty mat'l. - 328.5 to 349 Shale tends to be silty Bdg. evidence @ 55° also x-bdg.	55°	30° 45°	95
349-404	55'	S.S. - med. to dk. gy., f. to m. gr. - pred. cht. - minor qtz - good silica cement - med. sorting sub A to sub R - grades coarser downward 352-353 - high deg. of frac. part. decementation high deg. of frac. (to 365) 361 - coal ptg. 363-7 - coal ptg. cement Sub A to A poorly sorted, core moderate sound & hard, but has mod-high deg. of frac. py throughout @ 365-404 - SS grades to cg in in areas to v.cg. but gen. cg. pred chert grains - good silica 365-368 - severe fracturing 368-368.2 - horiz. frac. o/c coal on frac. 378.5-379.2 - vert. frac. -SS is cgl. 382-382.4 - slstn str. 382.6 - coal ptg., py. cal. 382.4 & 383.2 - coal ptg. 383.6 & 383.9 - coal ptg. 383.9-389 - high deg. frac. along coal ptg. 387-392 - frac. along coal ptg. @ 30° 394.5-399 - coal ptg. throughout, water course @ 402.6 - coal ptg.		generally good 30° 60° 60°	95
404-413	9	Mudstone - dk. gy., bit. soft, friable 402-406 Rec: 1.5/2.0 - coaly 404.3-404.5 406-406.3 - black shale 406.3-407.1 - coal, durain, soft, mushy 407.1-410 - Bl. bit. shale, abund. fossil coaly 410-412.5 - silty shale, gr. silty downwards bound, med. gy. in colour		good	95
413-446.1	33.1	Siltstone - Shale - interlamminate & bedded - core sound, med. deg. of frac., bedding, X bdg. @ 30 413.9 - calcite on frac., calcite refilling throughout bit. ptg.			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FRAC TO CORE AXIS	CORE EVAL.	ACC. EVAL.
		415-415.6 -vert. frac with gouge fill'd	60°		
		416.7-416.8 -coal ptg			
		422.5-423.8 -numerous coal ptg causing soft area			
		425-427.5 Sandstone stringer			
		-med. dk. gy			
		-complete qtz. & chert			
		- vertical frac. through unit			
		-fine grained, bedded & x bedded			
		Siltstone - Shale cont'd			
		- laminated	60°		95
		-siltstone grades to v f g ss			
		-core moderately sound			
		-high to several deg. of frac.			
		Shale - dk gy to bl "bituminous"			
		tr. marcasite			
		fractured along bedding @ 40°	60°	60°	
446.1-476	29.9	Coal Seam 2			
		447-447.7 - clarain thinvitrain bands			
		447.7-447.9-mudstone			
		447.9-449-clarovitrain & marcasite			
		449-450-mudstone			
		450-450.4-clarain & fusain			
		450.4-450.5-mudstone			
		450.5-450.8-clarain			
		450.8-451 -mudstone			
		451-451.4 -clarain			
		451.4-451.6 - mudstone			
		451.6-453.4 -claro-vitrain,tr marcasite with durain			
		453.4-453.5 -mudstone			
		453.5-456 -clarion with vitrain, banding marc. through			
		456-456.6-clar -fusain			
		456.6-456.8 -durain			
		456.8-459.5 -claro-vitrain with marc			
		459.5-459.6 -shale			
		459.6-460.5 -claro vitrain			
		460.5-460.7 -shale			
		460.7-460.8 -coal			
		460.8-460.9 - shale			
		460.9-462.5 -claro-vitrain			
		462.5-466.5-claro-vitrain with marcasite			94
		466.5-467.3 -clarain-vitrain banding			
		467.3-467.9 - soft fusain			
		467.9-469.4 - clarain			
		469.4-472 -claro-vitrain			
		472-472.5 -clarain			
		472.5-473 -fusain & clarain			
		473 -473.3 -shale			
		473.3-473.4 -clarain			
		473.4-473.6 -shale			
		473.6-474 -clarain & vitrain			
		474-474.2 -shale			
		474.2-474.3 -clarain			
		474.3-474.7 -shale			
		474.7-474.9 -clarain			
		474.9-475.6 -shale			
		475.6-476 -clarain			
		* Recoveries (see overleaf)			
476-500.5	24.5	Mudstone			
		-dk gy - bl.			
		-micaceous-carbonaceous in part			
		479-480 -soft coaly,in part			
		481.5-481.8 -soft coaly parting			
		495.5 -coal parting			
		499 - coalparting soft wg			

Recoveries

446-448	1/2
448-453	5/5
453-458	5/5
458-462.5	4.5/4.5
462.5-466.5	2.7/4
466.5-472	5/5.5
472-476	4/4

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FRAC TO CORE AXIS	CORE EVAL.	EVA. REC.
500.5-504.4	~2.9	Siltstone: - pred, grading to vf & f grained sandstone - interlaminate x bed with slate - color med grey & white - sand/silt sections very sound -shales tend to bitominous, med dk gry gen softer - core has high deg. of frac. 504-504.4 -brecciated shale 505.5-508 -brecciated & frac. clay in fill 517-519.2 -brecciated shale (sim to 1001) fracturing tend along bedding at 60° towards bottom grades to vp gyd s.s. 542.2 -coal part 543-543.4 - bl bit shale	60°	gen frac 60°	95
543.4-569.2	25.8	Sandstone -m grained, massive bed -lt gy qtz & chert -carbonaceous, m soft -sub orange - sub red -silica cmt -tends to slight frac.-upwards -high -severe deg. frac -frac -along 60° bed to vert 558-559 -water zone, soft gouge -contact abrupt -poss erosional	60°	60°	95
569.2-595.4	26.2	Shale -bl -dk gy -silty, micaceous, carb in part -mod sound -Blow ? -Frac. at 30° & along bed @ 60° 572-574 -shale is silty 575.7 -coal part 576-576.5 -coaly interval 576.5-577 -Brec zone 582-595.4 -soft, hi Brec zone of shale -poss fault zone -poss coal part, due hi Brec mashed, hard to tell zones	60°	60° & 30° broken	76
595.4-628.9	33.5	Coal Seam 4 u 595.4-601.5 -mod hd, clarovit tr marc @ 601.5 - sh ptg 601.5-601.7 -durain (vit band) 601.7-602 -claro vit 602.1-602.3 -durain -vit band 602.3-603.6 -claro vit 603.6-603.7- shale 603.7-606 - claro-vit soft 606-606.2 -claro-fusain soft 606.2-606.4 - durain 606.4-607 -claro-vit-marc 607-607.1-shale 607.1-608-claro-vit 608-608.1 -durain 608.1-608.4 - claro-vit 608.4-609.3 - clarain, fusain			80

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	[illegible]
		609.3-609.5 -durain, vit band 609.5-609.9 -claro-vit 609.9-610.1 -durain, clarain 610.1-610.6 -soft clar & fusain 610.6-611 -NO CORE 611-612 -clarain (vit band) 612-612.5 -durain 612.5-614.6 -clarain 614.6-614.9 -claro-durain 614.9-615.5 -clarain 615.5-615.7 -durain 615.7-616 -clarain 616-617 - shale (core lost) 617-617.6 -clarain (rather soft) 617.6-617.8 -durain 617.8-618.8 -clarain 618.8-619 -shale 619-619.5 -durain 619.5-620.5 -durain (soft,mushy) 620.5-622 -durain (hard) 622-623 -clarain 623-627.6 -claro-durain (soft,minor hd) (thin durain) (banding) 627.6-628.2 -durain (soft,mushy) 628.2-628.9 -fusain (soft,mushy,clayey) * Recoveries (see overleaf)			
628.9-638	9.1	Mudstone -med -dk grey -carb. plant fossils throughout -sound silty, content increasing 631.5-632 -frac. broken 634.3-635 -soft-Rit, Ptg 634.6-634.7 -coal ptg		45°	
638 - 646	8'	Coal Seam 4L 638-642.5 -claro durain (gen.soft) 642.5-643 -claro vitrain 643-643.7 -clarain 643.7-646 -durain & carbargillite *Recoveries (see overleaf)			7
646 -662.5	16.5	Mudstone -med,dk gy, rather mic, carb gen badly broken 654.2-654.4 -coal ptg 655.2-655.4 -coal ptg 659-659.4 -claro-durain (arg-hd) 660.5 -coal frac + 658.5-672.5 -CORE BADLY FRAC with frac @ 90° & 25°			
662.5-676.[illegible]	13.8	Siltstone -grading to mudstone -badly fractured-normal & at low angle -well lams @ 60° 668-670.7 -sandstone str lt gy sl congl v fg laminated shale interbeds	60°	90° 25°	95

Recoveries - Seam 9U

576.7-578.7	1.5/2
578.7-582	2.5/3.3
582-583	0/1
585.5-589.5	3/4
589.5-594.5	4.2/5
594.5-600.5	5/6
600.5-606	3.5/5.5
606-611	4.6/5
611-617	5.3/6
617-622	5/5

Recoveries - Seam 9 L

640-643	1.5/3
643-646.5	2.5/3.5
646.5-652	5/5.5

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FRD TO CORE AXIS	CORE EVAL.	[illegible]
676.3-753.5	77.2	Mudstone -med to dk gy, gen badly broken -micaceous -carb 676-677.6 coaly broken 679-683 Brec coal on frac 683-689.5 -Brecciated 689.5-699.7-frac. along bedding calcite infilling 700.1-700.9-soft,shale poss. goupe 701.3-701.9 -A.A. 703.7-704.4 704.9-705.2 -soft goupe zone 706.4-706.6 -coaly shale 708.4-711.5 -brecciated with coal stringers 711.5-717.5 -severe brecciation with clay infill 725.3-725.6 -soft coaly zone 733.3 - coal parting Mudstone continues as below -carb, tr marcasite thin coal part -interlaminated with siltst (738-738.5) 739.5-740 -soft sed deformation -mudstone chips in with very fine gr ss matrix -twigs present 745.6-746.5 -vfn gr. ss-med gr -abrupt contact at base -calcite on frac with marcasite -75° @ contact -erosional contact 750-753.5 -num vit str throughout	60°	60°	95 85
753.5-760	6.5	Sandstone -m. crs grained -med gy -with silica cmt, carb, coal part throughout, frac. thru-out near vert -coal part @ 755.4-755.6, bl shale with str			
760-778	18	Mudstone -bl,carb,slicken side; micaceous 767.3-768 - soft shale-coaly zone 768.7 - coaly part 776-777 - 20° frac. - calcite on frac.		20°	
778-786	8	Interlam Siltstone-Shale Sandstone -thin laminations -breaks along bed -carb exhibits xbedding	60°	60°	

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FRD TO CORE AXIS	CORE INTVL.	
786-821	35	Sandstone -m gr dk grey -silica cmt (w cmt), carb, -chert pred, minor qtz -twigs thru-out 788.8-789.3 -ss soft zone,minor gouge 796-797.3 -soft zone, part decementation 797.3 - coal part 799.3 - coal part 799.5-801.7 -soft zone ass/coal part 803.4-803.7 - coal 808 - rip up clasts 809 - coal part 813 - coal part -apparent massive bed, minor thin bed -cg towards base 817-821 -rip up clasts & min coal part 818.9-819 -coal part, vitrain,coal part towards base			
821-834	13	Mudstone -thin lam;bit & carb, abund coal part -soft & frac thruout 823 -coal part 827.6-828 -coaly zone 829.6-829.9 -soft,argil coal,soft-crushy 833.6-833.8-soft shale zone -base m-fine gr ss towards carb, shale at top		Sound	9
834-845	11	Sandstone -med- dk gy -carb qtz chert pred silica cement -massive, with vert frac -calcite infill -mod sound 834-836 siltstone frac parallel to core -calcite on fractures -becoming sandier, by 836 is sandstone 839.6-840.3 -soft zone argil infill water zone		not sound	9
845-857.6	12.6	Mudstone -silty in part -high fracture soft -silty zones, num frac; calcite infill slicken -coal thru-out vit bands *Could be a possible fault zone, abd. gouge mat'l. Highly brecciated from 845-848- coal part also- 855-857.6 - high Brec ; v soft		soft broken	9
857.6-890.2	32.6	Coal Seam 5 857.6-858 - clarain, soft m fusain 858-859.1 - claro-vit 859.1-859.5 - clarain 859.5-861.5 - claro-vit(clar pred) tr. marc. 861.5-861.8 - clarain; minor fusain 861.8 - shale str 861.8-863 - clarain, minor fusain 863-864.3 - clarain 864.3-865.4 - carbargilite			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE ANGL.	REC.
		865.4-866.8 - shale 866.8-866.2 - claro-vit 866.2-868 - NO CORE 868-868.2 - durain/vit band 868.2-868.5 -bl. carb shale 868.5-868.8 - clarain 868.8-869.1 -bl carb shale/vit band 869.1-869.3 -claro-durain 869.3-869.5 -shale 869.5-869.6 -clarain; tr marcasite 869.6-869.65-shale 869.65-869.7 -clarain 869.7-869.8 -shale 869.8-870 -clarain -tr marcasite 870-870.5 -clar; hard 870.5-873.8 -clarain soft 873.8-874.9 -durain & argil 874.9-878 - clarain 878-883 -clarain, very soft & mushy 883-885 -durain & 1" shale slp. 885-888.2 -clarain 888.2-888.7 -shale, bl carb 888.7-890.2 -claro-vitrain *Recoveries - (see overleaf)			
890.2-891.5	1.3'	Mudstone Dr.-bl-brown-carbonaceous brittle			
891.5-970.3	78.8	Sandstone - Basal -lt med gy -fractured by random fractures into 1-2" frag -prominent set joints at 80° to core axis & at 45° -core is well cemented, individual pieces are sound -Basal, f -med gr., dk gy, bl & carb 898-910 -core v sound -904.4-coal part 908.4-908.8-coal part,vit 905.6- -coal part - marc 910-913 - core mod sound 913-923.6 - ss, high frac -gouge mat'l on frac 919.4-919.5-soft bit. shale with coal -poss water zone, part decementated 925.6- fracture at 25° tr calcite m frac surf 923.6-948 -severely broken,calcite ar frac random vert frac thru-out 956.5 -frac 45° 948-966 -core mod sound 966-970.4-partial decementation due to water - very soft		80° 45° gen. sound 25° 45°	95
		JURASSIC-FERNIE GROUP			
970.3-993	22.7	Shale Interbedded Siltstone & Sandstone Passage Beds -bl carb shale fissile 975-983-ss v fg-silty micaceous very sound, silica cement 977-78 - frac @ 20° 984-986.5 -severe frac-water zone-partial decementation	80°	20°	

Recoveries - Seam 5

853-858	3.8/5
858-863	4/5
863-868	3.2/5
868-873	5/5
873-878	5/5
878-883	2.5/5
883-885	1.3/2
885-890	5/5
890-893	3/3

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FRD TO CORE AXIS	CORE INTAL.	
		987 - slickenside			
		988.6 - frac @ 45°	45°		
		988.6-989.7 -frac zone (severe)			
		990.7-991 -frac zone			
		992-992.5 -slicken sided frac @80°	80°	80°	
		983-993 -very thinly interbedded carb shale & fine grained ss shale-fissile			
	993	TOTAL DEPTH			

DIAMOND DRILL RECORD

Hole No.: 75D-07

Property: Sage Creek Coal

Location: North Hill
17,856,321 N
586,353 E

Elevation: 4749' asl.

Contractor: Connors Drilling

Hole Size: BQ

Rig No.: Rig #1

Date Commenced Drilling: September 26, 1975

Date Finished Drilling: October 6, 1975

Date Hole Completed: October 7, 1975

Logged By: J. Mitchell and K. Wilson

Date: October 6, 1975

Probed By: Roke Oil Enterprises

Date: October 6, 1975

Total Depth Drillers: 718'

Depth of Overburden: 9'

Total Depth Logger: 718'

Water Level: 4684' asl.

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Ti

Surface Casing: 80' (left in hole)

Total Drilling Time:

Total Down Time:

Total Footage Chargeable:

Total Hourly Contact:

Standby Time for Logging:

Other Standby Time:

Total Chargeable Standby Time:

Actual Moving Time Between Holes: 1

Chargeable Moving Time " " :

Quantity of Mud Used:
Quik Gel - 96 bags
Kwik Trol - 76 bags
Asbestos - 50#
CCl4 - 1

Remarks:-

Probe Report:

70?-0.....Gamma Ray/Neutron.....Thru NQ Drill Rods.
702-0.....Sidewall Density.....Thru NQ Drill Rods.
715-0.....Sidewall Density.....Open Hole.
715-0.....Caliper.....Open Hole.
715-80.....E-Log.....Open Hole.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam #2	194 -204.5 215 -216	10.5' 1'	194-206 216-217.75	11' 1.75'
Seam #4U #4L	255 -294 338.9-343.2	39.0' 4.3'	257-295 338.5-342	8' 3.5'
Seam #5U	583.5-618	34.5'	583-605	22'
5L			606-617.5	11.5'

...VAL	UNIT THICKNESS	DESCRIPTION	< OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
0 - 8	8'	Overburden - Soil & wthrd. broken rock.			
		Cretaceous-Kootenay Formation			
8 - 52	44'	Shale - dk. gy., carb., in part sltst. & f. gr. SS, minor coal strgs.			
52 -112.5	60.5'	Sandstone - lt. to med. gy, S.& P., med.-gd. coarsening downward to cgl. @ 80'. Fractures range from 45° to 60° to axis. Some gouge material & decementation along fractures. Core gen. fractured & broken. 68-71 - Recovery 2.0/3.0. 71.5-72 - Brec. & decemented. 71-77 - Recovery 4.5/6.0. 88 - water zone. 67.5 - Jointing @ 20°. 95-96 - Coal partings. Abnt. fracturing @ low angle to core. 98-100 - Core is broken, decemented & possibly water zone. Also 103.5. 104-104.5 - Fractures @ 20° to core. 108-109 - Shale str.	55°	J 45° - 60° J 20° J 25° J 20°	68 to 77 30%
112.5-133	20.5'	Shale - med. to dk. gy., massive, competent, micromicaceous. - Bedding @ 65°. 105.5-108 - broken, clay infilling on frac. planes. 109.8-110 - coal. Fractures @ 114' - 20° 118' - 20° 123' - 22° Numerous hairline fractures @ 25°. Bedding fractures @ 60°.	65° 60°	J 20° J 22° J 60°	95%
133 -143	10'	Sandstone - lt. to med. gy, argil., mg gr. to cgl. at base. Soft cemented 134-135, & prob. water course. 133-138, Rec. 3.8/5.0. 137.3-138 - Sh. dk gy. 138-143 - SS, Cgl., abnt. coal str. from 140' to 143' with pyrite. Core is badly broken & frac. @ 25° to 30°.	60°	J 25° - 30° Gen. sound. Few frac.	95%
143 -194	51'	Shale - Med. to dk gy, silty near top, Sound, Bedding 50° to 60° to core. Jointing 160' - 20°, 163' - 25°. 162-163 - Badly broken, pyritized. 164 - Bedding - 45°. Numerous hairline fractures. 170.6-172.5 - Brec. sh. 172.5-173 - Brec., sandy. 173-177.5 - Brec. coaly from 173.5-174. 173-177 Rec. 2/4.0. 180.5-194 - Brec., soft coaly str.	50° - 60°	J 20° - 25° Sound with minor brec.	95%

...VAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
194 - 204.5	10.5'	COAL - Seam #2 194-204.5 - Claro-vitrain.		Fair to good.	95%
204.5- 255	50.5'	Shale - Carb. to coaly sh., coal str., Contact with Seam 2 above is gradational with carb. and coaly str. interbedded with shale. 204.5-205 - Sh. with durain & coal strs. 205-207.5 - Clarain & durain 207.5-208 - Sh. with thin coal strs. 208-209.5 - Shale. 209.5-214.6 - Carb. Sh. 214.6-216 - COAL. 216-228 - Mudstone, carb. with thin coaly bands. 228-235 - Core is very badly frac. 233 - Thin coal parting. 235-255 - Shale, brec., carb. at base. 251 - Frac. @ 45° to C/A. 253-255 - 50% Rec.	45°	Core is sound / minor brec. J 45°	95% 50%
255 - 294	39'	COAL - Seam #4U 255-264 - Clarain with vit. banding. 264 - Sh. str. 264-266 - Clarain with fusain. 266-268 - Core missing. 268-272 - Clarain. 272 - Sh. str. 272-275 - Clarain. 275-275.3 - Claro-vitrain. 275.3-276.1 - No core. 276.1 - Sh. str. 276.1-277 - Clarain & fusain, soft. 277-277.3 - Clarain. 277.3-279 - Clarain with durain. 279-279.3 - Claro-vitrain. 279.3-280 - Clarain & fusain, soft. 280-283 -no core 283-283.6 -Clarain 283.6-283.8 - Mudstone, bl., carb. soft. 283.8-284 - Claro-vitrain. 284-284.7 - Mudstone. 284.7-287 - Claro-vitrain. 287-287.5 - Clarain. 287.5-289.6 - Durain, minor vit. bndg. & marc. 289.6-289.7 - Shale. 289.7-290 - Fusain. 290-291 - Clarain & fusain, soft. 291-294 - Clarain with vit. Recoveries 255-260 - R 3.4/5.0 - 68%. 260-264 - R 0/4.0 - 0%. 266-268 - R 0/2.0 - 0%. 268-271 - R 2.6/3.0 - 86%. 271-272 - R 0.3/ .0 - 10%. 272-275 - R 2.6/3.0 - 86%. 275-277 - R 1.3/2.0 - 65%. 277-280 - R 2.5/3.0 - 83%. 280-283 - R 0/3.0 - 0%. 283-287 - R 2.0/4.0 - 50%. 290-294 - R 3.2/4.0 - 80%.		Coal is soft & mushy. Gen. poor rec.	Overall Rec. 62%

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FRAC TO CORE AXIS	CORE EVAL.	
294 - 338.9	44.9'	Shale Med gy, becoming silty, mod frac throughout 296.8-297 -Coal str. 298.7-299 -Coal str. 299.1-301 -Soft coal, brec, poorly disc bedding @ 50° Frac along bedding-very prominent. 315-326 -Brec with sandy infill random jointing @ 45° throughout. 321 -Jointing @ 20° 323.5 -Jointing @ 20° 326-337.5 -Silty to v f grade sandy, prom lams @ 60°, soft sed. x-bedding. 337.5-339 -Blk mass shale, carb	50° 60°	Gen. good. J_f 50° J 45° J 20°	
338.9-343.2	4.3'	Coal Seam 4L 338.9-340 -Clarain, vit bndg. 340-341 -Clarain & fusain 341-341.1 -Shale, bl, carb, soft 341.1-343.2 -Clarain & fusain		Good Coal is argil.	
343.2-418	74.8'	Shale Dk gy to bl micmica, silty badly broken into 3-4 inch frags. Silt laminations @ 353'-45°	45°	Mostly mech frac. Generally sound.	
418-429	11'	Sandstone f grade laminated. At base of section core is missing, dk gy to bl & carb. Core is sound, some frac with calcite infill. Recoveries 413-418 3.5/5 420-425 3.3/5	50°	J_c 25°	
429-456	27'	Sandstone, Shale & Siltstone 429-432 -Shale is bl finely lam slty. Fracs are ss infilled with calcite @ 430.5 -small frac has offsets - 0.2' 432-434.8 -ss f to m g, carb thin lams highly frac 434.8-443.7 -Shale with fine sand & silty lams. Brec with calcite infill. 443.7-446.4 - Shale intlam with sltstn gr to vfg ss. X-bdg with soft sed defm. Ss fractures along bedding. Calcite infil 446.4-447.6 -Soft brec zone, slty shale. Last .5' is soft decom f g to m g ss with coaly partings 447.6-449.1 -Coal soft with vitrain bands. 449.2-453 -Shale intbd with v f g ss & siltstone grading to v f g ss @ 454	60° 60° 60° 60°	Core is sh,sltstn & ger. sound J_c 25° Sound J_f 60°	1.. 1..

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FRAC TO CORE AXIS	CORE INTAL.	[illegible]
456-485	29'	Sandstone			
		Dk gy to bl carb., S & P, m grained to coarse grained			
		458-463 -Badly broken	65°	J 65°	9[illegible]
		463-468 -Sound . Fractures readily along bedding planes & normal to bedding.		J_c 25°	
		471.5-472 -Frac. soft decom.		Core is gen sound & intact	
		473-477 -Core badly fractured parallel to and normal to core.			
		477-482 -mod soft. Frac inplace.		J 90°	
		480-482-Soft,arg,coaly water course.		J 0-5°	
		482-487 -SS gr to siltstone, arg randomly frac.			
485-508	23'	Siltstone Grading to Shale			
		487-490.5 -Silst. arg., soft sandy infilled brec	65°	Core Frac. readily.	
		490.5-492 -SS intl. silty, soft broken.		J_c 25°	
		492-493.5 -Shale soft silty, brec.			1[illegible]
		493.5-494.5 -Coaly mud, coaly carb. very soft, silty - vitrain stringers.			
		504 - 507.5 -Gouge filled frac @ 60°.		J 60°	

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE INTERVAL	[illegible] REC.
509 -516	8'	Sandstone - Lt. brd. gy, S & P, silica cmt. highly frac. numerous coal and carb. stringers & frags., vitrinite, breaks readily along coal partings.	65°	J 25°	[illegible]
516 -557	41'	Shale and Siltstone - Sh. dk gy, fractured. 517-522.6 - Coaly section. 517-518 - Sh. 518-518.9 - Carburg. & sh., soft. 518.9-519.4 - Clarain. 519.4-519.8 - Sh., carb. dk brn. 519.4 - sh. str. int. with vitrain. 522-538 - Sh. silty, numerous coal stg. and str. throughout. 523-523.7 - dk gy carb. 523.7-523.8 - coal. 524.2-524.3 - coal. 525-525.2 - coal. 529.1-529.4 - coal. 529.9-530 - coal Fractures commonly along coal partings. 532-532.5 - silty lt brn lam. in sh. 534-536.5 - finely l m. well devel. joint sets parallel to bdg. 25°. 536.1-536.3 - coal, soft. 537-538.5 - Badly broken by low angle (25°) joints. 538-557 - Siltst., dk gy brn, arg. Core is cut by numerous frac. parallel & perp. to bedding, calcite infill. 541-542 - Highly frac. & decomp. 542.8 - soft, brec. 543-543.3 - V. soft brec., coaly str., poss. water source. 548-549 - soft brec. with silty gouge coaly frags. numerous hairline fracs. 552-557 - Siltst. gr. to v-f gr. SS. Core is intact but rubbley, broken by numerous frac., calcite filled dec.	60° 60° 60° 60°	Core is soft broken. J [illegible]° J [illegible]° Jf [illegible]° Jf [illegible]° Jc 25° Jc [illegible]°	[illegible]
557 -583.5	26.5'	Shale - Dk gy to bl., broken & brec. Calcite & marc. infill, joints at low angle and along bedding. 558-559.4 - Coaly carb. sh. 574-579.6 - Poor recovery, rubble. 579-583.6 - Bl., carb. mudstone soft fissile throughout due to vitrain banding. Recoveries 577-578 - R 4.3/6.0. 578-579 - R .5/1.0. 579-583 - R 3.3/5.0. 583-588 - R 1.5/5.0. 588-593 - R 4.5/5.0. 593-597 - R .8/4.0	60°	Broken & frac. Jc 25°	57[illegible] [illegible] 58[illegible]

INTERVAL	UNIT THICKNESS	DESCRIPTION	< OF BED TO CORE AXIS	CORE INTERVAL	REMARKS
583.2-618	34.9'	COAL - Seam 25			
		583.5-584.5 - cl. & fus., soft. 584.5-584.8 - cl. & vitrain. 584.8-588 - Lost core. 588-588.9 - Carbarg. & sh. 588.9-589 - Vitrain. 589-589.7 - Clar. & dur. 589.7-590.1 - Carbarg 590.1-590.4 - Claro-vit. 590.4-593 - Clar. & vit. 593-597 - Clar, vit. & dur. 597-597.8 - Dur. & sh. 597.8 - 599 - Clar. 599-599.1 - Sh. 599.1-599.6 - Clar. 599.6-600 - Dur. & marc. 600-600.4 - Clar. 600.4-600.7 - Fus. 600.7-600.8 - Sh. 600.8-600.9 - Fus. 600.9-601 - Sh. 601-603 - Dur. & clar. 603-603.9 - Clar. 603.9-605 - Fusain, slicken. muddy gy. 605-606.1 - Cl. & vit. 606.1-606.3 - Carbarg. 606.3-607.5 - Clar. v. soft. 607.5-607.3 - Clar., vit. band 607.3-609 - Fus. (609-611 not described) 611-611.5 - Vitrain & Clarain 611.5-612 - Fus., soft. 612-613 - Clar., soft mushy. 613-614.7 - Clar., vit. band. 614.7-617.2 - Clar. soft mushy. 617.2-617.4 - Dur. & marc. 617.4-618 - Clar. & vit., hard tr. marc. <u>Recoveries</u> 584.8-588 - R 0/3.2. 605-610 - R 4.3/5.0. 610-612 - R 1.5/2.0. 618-620 - R 1.6/2.0. 620-625 - R 3.7/5.0. 625-627 - R 1.0/2.0.			
618 -708	90'	<u>Sandstone (Basal)</u> - Ref. to dk gy., S & P, top 10" of SS is finely laminated with hairline coal partings along bdg. Core badly broken. 618-623.4 - Sh. bl to dk gy-brn, very carb. at top, grading to v. silty. Core is broken. Finely lam. in silty section. 657.6-662 - Rec. 3.5/5.0 = 75%. 675-677 - Core broken in 2" frags. 685 - Bedding has flattened to 25°-30°. Fractures along fol. planes. 637.5-639.5 - Core is soft rubbly decemented. 637-647 - SS is arg. & dark gy. Badly broken with low angle frac. 647-654 - Core sounder, 2 joint sets 20° & 60°. 654-662 - Core badly broken. & 662' sections soft & decem.	70° 25°-30°	Core is broken & frac. If 70° If 25°-30° Jc 20° Jc 60°	Over [illegible] Vin lost cor in arc

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	[illegible] REC.
		663-677 - Core generally badly broken. 682 - Core is sound, SS is mg., well sorted, v. arg., grades into brec. SS with clay infill. 703-706 - Very brec, silty sand infill.	60°		
		Jurassic - Fernie Group			
708 -713	10'	Fernie Beds - v-f gr. SS at top gr. into finely laminated banded siltst. 711-713 - Brec. v-f gr. SS, dk gy & arg. broken. 714-718 - Mud none. Dark bands in section are bit. or carb. and core parts readily along carb. bands.	45° 45°	JF 45°	100%
	718'	Total Depth.			

RIO TINTO COLORADO [illegible]

DIAMONDDRILL RECORD

Hole No.: 75p14 Property: Sage Creek Coal

Location: North Hill
17,855,189 N
584,381 E

Elevation: 5319' asl

Contractor: Connors Drlg.

Hole Size: HQ

Rig No.: 2

Date Commenced Drilling: November 8, 1975

Date Finished Drilling: November 11, 1975

Date Hole Completed: November 12, 1975

Logged By: O. Cullingham E. Wilson Date: November 12, 1975

Probed By: Robo Oil Enterprises Date: November 11, 1975

Total Depth Drillers: 150' Depth of Overburden: 17

Total Depth Logger: 150' Water Level: Full (Gel)

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling T

Surface Casing: 17
Total Drilling Time: 40 hr.
Total Down Time: -
Total Footage Chargeable: 150
Total Hourly Contact: 0

Standby Time for Logging: 2
Other Standby Time: -
Total Chargeable Standby Time: 2
Actual Moving Time Between Holes: 12
Chargeable Moving Time " " : 12

Remarks:- Oxidation test holes drilled @ -60° on azimuth 285°

Quantity of Mud Used:
Quik Gel 18
Quik Trol 18
CC 1

Probe Report:

145-0	Gamma Ray Neutron	Logged through HQ rods
139-0	Density	Logged through HQ rods
125-0	Caliper	Logged open hole
145-26	E-Log	"

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 4 L	17 - 34.9	17.9	16 - 33.5	17.5 +
Coal	49 - 51.3	2.3	49 - 51	2

INTERVAL	DRILL THICKNESS	DESCRIPTION	∠ OF FLD TO CORE AXIS	CORE EVAL.	ETC. REQ.
0 - 17	17	Overburden - brn clayey till - silts & sands to boulders			
		Cretaceous-Kootenay Formation			
17 - 34.9	17.9'	Coal Seam 4L			
		17'-20' - soft, muddy texture - v. fine - prbly. mostly clarain			
		20'-32.6'- soft - muddy texture - mostly fine - no stratigraphy available			
		32.6-34.9' - soft - becoming more brittle & brighter - faint laminations indicative of depos.bdg.			
		Recovery 17'-20' 1.1/3 20'-22' 0.5/2' 22'-24' 0.6'/2' 24'-26' 0.8'/2' 26'-28' 1.0'/2.0' 28'-30' 1.1'/2' 30'-31.6' 1.4'/1.6' 31.6'-35' 3.1'/3.4' 35'-36' 0.9'/1.0' 31.6'-32.7' 1.0/1.1 32.7'-35' 2.1/2.3			
34.9 - 49	14.1	Shale			
		34.9'-35'- Carbargillite hd., dark, coaly shale			
		35 - 36.3'- Shale dk. gy. thinsplints of coal jointed @			
		36.1± fracture @ 60° to C/A Bdg. - Sh. indistinct breaks easily @ rt.∟'s to C/A.			
		36.3-36.6'-coal, hd. brittle, thin dull coal, coaly sh. ptgs.			
		36.6-49 Shale Mudstone -black -massive becomes lighter and sl. silty -vague silty lams @ -abundant frac. perp core along foliations	70-75°	J 75°	
		45 - 49 -Shale is bleached to light grey and very rusty water course -sl silty			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	PER. REC.
49 - 51.3	2.3	Coal			
		49 - 49.5 - coal clean bright clarain few thin ptgs.			
		49.5 - 51.3 - coal hard, shaly, gr to carbarg			
		49 - 51.3 Rec. 2.2/2.3			95%
51.3 -103	51.7	Shale			
		- med gy - sl silty, massive - few thin coal str @ start			
		50 - 51 - broken, very rusty abund jt. normal to core		J90°	
		61 - 64 - Shale is brecc. coaly - very soft shale fragments			
		64 - 71 - Shale - bl mudstone - very broken, Carb. - abun 20° jts rusty		J20°	
		71 - 83 - Shale - med gy - silty - badly broken frac parallel to core - rusty - abund. 20-25° jts		J20-25°	
		83 -103 - silt content gradual incr vague x bedding & fine lams. Few jts @ 30° and normal to core. All jts rusty		jts-30° 3-5'per @ 90°	
103 - 150	47	Siltstone			
		- med to lt. gy. - finely laminated quite intact few low angle jts that are rust coated	@ 80°		
		123 -128 - Badly jointed, rusty soft disagglomerated			
		132 -135 - very rusty parallel jts splits core in half, few fol jts & 20° jts, all rusty		20°jts 1/5'sec	
		135 -150 -Compact finely lams, x bedded			
		E.O.H. @ 150			

Drill Hole Sample Intervals and Sample Weights in Grams

Hole No: 75D-11

Interval	Weight (Grams)
17-20	1075
20-22	700
22-24	722
24-26	1095
26-28	1222
28-30	1340
30-31.6	1825
31.6-32.7	1020
32.7-34.9	2344
34.9-36.6	3015

DIAMOND DRILL RECORD

Hole No.: 75_D13

Property: Sage Creek Coal

Location: North Hill
17,855 114 N
584 199 E

Elevation: 5323

Contractor: Connors Drilling Limited

Hole Size: HQ

Rig No.: 2

Date Commenced Drilling: November 13, 1975

Azimuth: 285°

Date Finished Drilling: November 15, 1975

Dip: -60°

Date Hole Completed: November 15, 1975

Logged By: O. Cullingham

Date: November 15, 1975

Probed By: Roke Oil Enterprises

Date: November 15, 1975

Total Depth Drillers: 100

Depth of Overburden: 15'

Total Depth Logger: 95

Water Level: Full

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Ti

Surface Casing: 20'
Total Drilling Time: 46 hrs.
Total Down Time: --
Total Footage Chargeable: 100
Total Hourly Contact: 18 hrs.

Standby Time for Logging: 6
Other Standby Time: 1
Total Chargeable Standby Time: 7
Actual Moving Time Between Holes: 11
Chargeable Moving Time " " : 11

Remarks:- Oxidation test hole
Drilled at -60° on
Azimuth of 285°

Quantity of Mud Used:
Quik Gel 28
Quik Trol 28
CC16 1

Probe Report:

93-O .....Gamma Ray/Neutron .....Thru HQ Drill Rod
92-O .....Sidewall Densilog .....Thru HQ Drill Rod

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Coal Seam 4U	17-24	7	17-28	11'+
Coal Seam 4L	47-73	26	46-69.5	23.5

INTERVAL	DRIFT THICKNESS	DESCRIPTION	∠ OF PEN TO CORE AXIS	CORE EVAL.	EST. REC.
0 - 17	17'	OVERBURDEN - Glacial till - High %age clays & silts - Cobble & boulder till - M. dk. buff brown.			
		CRETACEOUS KOOTENAY FORMATION			
17 - 24	7'	COAL SEAM 4U - Soft, mushy, indurated with clay in upper 3 ft. - Clayey or plasticine texture throughout - Stratigraphy or banding is masked. Recoveries 17-19 2/2 19-23 0/4 23-24 .6/1 24-28 1.5/4			37
24 - 47	23'	SHALE - buff brown to dark grey - in part silty & hard - in part carb. 24' - 34' sh highly weathered indurated with clay; friable; appearance of overburden 34' - 36.3' sh very friable; breaks easily at rt. /'s to c/A. 36.3- 44' sh very friable, mushy indurated with clay. in part contains silty sh. frags. blocky, breaks readily into small blocks. Lmn. str. on fracture faces. 44' - 46' mud/sh frags inbedded in mud. 46' - 46.8' loose fragments of sh /clay - soft, mushy. 46.8-47' (last .2' of intvl blocked - core band) carbargillite/coal ptgs.	90°	Friable to blocky weathered appearance	95

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE INCH.	EST. REC.
47 - 73	26	COAL SEAM 4L			
		47' - 49' coal hd, blocky, mostly durain/thin ptgs of durain rec. 1.3"/2.0'.			
		49' - 51' coal hd blocky, dull in part, carbargillite -.4' of carbargillite from 0.5' to 0.9' of the 1.2' recovered.			
		51' - 53' coal/carbargillite -hd., dull, blocky. -light in weight. -coal/bands of carbargillite. -carbargillite contains ptgs. of coal.			
		53' - 55' coal 53'-53.4 coal, soft, friable, fine 53.4-54.0 coal, hd., dull to vitreous, blocky. -ptgs. of carbargillite. 54.0-54.4 sh, silty, hd., rnd. frags. (pble) of sltst. 54.4-55' coal, soft, fine, dull/bright ptcls			
		55' - 57' coal banded, soft, vitreous to bright, fine, tr. marcasite.			
		57' - 59' No core.			
		59' - 59.9' coal, bnd., soft, fine, vitreous lustre, tr. marcasite. -prbly. durain.			
		59.9-61.9 59.9-60.0 carbargillite. 60.0-61.1 coal. hd., vitreous splints of durain, well bnd. 61.1-61.9 coal soft, mushy, clay texture.			
		61.9-63' No core.			
		63' - 65' Coal 63'-63.8 coal well bnd., hd., durain/thin vitrain bnds. -vitreous to bright; tr. marcasite.			
		63.8-65.0 coal soft, fine, dull/bright phds. -in part/ appear			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF PED TO CORE AXIS	CORE EVAL.	PERV. MEC.
		65' - 66.4' coal, soft, fine, dull/bright ptcls., marcasite on core surface. highly sks.			
		66.4- 68' coal, soft, dull, bnd., indistinct, prbly. durain/some fusain. some hd. frags of coal dull, prbly durain.			
		68' - 68.4 coal, hd., thinly partd mostly durain. trace of marcasite.			
		68.4- 70.4' coal 68.4- 69.1 coal, soft, friable, fine, dull/bright ptcls. 69.1- 70.4 coal, hd., blocky, mostly durain/vitrain bnds. -contains thin partings of carbarg. -tr. marcasite			
		70.4-73' coal, soft, dull to bright/hd bnds of duro-vitrain intvl. mostly durain/some fusain.			
		Recoveries 47 - 49 1.3/2 49 - 51 1.2/2 51 - 53 1.2/2 53 - 55 1.6/2 55 - 57 1.3/2 57 - 59 0/2 59 - 59.9 0.8/0.9 59.9- 61.9 1.7/2 61.9- 63 0/1.1 63 - 65 1.6/2 65 - 66.4 1.3/1.4 66.4- 68 1.6/1.6 68 - 68.4 0.4/0.4 68.4- 70.4 1.6/2 70.4- 73 1.4/2.6 73 - 75 1.3/2			
73 - 100	27	SHALE - dk. gy., in part slty & in part carb. 73 - 75 1.3'/2.0' 0.3' carb. mudstone 0.3' sh in gy. brn., sl. carb hd.			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FRP TO CORE AXIS	CORE INTVL.	ROCK DESC.
		0.4' coal soft,arg., dull to bright.			
		0.3' carbargillite.			
		@ 76.1', 77.3' & 77.8' prominent fractures @		40° to C/A	
		76.6'- 76.9', broken zone containing carb. mudstone & coal fragments.			
		irregular parting contact @.	80° to C/A		
		Core is generally sound throughout intvl. except where noted.			
		Fractures @ 25° to C/A and 45° to C.A.		25°/C/A to 45 to C/A	
		79' - 84' fractured 6/5' Section @ 25° to C/A.			
		@ 85.1' & 85.4' fractures @ Lmm. stru. on fracture surface.		25° to C/A	
		85.9- 86.4 coal soft, arg., high in fusain; dull/ptgs of carbargillite.			
		86.4- 86.7 carbargillite/coal ptgs grades to carb. sh.			
		89 - 90 carbargillite to coaly sh. -dk. gy. to blk. -v. carb/coal splints -core is badly broken prbly mechanical.			
		91.6' pronounced sks.			
		93' -100' sh dk.gy., in part carb., becomes silty downwards in section. -breaks easily @ 85°-90° to C/A.	85° - 90°		
		4 fractures @ 20°-25° to C/A		25° to C/A	
		2 fractures @ 45° to C/A/		45° to C/A	
	100'	Total Depth.			

Drill Hole Sample Intervals and
Sample Weights in Grams

Hole No: 750-13

Interval	Weight (Grams)
75-28	4480
47-49	1595
49-51	1715
51-53	1522
53-55	2000
55-57	1604
59-61.9	2475
63-65	1870
65-68	3407
68-70.4	2305
70.4-73	2090

DIAMOND DRILL RECORD

Hole No.: 75_D15

Property: Sage Creek Coal

Location: North Hill
17,855,155 N
583,392 E

Elevation: 5287' asl.

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: 2

Date Commenced Drilling: November 17, 1975

Date Finished Drilling: November 19, 1975

Date Hole Completed: November 20, 1975

Logged By: E. Wilson, J. Mitchell

Date: November 20, 1975

Probed By: Roke Oil Enterprises

Date: November 20, 1975

Total Depth Drillers: 170'

Depth of Overburden: 61.5'

Total Depth Logger: 170'

Water Level: Full (Gel)

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling

Surface Casing: 61'
Total Drilling Time: 62 hrs.
Total Down Time: --
Total Footage Chargeable: 170'
Total Hourly Contact: 22 hrs.

Standby Time for Logging: 10 hrs.
Other Standby Time: --
Total Chargeable Standby Time: 10
Actual Moving Time Between Holes: 2
Chargeable Moving Time " " : 2

Remarks:- Oxidation test hole
Drilled at -60° on
Azimuth of 285°

Quantity of Mud Used:

Quik. Gel	36
Quik Trol	36
CC-16	1

Probe Report:
169 - 0 ..... Gamma Ray - Neutron .... Logged thru Rods.
150 - 0 ..... Density ..... Logged thru Rods.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 5U	61 - 91.6		62.5 - 77.5	15'
Seam 5L		30.6	81 - 94	13'

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FED TO CORE AXIS	CORE INCL.	[illegible]
0 - 61.5	61.5	OVERBURDEN - brn. clayey till - silts, sands to boulders			
		CRETACEOUS - KOOTENAY FORMATION			
61.5- 91.6	30.1	COAL SEAM 5			
		- small boulder at top of coal 61 -63 soft coal mush 63 -65 soft coal mush 65 -67 coal, soft durain 67 -68.5 clarain 68.5-70 soft earthy coal durain 70 -72 soft coal, durain 72 -74 clar & dur. 74- -76 soft coal durain 76 -77 soft coal 77 -78 clarain & fus. 78 -80 soft coal, few thin sh str. 80 -82 clarovitrain tr durain 82 -83.1 soft coal tr shale 83.1-84.8 soft coal 84.8-86.2 soft coal 86.2-87.6 soft coal & durain 87.6-88.9 soft durain/clarain 50/50 88.9-91 soft durain & clarain 50 / 50 91 -91.6 soft coal		poor soft coal	5[illegible] in co se[illegible]
		Recoveries 61 - 63 0.5/2.0 63 - 65 1.2/2.0 65 - 67 1.3/2.0 67 - 68.5 1.2/1.5 68.5- 70 1.1/2.0 70 - 72 1.5/2.0 72 - 74 1.6/2.0 74 - 76 1.0/2.0 76 - 77 1.0/1.0 77 - 78 0.7/1.0 78 - 80 1.7/2.0 80 - 82 1.5/2.0 82 - 83.1 0.9/1.1 83.1- 84.8 0.8/1.7 84.8- 86.2 0.8/1.4 86.2- 87.6 1.2/1.4 87.6- 88.9 1.0/1.3 88.9- 91 1.6/2.1			
91.6-96.5	4.9	MUDSTONE -bl brn carb -very soft Recoveries 91 - 93 1.7/2.0 93 - 95 1.7/2.0			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FRD TO CORE AXIS	CORE EVAL.	EVA. REC.
96.5-135	38.5	SANDSTONE BASAL - very rubbly - dk gy to bl - S & P med gd. 106 - 123 core composed almost totally of sandstone pieces. strong Jt system are parallel & at 15° to core. 132 - 135 core is intact although fractured. Abund coaly ptgs & lenses, massive. Recoveries 95 - 100 2.5/5.0 100 - 103 1.5/3.0 103 - 106 2.0/3.0 123 - 126 2.5/3.0			72.[illegible]
		JURASSIC FERNIE GROUP			
135-170	35	SHALE, SILTSTONE - dk bl silty - intbd with gy arg siltstone - whole section of shale is brecciated & mud filled -finely laminated 135 - 146 generally broken, brecciated, mud filled 146 - 165 dk, gy siltstone finely lam @ near normal to core - more intact than preceding - scattered 90° breaks & low angle frac 20-30° to core forms rubble. 165 - 170 Ribboned dk brn bl shale intbd with dk gy siltstone arg. Foliation essent right angle to core. End of Hole	75° 85°		

Drill Hole Sample Intervals and
Sample Weights in Grams

Hole No: 75D-15

Interval	Weight (Grams)
61-63	450
63-65	1530
65-67	1235
67-68.5	1165
68.5-70	955
70-72	1478
72-74	1795
74-76	1035.
76-77	1530
77-78	892
78-80	3027
80-82	1485
82-83.1	725
83.1-84.8	880
84.8-86.2	946
86.2-87.6	1600
87.6-88.9	2170
88.9-91	1545
91-91.6	670
91.6-93	1128
93-95	2650
95-96.5	2745

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

Hole No.: 75D17

Property: Sage Creek Coal

Location: North Hill
17,854,205 N
583,953 E

Elevation: 5293' asl.

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: 2

Date Commenced Drilling: November 21, 1975

Date Finished Drilling: November 22, 1975

Date Hole Completed: November 22, 1975

Logged By: J. Mitchell Esq.

Date: November 22, 1975

Probed By: Roke Oil Enterprises

Date: November 22, 1975

Total Depth Drillers: 127

Depth of Overburden: 25'

Total Depth Logger: 127

Water Level: 33'

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling T

Surface Casing: 25'
Total Drilling Time: 31 hrs
Total Down Time: --
Total Footage Chargeable: 127
Total Hourly Contact: 5

Standby Time for Logging: 6
Other Standby Time: --
Total Chargeable Standby Time: 6
Actual Moving Time Between Holes: 1
Chargeable Moving Time " " : 1

Remarks:- Oxidation test hole
Drilled @ -60° @
Azimuth of 275°

Quantity of Mud Used:
Quik Gel 14
Quik Trol 14

Probe Report: 127 - 0 .... Gamma Ray Neutron .... Logged thru HQ rods
118 - 0 .... Density ..... Logged thru HQ rods
124 - 0 .... Density ..... Logged open hole
124 - 0 .... Caliper ..... Logged open hole
125 - 26 ... E-Log ..... Logged open hole
125 ..... Deviation ..... Logged open hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 4U	25.2 - 65.5	40.3	26 - 65	39
Seam 4L	98 - 112	14	101.5-111	9.5
	122.8 - 124.3	1.5		

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FRAC TO CORE AXIS	CORE EVAL.	REC.
0-25	25	OVERBURDEN - m. brn., sdy. glacial till			
25-25.2	0.2'	Cored weathered rock in clay.		good	100%
		CRETACEOUS-KOOTENAY FORMATION			
25.2-65.5	40.3'	COAL SEAM 4U			
		25.2-25.7 coal, dull, brittle 25.7-26.0 soft, bright 26.0-27.5 hard,dull carbarg or durain 27.5-28.0 bright,brittle 28.0-29.5 no core 29.5-29.8 hard,bright,brittle 29.8-30.4 soft,bright 30.4-32.0 hard,bright 32.0-33.3 dull,hard 33.3-35.2 bright,brittle,soft in part 35.2-36.5 no core 36.5-39.5 soft,bright 39.5-43.0 no core 43.0-43.3 hard,bright 43.3-43.8 durain 43.8-45.0 soft,bright fissile 45.0-46.0 no core 46.0-46.4 hard,bright fissile 46.4-46.7 hard,bright,brittle 46.7-47.7 hard,bright fissile 47.7-48.0 no core 48.0-48.5 hard,bright fissile 48.5-49.2 hard,bright brittle 49.2-49.4 soft,bright 49.4-51.2 hard,bright fissile 51.2-52.5 soft,bright fissile 52.5-53.0 no core 53.0-57.8 soft,bright fissile 57.8-58.0 no core 58.0-58.3 AA 58.3-62.8 hard,bright fissile 62.8-63.0 no core 63.0-63.5 hard,bright fissile 63.5 durain stringer 63.5-65.0 soft,bright 65.0-65.5 no core		good	77%
		Recoveries 25.0-26.0 1/1 26.0-29.5 2/3.5 29.5-32.0 2.5/2.5 32.0-36.5 3.2/4.5 36.5-40.0 3/3.5 40.0-43.0 0/3 43.0-46.0 2/3 46.0-48.0 1.7/2 48.0-53.0 4.5/5 53.0-58.0 4.8/5 58.0-63.0 4.8/5 63.0-65.5 2/2.5			77%

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	% REC.
65.5-98.0	32.5	MUDSTONE - black - calcareous 65.5-88.0 rubbly,high to severe degree of fracturing. Core in 1" chunk. 88.0-98.0 appears competent but is highly fractured. 72.8-73.0 vitrain stringer	70°	poor	90.
98.0-112.0	14	COAL SEAM 4L 98.0-99.1 soft,bright 99.1-100 no core 100 -102 soft,bright 102 -103 no core 103 -103.8 soft,mushy 103.8-105 no core 105 -106 soft,bright 106 -107 no core 107 -107.6 hard,dull 107.6-108.2 hard,brittle 108.2-109 no core 109 -110.4 hard,brittle with durain 110.4-112 no core Recoveries 95-100 4.1/5 100-103 2/3 103-105 0.8/2 105-107 1/2 107-109 1.2/2 109-112 1.4/3			61. 61.
112.0-122.8	10.8	MUDSTONE - black,silty - moderately fractured.			95.
122.8-124.3	1.5	COAL - soft,bright			
124.3-127	2.7	MUDSTONE - black, silty - moderately fractured. END OF HOLE			

Drill Hole Sample Intervals and
Sample Weights in Grams

Hole No: 75D-17

Interval	Weight (Grams)
25.2-26	864
26-27.5	2845
27.5-28	535
29.5-30.4	737
30.4-32	1693
32-33.3	1322
33.3-35.2	2005
36.5-38	1485
38-39.5	1475
43-45	1730
46-47.7	1940
48-49.2	1258
49.2-51.2	2030
51.2-52.5	1385
53-54.5	1760
54.5-56.3	2115
56.5-57.8	1485
58-59.6	1502
59.6-61.2	1658
61.2-62.8	1503
63-65	2225
98-99.1	1455
100-102	2900
103-103.8	996
105-106	1438
107-108.2	1090
109-110.4	1825
122.8-124.3	1730

DIAMOND DRILL RECORD

Hole No.: 75_D19

Property: Sage Creek Coal

Location: North Hill
17,854 297 N
583 469 E

Elevation: 5294' a.s.l.

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: 2

Date Commenced Drilling: November 24, 1975

Date Finished Drilling: November 25, 1975

Date Hole Completed: November 26, 1975

Logged By: J. Mitchell

Date: November 26, 1975

Probed By: Roke Oil Enterprises

Date: November 26, 1975

Total Depth Drillers: 168

Depth of Overburden: 31'

Total Depth Logger: 168

Water Level: 115'

Bit Record

No.	Size	Make and Serial No.	F.J.B.	On	Off	Footage	Drilling Time

Surface Casing: 31'
Total Drilling Time: 41'
Total Down Time:
Total Footage Chargeable: 168
Total Hourly Contract: -

Standby Time for Logging: 7
Other Standby Time: -
Total Chargeable Standby Time: [redacted]
Actual Moving Time Between Holes: 20
Chargeable Moving Time " " : 20

Quantity of Mud Used:
Quik Gel 23
Quik Trol 23
CC 16 1

Remarks:- Oxidation test hole
Drilled @ -60° at azimuth of 275°

Probe Report:

153-0	Gamma Ray Neutron --------	Logged through HQ rods
152-0	Density ----------	Logged through HQ rods
165-0	Density ----------	Logged through open hole
165-0	Caliper ----------	Logged through open hole
160	Deviation ----------	Logged through open hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 5U	42.9 - 64.3	21.4	43.5 - 63'	19.5'
5L	70 - 88.9	18.9'	71.5' - 89.5	18

INTERVAL	UNIT THICKNESS	DESCRIPTION	% OF FEET TO CORE ACTU	CORE EVAL.	[illegible]
0 - 32	32	Overburden - soft, sandy, till - Not cored		good	100
32 - 42.9	10.9	Cretaceous-Kootenay Formation Mudstone - black, carbonaceous, soft - coal laminae throughout - coal str. - 33.4 - 33.7 37 - 37.5 Recovery 31 - 33 2/2 33 - 37 2.5/4 37 - 38 0.5/1 38 - 42 2/4			6
42.9-88.9	46'	Coal Seam 5 42.9 - 43.8 durain 43.8 - 45.5 hard bright brittle 45.5 - 46.5 soft mushy clarain 46.5 - 47.1 shale 47.1 - 47.5 soft dull 47.5 - 48.5 durain 48.5 - 50 No core 50 - 52.5 hard brittle tr shale 52.5 - 53 No core 53 - 55 hard brittle 55 - 57.5 hard dull shaly 57.5 - 58 No core 58 - 60.5 carb mudst, thin coal str. 60.5 - 61 No core 61 - 62 hard bright 62 - 62.2 soft fissile bright 62.2 - 62.4 soft clay coal 62.7 - 63.3 soft dull 63.3 - 63.7 soft clay 63.7 - 64.3 soft bright clarain 64.3 - 65.7 Mudstone 65.7 - 67 durain and shale 67 - 68 No core 68 - 71.4 Shale - thin coal interbeds, soft, fissile 71.4 - 72 soft bright fissile 72 - 73 No core 73 - 77 hard brittle poss, sh str. 77 - 78 hard fissile bright 78 - 79.3 hard brittle bright 79.3 - 83.6 soft bright clarain 83.6 - 86 soft brigh clarain 86 - 87 No Core 87-87.8 - Hard brittle coal 87.8-88.2 Carbargillite 88.2-88.9 Hard brittle Recovery 42 - 45.5 3.5/3.5			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	PER. DEC.
		Recovery (contd.)			
		45.5 - 50 3/4.5			
		50 - 53 2.5/3			
		53 - 58 4.5/5			
		58 - 61 2.5/3			
		61 - 63 .7/2			
		63 - 68 4/5			
		68 - 73 4/5			
		73 - 77 4/4			
		77 - 78 1/1			
		78 - 83 5/5			
		83 - 87 3/4			
		87 - 91 4/4			
88.9 - 91	2.1	Mudstone			
		- massive			
		- black, carbonaceous			
		- grading to siltstone			
91 - 164.7	73.7	Basal Sandstone		moderately sound	
		- med grained			
		- salt & pepper			
		- massive but finely laminated			
		- then carbon lenticules in upper part of section			
		- some severe irnstn on frac.			
		91 - 92 massive			
		92 - 97 thinly lam. frac @70°	70°	poor	
		97 - 103 abundant carb lenticules			
		102 - 102.5 thin mudstone beds subvertical irregular fractures pred, severely ironstoned			
		103 - 104 moderate degree of frac			
		104 - 108 tends to rubble highly frac with ironstone thin carb lenticules			
		108 - 113 irregular bedding frac	70° - 80°	sound	
		113 - 115 subvertical frac ironstone			
		115 - 118 sub vertic frac ironstone			
		118 - 123 frac @ 30°, 45°	75°	poor	
		123 - 126 mod sound		sound	
		126 - 128 rubbly subvert & 30° frac			
		128 - 138 rubble subvert frac			
		138 - 139 sound frac @ 20°			
		139 - 142 sound, irregular frac 70 - 90°			
		142 - 143 rubble			
		143 - 145 highly frac partially			
		145 - 148 low angle irregular frac			
		148 - 150 Sound,			
		150 - 153 one irregular subvert frac	70°		
		153 - 155 unbroken			
		155 - 158 rubble ironstoned			
		158 - 163 sound frac @ 30°			
		163 - 164.7 rubble			

INTERVAL	UNIT THICKNESS	DESCRIPTION	ANGLE TO CORE AXIS	COLL. ELEV.	ELEV. DESC.
164.7-168	3.3'	Jurassic - Fernie Group			
TD 168		Passage Beds			
		- thinly banded muddy siltstone			
		- micaceous			
		- compact			
		164.7 - 167 soft broken			
		167 - 167.7 hard, frac 80°			
		167.7 - 168 soft broken			

Drill Hole Sample Intervals and
Sample Weights in Grams

Hole No: 75D-19

Interval	Weight (Grams)
42.9-43.8	986
43.8-45.5	1610
45.5-46.5	590
46.5-47.1	740
47.1-48.5	1345
50-51.3	1420
51.3-53.5	1088
53-55	2662
55-57.5	1888
61-63	750
63-64.3	2380
64.3-65.7	2070
65.7-67	2415
68-70	3020
70-72	2725
73-75	2435
75-77	2500
77-78	1387
78-80	1880
80-81.5	2255
81.5-83	1650
83-84.5	1785
84.5-86	1895
87-88.9	2170

[illegible]

DIAMOND DRILL RECORD

Hole No.: 75_D20

Property: Sage Creek Coal

Location: North Hill
17,855 013 N
584 492 E

Elevation: 53 2 4' a.s.l.

Contractor: Connors Drilling

Hole Size: HQ -

Rig No.: 2

Date Commenced Drilling: November 28, 1975

Date Finished Drilling: November 29, 1975

Date Hole Completed: November 29, 1975

Logged By: E. Wilson J. Mitchell

Date: November 29, 1975

Probed By: Roke Oil Enterprises

Date: November 29, 1975

Total Depth Drillers: 66

Depth of Overburden: 25

Total Depth Logger: 65

Water Level: 15'

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling T.

Surface Casing: 25'
Total Drilling Time: 33 hours
Total Down Time: -
Total Footage Chargeable: 65'
Total Hourly Contact: 7 hours

Standby Time for Logging: 12 hr
Other Standby Time: 30 hr
Total Chargeable Standby Time: 42 hr
Actual Moving Time Between Holes: 10hr
Chargeable Moving Time " " : 10hr

Remarks:- Oxidation Test hole
Water and mud freezing in tanks
Lost circulation @ 27' and 32'

Quantity of Mud Used:
Quik Gel 25
Quik Trol 25

Probe Report:

65-0 Gamma Ray Neutron ---------- Logged through HQ rods
56-0 Density ---------- Logged through HQ rods
62-0 Density ---------- Logged open hole
62-0 Caliper ----------Logged open hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 2	26.5 - 45.4'	18.9'	26.5 - 42.5'	16'

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FOL TO CORE AXIS	CORE ENGL.	CAV. ENG.
0 - 25	25	Overburden			
		Cretaceous-Kootenay Formation			
25 - 26.5	1.5	Clay - soft - brown			
26.5-45.4	18.9	Coal Seam No. 2			
		26.5 - 27 ; Coal soft mushy 27 - 28 ; Clarain bright soft			
		28 - 32 ; Clarain bright soft, few black shale chips		coal v.soft	
		32 - 36 ; Soft mushy coal clarain mostly			
		36 - 38 ; Soft mushy coal clarain mostly			49.
		38 - 40 ; Soft mushy coal clarain mostly			
		40 - 42 ; Soft Mushy - clean coal mostly clarain			
		42 - 43 ; Clarain, bright, fairly intact and hard v/t. bndg			
		43 - 43.2; Mudstone stringer 43.2 - 45 Soft mushy coal Argill			
		45 - 45.4 very shaly coal, soft mushy			
		Recoveries			
		25 - 27 Rec. 1.1/2 27 - 28 Rec. 0.7/1 28 - 32 Rec 1.0/4 32 - 36 Rec 1.5/4 36 - 38 Rec 1.0/2 38 - 40 Rec 1.4/2 40 - 43 Rec 2.5/3 43 - 45 Rec 1.7/2			
45.4-47.5	2.1	Mudstone - black - V carb - Scatt coal str. - badly broken & brecc. Recovery 47 - 49 Rec 1/2		Broken	10
47.5-56	8.5	Siltstone - m. gy - rubbly rusty weathering - horiz jointing & normal to core fol normal to core	90	00&900	10

INTERVAL	BEST THICKNESS	DESCRIPTION	∠ OF TPD TO CORE AXIS	CORE EXCL.	EST. RSC.
56 - 66	10	Mudstone - Black - Silt sl lam @ 65° - broken - 57-57.5-coal str clarain - becomes incr silty with depth - abund 60° jts 2/1' sec - badly broken	65°	ensent. orig?	100
T.D.	66'				

Drill Hole Sample Intervals and
Sample Weights in Grams

Hole No: 75D-20

Interval	Weight (Grams)
26.2-27	735
27-28	710
28-32	1315
32-36	1080
36-38	970
38-40	1030
40-42	1000
42-43	850
43-45	2160

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

ole No.: $75_D 20A$ | Property: Snap Creek Coal

ocation: North Hill
17,855,013 N
584,492 E | Elevation: 5324' asl.

ontractor: Connors Drilling | Hole Size: NQ

Rig No.: 2

ate Commenced Drilling: December 6, 1975

ate Finished Drilling: December 6, 1975

ate Hole Completed: December 7, 1975

ogged By: E. Wilson, J. Mitchell | Date: December 7, 1975

ored By: Roke Oil Enterprises | Date: December 7, 1975

otal Depth Drillers: 72' | Depth of Overburden: 31'

otal Depth Logger: 72' | Water Level: 8'

il Record

o.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling T

urface Casing: 30'
otal Drilling Time: 17 hrs.
otal Down Time: 0
otal Footage Chargeable: 72'
otal Hourly Contact: 6'

Standby Time for Logging: 4
Other Standby Time: 0
Total Chargeable Standby Tim[redacted]
Actual Moving Time Between Holes: 17
Chargeable Moving Tim: " " : 17

emarks:- Oxidation test hole
Drilled @ -70° on azim 105°

Quantity of Mud Used:
Quik Gel 12 bags
Quik Trol 12 bags
CC 16 1 bag

robe Report:

71 - 0 ..... Gamma Ray Neutron ..... Logged thru BQ rods
66 - 0 ..... Density ..... Logged thru BQ rods
66 - 0 ..... Density ..... Logged open hole
66 - 0 ..... Caliper ..... Logged open hole

Coal Horizons

oal Horizon	Drillers Picks		Log Picks	
Seam 2	31 - 54.6	23.6	34.2 - 52.7	18.5

INTERVAL	UNIT THICKNESS	DESCRIPTION	% OF FED TO CORE ANAL.	CORE ANAL.	[illegible]
0 - 31	31	OVERBURDEN 29-31 Overburden & soft coal wash.			
		CRETACEOUS-KOOTENAY FORMATION			
31 -54.6	23.6	COAL SEAM 2			
		31.0-33.0 soft coal, thin shale bands at 32 & 32.8. 33.0-37.0 soft oxid coal clarain, shaley @ 33. 37.0-40.0 soft coal becoming slightly fiss & hard 40.0-43.0 soft oxid coal 43.0-46.0 soft oxid coal 46.0-48.5 fissile coal, oxid clar, tr. shale 48.5-50.0 no core 50.0-51.8 soft fiss coal clarain 51.8-52.4 durain & clarain to more. 52.4-53.0 no core 53.0-54.6 clarain with vitrain. Recoveries 29 - 31 1.3/2 33 - 37 3.0/4 37 - 40 2.0/3 40 - 43 2.2/3 43 - 46 2.4/3 46 - 50 2.5/4 50 - 53 2.2/3 53 - 56 3.8/5			
54.6-72	17.4	MUDSTONE - black - carbonaceous - rubble - severe ironstain on frac. Then coal str @ 56' in mudstone slicken at 62.5.			
TD	72				

Drill Hole Sample Intervals and
Sample Weights in Grams

Hole No: 75D-20A

Interval	Weight (Grams)
31-33	3710
33-35	2180
35-37	1280
37-40	1950
40-41.5	1200
41.5-43	885
43-44.5	1430
44.5-45	1173
46-47	1740
47-48.5	1525
50-51.8	1920
51.8-52.4	627
53-54.6	2050

RIO TINTO CANADIAN EXPLORATION LIMITED

DRILL RECORD

Hole No.: 75-D-23

Property: Sage Creek Coal

Location: North Hill
17,853 434 N
583 790 E

Elevation: 5217' asl

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: 2

Date Commenced Drilling: December 1, 1975

Date Finished Drilling: December 2, 1975

Date Hole Completed: December 2, 1975

Logged By: E. Wilson & J. Mitchell

Date: December 2, 1975

Probed By: Roke Oil Enterprises

Date: December 2, 1975

Total Depth Drillers: 91'

Depth of Overburden: 8

Total Depth Logger: 91'

Water Level: Full

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Ti

Surface Casing: 10'
Total Drilling Time: 20 hrs
Total Down Time: 0
Total Footage Chargeable: 91'
Total Hourly Contact: 6 hours

Standby Time for Logging: 5
Other Standby Time: 0
Total Chargeable Standby Time: 5
Actual Moving Time Between Holes: 21
Chargeable Moving Time " " : 21

Remarks:- Oxidation test hole

Quantity of Mud Used:
Quik Gel - 25 bags
Quik Trol - 25 bags
CC 16 - 1 bag

Probe Report:

90-0 ... Gamma Ray Neutron... Logged through HQ rods
85-0 ... Density ... Logged through HQ rods
88-0 ... Density ... Logged open hole
88-0 ... Caliper ... Logged open hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 4U	8-34.5	26.5	12' - 34.5'	22.5'
Seam 4L	50.4-70	19.6	52'-68.5'	16.5'

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	[illegible] REC.
0-8	8	OVERBURDEN Gravel, boulders, etc.			
		CRETACEOUS-KOOTENAY FORMATION			
8-34.5	26.5	Coal Seam 4U 8-11: coal, soft, dull, earthy 11-15: coal, soft, dull, earthy 15-17: coal, soft, dull, earthy 17-18.5: coal. Rather soft, partly granular sucrosic br. coal. 18.5-19: soft, dull coal. 19-20.5: soft, dull coal. 20.5-22: coal, gran. br. hard(lost dull, earthy appearance). 22-23: No core. 23-25: Coal, granular bright hard. 25-27: Coal, bright fissile. 27-28: No core. 28-29: Clarain, vit bndg. hard br. fissile 75°. 29-30.3: Clarain and durain. 30.3-32: No core. 32-32.5: Durain. 32.5-33.2: Clarain, soft bright. 33.2-34.5: Clarain, soft bright. Recoveries: 8-11: Rec. 1.2/3.0 11-15: " 1.5/4.0 15-17: " 0.9/2.0 17-19: " 1.3/2.0 19-23: " 3.0/4.0 23-25: " 1.3/4.0 25-28: " 1.8/3.0 28-29: " 0.4/1.0 29-32: " 1.3/3.0 32-34: " 1.0/2.0	75°		53%
34.5-46.5	12	Mudstone 34.5-34.8: med soft, coaly black. 34.8-36: no core. 36-42: mudstone: - carb - d b gy to bl - blocky high degree frac. - quite soft 42-45: more comp. still frac. jts 70° 6/3' sec. jts 20° random Grades into ss. by 46.5 Recoveries: 34-36 .8/1.0 36-40 2.5/4.0		70°	
46.5-50.4	3.9	Sandstone - s. & p. - highly ironstained. - blocky rubble. - 47-48: decemented.			
50.4-70	19.6	Coal Seam 4L 50.4-51.1: soft bright clarain 51.1-52: No core 52-52.3: clarovitrain 52.3-53: clarain 53-54: No core 54-54.7: clarovitrain			68%

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EXP. REC.
		54.7-55.9: clarovitrain 55.9-58: no core 58-58.2: durain 58.2-59.2: clarain 59.2-60: no core 60-60.8: soft bright coal 60.8-62: no core 62-66: soft bright mushy 66-66.5: Pred. clarain, soft br. fiss. 66.5-67.5: Carbarg & durain 67.5-67.8: hard br. fiss coal 67.8-68.2: pred. durain 68.2-68.6: clarovit hard br. fiss 68.6-68.8: durain 68.8-69.6: clarovitrain 69.6-69.7: durain 69.7-70: durain v. soft			
		<u>Recoveries</u> 49-52: Rec. 2.1/3.0 52-54: Rec. 1.0/2.0 54-58: Rec. 1.9/4.0 58-60: Rec. 1.2/2.0 60-62: Rec. 0.8/2.0 62-66: Rec. 3.3/4.0 66-70: Rec. 4.0/4.0			
70-80.6	10.6	<u>Mudstone</u> - bl fissile - massive to sl fol @ 65° 70-72: soft, broken fissile 72-73.5: comp. blocky - split by vert. frac 74-79: silty, prom, fol @ 65° 79-80: low angle jointing 2/5'sec 80-80.6: carb, soft	65°	intact core 90° 20°	
80.6-81.6	1.0	<u>Coal</u> Hard, bright, clarain vit. bndg. shale str. @ 82			
81.6-91	9.4	<u>Mudstone</u> - silty 81.6-83: very carb soft 83-87: broken to rubbly Low angle jtg 2/5' sec and fol 65° frac. E.O.H. @ 91°.		gen. intact	

Drill Hole Sample Intervals and Sample Weights in Grams

Hole No: 75D-23

Interval	Weight (Grams)
8-11	1498
11-15	1925
15-17	1045
17-19	1395
19-20.5	1605
20.5-22	1516
23-25	1420
25-26	1140
26-27	815
28-29	350
29-32	1290
32-34	1112
34-34.5	475
34.5-38	448
50.4-52	1025
52-54	1260
54-58	2117
58-60	1962
60-62	1160
62-64	1977
64-66	2087
66-66.5	830
66.5-67.5	1335
67.8-68.6	900
68.6-70	1305
80.6-81.6	1287

RIO TINTO Consolidated Exploration Limited

DIAMOND DRILL RECORD

Hole No.: 75_D26

Property: Sage Creek Coal

Location: North Hill
17,852,864 N
584,156 E

Elevation: 5194' asl

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: 2

Date Commenced Drilling: December 4, 1975

Date Finished Drilling: December 4, 1975

Date Hole Completed: December 4, 1975

Logged By: J. Wilson, J. Mitchell

Date: December 5, 1975

Probed By: Roke Oil Enterprises

Date: December 4, 1975

Total Depth Drillers: 71'

Depth of Overburden: 16

Total Depth Logger: 70'

Water Level: Dry

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time

Surface Casing: 15'
Total Drilling Time: 11 hrs.
Total Down Time: 0
Total Footage Chargeable: 71'
Total Hourly Contact: 4 hrs.

Standby Time for Logging: 4 hrs.
Other Standby Time: -
Total Chargeable Standby Time: -
Actual Moving Time Between Holes: 12 h
Chargeable Moving Time " " : 12 h

Remarks:- Oxidation test 60°
Coal oxidized to 29'
Zone partial oxidation 23'-29'
Recovery 79.3%

Quantity of Mud Used:

Quik Gel	8
Quik Trol	8
CC 16	1

Probe Report:

69 - 0 ..... Gamma Ray Neutron ..... Logged thru HQ rods
55 - 0 ..... Density ..... Logged thru HQ rods
67 - 0 ..... Density ..... Logged open hole
67 - 0 ..... Caliper ..... Logged open hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 2	22 - 49.5	27.5	20-35 41.5-47.5	15'] 6'] 27.5'

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	[illegible]
0 - 16	16	OVERBURDEN & SANDSTONE RUBBLE			
		CRETACEOUS-KOOTENAY FORMATION			
16 - 21	5	SANDSTONE			
		- S & P - m to Cg. - vaguely lam @ 60° - core is rubble and weathered - thin coal str @ 20.8-20.9	60°		85%
		21 - 22 no core			
22 - 49.5	27.5	COAL SEAM 2			
		22.0-23.0 soft coal mush 23.0-24.4 soft durain 24.4-25.2 durain, brittle, vit bndg, tr shale 25.2-26.5 clarain, vit bndg. 26.5-27.0 no core 27.0-27.3 clarain, vit bndg. 27.3-27.8 mudstone,soft 27.8-28.0 clarain, vit bndg. 28.0-29.0 no core 29.0-29.7 durain,bright,soft 29.7-29.9 fusain 29.9-30.5 clarain,bright 30.5-31.0 no core 31.0-32.3 soft fluid mush of bright durain,thin vit bndg. 32.3-33.0 no core 33.0-33.4 mudstone,bl,hard,carb. 33.4-34.0 carb shale,gr to mud,soft soupy, shale chips throughout. 34.0-35.0 no core 35.0-36.0 soft mushy shale,gr to coal. 36.0-37.5 clarain,bright, v soft. 37.5-38.2 v soft mush with durain frags; soft fusain clarain. 38.2-39.0 no core 39.0-39.4 brn shale with mushy shaley coal. 39.4-40.4 soft mushy clarain & fusain argillaceous 40.4-41.5 dull fusain scattered coal str or chips 41.5-42.0 no core 42.0-42.8 bright clarain mush & fusain 42.8-42.9 fusain,clayey,v dense,stiff & black 42.9-43.5 dull earthy fusain scatt clarain str throughout 43.5-43.9 clarain,bright 43.9-44.3 fusain,dull earthy scattered clayey bands 44.3-45.0 no core 45.0-45.1 clay str,plastic 45.1-46.0 clarain soft mushy 46.0-47.2 clarain			79.

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FED TO CORE AXIS	CORE EVAL.	EST. REC.
		Coal Seam 2 (cont'd)			
		47.2-48.0 clarain bright sucrosic intbd with dull earthy fusain.			
		48.0-49.0 fusain,dull,arg,includes few shale chips			
		49.0-49.5 clarain,bright,but shale str.			
		contact with underlying mudstone appears to be @ 45-50°.			
		Recoveries:			
		19 - 23 3.0/4			
		23 - 27 3.5/4			
		27 - 29 1.0/2			
		29 - 31 1.3/2			
		31 - 33 1.3/2			
		33 - 36 2.0/3			
		36 - 39 2.2/3			
		39 - 42 2.5/3			
		42 - 45 2.3/3			
		45 - 50 5/5			
49.5-57.0	7.5	MUDSTONE			
		- brn to bl			
		- carbonaceous			
		- massive			
		- contains coaly str to 53.2			
		50.0-51.0 very carg. bl mass,soft			
		51.0-53.2 soft mudstone,carbonaceous			
		53 -57 mudstone is soft,less carbonaceous, fractures are rusty; generally broken throughout			
57.0-71.0	14	SILTSTONE			
		- db gy to black			
		- gradually to med gy,well lam @ 50°	50°		
		- jtg well defined @30°. 1 jt/1' sec are rust coated		J30	
		- core is intact generally		intact core	
		66.0-66.5 black,soft,mudstone			
T.D.	71'				

Drill Hole Sample Intervals and Sample Weights in Grams

Hole No: 75D-26

Interval	Weight (Grams)
22-23	304
23-25	2225
25-27	1477
27-27.4	404
27.4-28	1145
29-31	1695
31-33	1580
33-34	1415
34.5-36	1492
36-37.5	1310
37.5-39	977
39-40.5	2378
40.5-42	1115
42-43.5	1230
43.5-45	1450
45-46	940
46-48	2380
48-49	835
49-49.5	475

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

Hole No.: 75D 29

Property: Sage Creek Coal

Location: North Hill
17,857,288 N
584,602 E

Elevation: 5112'asl.

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: 2

Date Commenced Drilling: December 8, 1975

Date Finished Drilling: December 8, 1975

Date Hole Completed: December 8, 1975

Logged By: W. Boyd

Date: December 9, 1975

Probed By: not probed

Date:

Total Depth Drillers: 33'

Depth of Overburden: 15'

Total Depth Logger: -

Water Level: -

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Time

Surface Casing: 15'
Total Drilling Time: 8 hours
Total Down Time: 0
Total Footage Chargeable: 33'
Total Hourly Contact: 2 hours

Standby Time for Logging: 0
Other Standby Time: 7 hours
Total Chargeable Standby Time: 7 hrs
Actual Moving Time Between Holes: 16 h
Chargeable Moving Time " " : 16 h

Remarks:- Oxidization test @ 60°, azimuth 285°. Collared in overburden and drilled to 33' in basal sandstone below 5.

Quantity of Mud Used:
Quik Gel 6 bags
Quik Trol 6 bags

Probe Report:

Not probed.

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
No Seams encountered.				

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FED TO CORE AXIS	CORE EVAL.	EST. REC.
0-15	15	Overburden			
		Cretaceous - Kootenay Formation			
15-33	18	Sandstone (Basal Unit)			
		Fine to med gr, salt & pepper 15-19.5 -Rubble, iron stained. 19.5-23 -V good core, jts @ 35-40°. 23-23.5 -Rubble 23.5-25.5 -Good core, jts @ 40°. 25.5-27 -Partially consol rubble, non cemented. 27-28 -Rubble, Fe stained frac surfaces. 28-30 -Rubble 30-31 -Partially decem. 31-33 -Good core, jts @ 70°, core parting @ 90°. EOH @ 33'		Poor	

DIAMOND DRILL RECORD

Hole No.: 75_D31

Property: Sage Creek Coal

Location: North Hill
17,856,737 N
585 576 E

Elevation: 5050' asl.

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: 3

Date Commenced Drilling: December 9, 1975

Date Finished Drilling: December 10, 1976

Date Hole Completed: December 10, 1975

Logged By: James Mitchell

Date: December 11, 1975

Probed By: Roke Oil Enterprises

Date: December 10, 1975

Total Depth Drillers: 58'

Depth of Overburden: 18'

Total Depth Logger: 58'

Water Level: Full

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Ti

Surface Casing: 19'
Total Drilling Time: 20 hrs.
Total Down Time: 0
Total Footage Chargeable: 58'
Total Hourly Contact: 7 hrs

Standby Time for Logging: 4 hrs.
Other Standby Time: 0
Total Chargeable Standby Time: 4 hr
Actual Moving Time Between Holes: 15
Chargeable Moving Time " " : 1

Remarks:- Oxidation test hole

Quantity of Mud Used:
Quik Gel 14
Quik Trol 14
CC 16 1

Probe Report:
57 - 0 ..... Gamma Rau Neutron .....Logged thru HQ rods
54 - 0 ..... Density .....Logged thru HQ rods
55 - 0 ..... Calipers .....Logged Open Hole

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
Seam 2	24 - 45	21'	25' - 46'	21'

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	[illegible]
0 - 18	18	OVERBURDEN - till & wthrd rock.			
		CRETACEOUS KOOTENAY FORMATION			
18 - 24	6'	MUDSTONE - dk grey, compact - silty - core is rubble - ironstained		poor	
24 - 45	21'	COAL SEAM 2			
		24.0-28.0 soft, fissile in part, clarain 28.0-28.5 mudstone rubble 28.5-31.0 soft fissile clarain 31.0-33.0 no core 33.0-36.5 soft fissile clarain and clarovitrain 36.5-38.0 no core 38-41.3 soft fissile argillaceous clarain 41.3-43 no core 43.0-43.8 bright clarain 43.8-44.4 bright fissile clarain 44.4-45.0 soft argillaceous clarain		good	80%
		Recoveries: 23 - 28 5/5 28 - 33 3/5 33 - 38 3.5/5 38 - 43 3.3/5 43 - 48 3.8/5 48 - 53 2.6/5			
45 - 58 TD	13'	MUDSTONE & SILTSTONE - abrupt contact with siltstone to vf grained SS.	60°		
		45.0-46.0 siltstone to vf gr ss, hard, compact 46.0-46.8 sandstone breccia, med. grained salt and pepper ss. angular clasts in silty sand matrix. 46.8-48.0 no core 48.0-50.3 soft mudstone in part brecciated 50.3-50.6 argillaceous coal 50.6-53.0 no core 53.0-58.0 mudstone highly fractured ironstained thin carbonaceous laminae. EOH @ 58'			

Drill Hole Sample Intervals and Sample Weights in Grams

Hole No: 75D-31

Interval	Weight (Grams)
24-26	2345
26-28	1860
28-28.5	750
28.5-31	2353
33-35	2230
35-36.5	648
38-39.5	1527
39.5-41.3	2000
43-43.8	595
43.8-44.4	645
44.4-45	720

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

Hole No.: 75D33

Property: Sage Creek Coal

Location: North Hill
17,857,095 N
584,752 E

Elevation: 5072' asl.

Contractor: Connors Drilling

Hole Size: HQ

Rig No.: 2

Date Commenced Drilling: December 10, 1975

Date Finished Drilling: December 12, 1975

Date Hole Completed: December 12, 1975

Logged By: James Mitchell

Date: December 12, 1975

Probed By: Not probed.

Date:

Total Depth Drillers: 59'

Depth of Overburden: 50'

Total Depth Logger: -

Water Level: -

Bit Record

No.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling Tim

Surface Casing: 51'
Total Drilling Time: 25 hours
Total Down Time: 0
Total Footage Chargeable: 59'
Total Hourly Contact: 11 hours

Standby Time for Logging: 0
Other Standby Time: 3 hours
Total Chargeable Standby Time: 3 hour
Actual Moving Time Between Holes: 12
Chargeable Moving Time " " : 12

Remarks:- Oxidization test.
Seam 5 not encountered.

Quantity of Mud Used:
Quik Gel 22 bags
Quik Trol 22 bags
CC 16 1 bag

Probe Report:

Not Probed

Coal Horizons

Coal Horizon	Drillers Picks		Log Picks	
No seams encountered				

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF BED TO CORE AXIS	CORE EVAL.	EST. REC.
0-50	50	Overburden Abundant blders			
50-59	9	Cretaceous Kootenay Formation Sandstone (Basal Unit) Typical basal ss. Fine - med gr salt & pepper Core rubbly. Predominate fracturing @ 20° to C/A. EOH @ 59'		v poor	

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

ole No.: 75D35 Property: Sage Creek Coal

ocation: North Hill 17,856,961 N 584,930 E Elevation: 5047' asl.

ontractor: Connors Drilling Hole Size: HQ

Rig No.:

ite Commenced Drilling:

ite Finished Drilling:

ite Hole Completed: December 14, 1975

ogged By: Date:

robed By: Roke Oil Enterprises Date: December 14, 1975

otal Depth Drillers: 148' Depth of Overburden: 120'

otal Depth Logger: 91' Water Level:

it Record

o.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drilling T

urface Casing:

otal Drilling Time: Standby Time for Logging:

otal Down Time: Other Standby Time:

otal Footage Chargeable: Total Chargeable Standby Time:

otal Hourly Contact: Actual Moving Time Between Holes:

Chargeable Moving Time " " :

emarks:- Quantity of Mud Used:

Hole drilled at -60°, azimuth 285°

roke Report:

91-0 --- Gamma Ray Neutron ---------- Thru HQ drill rod
70-0 --- Sidewall Density ---------- Thru HW drill casing
91-70 -- Sidewall Density ---------- Open Hole

Coal Horizons

oal Horizon	Drillers Picks		Log Picks	
Seams not cored				

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FED TO CORE AXIS	CORE EVAL.	[illegible]
0-120	120	Undifferentiated Lithologies Drillers triconed this hole to 120 feet believing to be in overburden. At 120' encountered basal sandstone and commenced coring.			
120-148	28	Sandstone (Basal) F med g, salt & pepper aspect not apparent, rubbly, highly frac @ 45° decem in part, becoming sl more competent basally.			
TD	148	Note: Hole was probed and indicated Seam 5 was drilled but unrecognized Redrilled hole. See 75D-35A			

RIO TINTO CANADIAN EXPLORATION LIMITED

DIAMOND DRILL RECORD

ole No.: 75D35A

Property: Sage Creek Coal

ocation: North Hill
17,856,961 N
584,930 E

Elevation: 5047' asl

ontractor: Connors Drilling

Hole Size: HQ

Rig No.:

ate Commenced Drilling:

ate Finished Drilling:

ate Hole Completed: December 16,1975

ogged By:

Date:

robed By: Roke Oil Enterprises

Date: December 16, 1975

otal Depth Drillers: 113'

Depth of Overburden: 25'

otal Depth Logger: 108'

Water Level:

it Record

.	Size	Make and Serial No.	R.P.M.	On	Off	Footage	Drill [illegible]

urface Casing:
otal Drilling Time:
otal Down Time:
otal Footage Chargeable:
otal Hourly Contact:

Standby Time for Logging:
Other Standby Time:
Total Chargeable Standby Time:
Actual Moving Time Between H[illegible]:
Chargeable Moving Time " :
Quantity of Mud Used:

emarks:-

robe Report:

Sidewall Density

Coal Horizons				
oal Horizon	Drillers Picks		Log Picks	
Seam 5U	62 - 75.5	13.5	61 - 73	12
Seam 5L	83 -103	20	81 - 90.5 94.5-102	9.5 7.5

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FSD TO CORE AXIS	CORE EVAL.	EST. REC.
0-25	25	Overburden			
		Cretaceous Kootenay Formation			
25-62	37	Mudstone Bl, carb, plant remains, rubbly broken, silty in part. 25-41 -Soft, highly weathered mudstone & siltstone, carb, plant mat'l. 25-39 -Siltstone, thin lam, rubble. 39-41 -Mudstone. 41-52.5 -Silty mudstone, rubble. 52.5-62 -v badly broken , mudstone tr coal throughout. Recoveries 52-53 .5/1 53-58 3/5 58-60 .8/2 60-61.5 .5/1.5			50%
62-75.5	13.5	Coal Seam 5U 62-63 -Soft clarain 63-64 -Clarain, fissile, tr mudstone 64-65 -Durain 65-65.5 -Durain 65.5-67 -Soft fissile, bright clar tr marc. 67-69 -No core 69-73 -Soft fissile clarain 73-75.5 -Soft fissile, clarain tr shale. Recoveries 61-63 .9/2 63-65 1.5/2 65-67 2/2 67-69 0/2 69-73 4/4 73-75.5 2.5/2.5			
75.5-83	7.5	Mudstone 75.5-79 -Mudstone & durain 79-83 - Mudstone Recoveries 75.5-79 - 1.3/3.5 79-83 1/4			

INTERVAL	UNIT THICKNESS	DESCRIPTION	∠ OF FED TO CORE AXIS	CORE EVAL.	[illegible] REC.
83-103	20	Coal Seam 5L 83-86 -intbd clarain & durain 86-88 -Durain & clarain 88-93 -Thinly bd carbarg & soft fissile clarain. 93-98 -Soft fissile, clarain, tr durain 98-101 -Clarain 101-103 -Durain & clarain Recoveries 83-86 2.5/3 86-88 2/2 88-93 5/5 93-98 3.7/5 98-103 3.2/5			
103-104.5	1.5	Mudstone Bl, carb, as above.			
104.5-113	8.5	Sandstone - Basal Unit Typical basal sandstone			

Drill Hole Sample Intervals and Sample Weights in Grams

Hole No: 75D-35A

Interval	Weight (Grams)
62-63	335
63-65	2150
65-67	2220
69-71	2191
71-73.2	2254
73.2-75.5	3412
75.5-79	1750
79-83	1996
83-86	3210
86-88	2440
88-90	2287
90-92	1820
92-93	1343
93-95.5	1910
95.5-98	2045
98-100.5	2105
100.5-103	3015

K- SAGE CREEK 75(1)D

K - SAGE CREEK 75(1)D
82-G-1, 2

SAGE CREEK COAL LIMITED
REPORT ON
1975 DRILL PROGRAMME

OPEN FILE

Toronto, Ont. O. Cullingham
June 30, 1976 H. W. Marsh

GEOLOGICAL BRANCH
ASSESSMENT REPORT

00 369 (4)

82-G-1,2

SAGE CREEK COAL LIMITED
REPORT ON
1975 DRILL PROGRAMME

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SAGE CREEK COAL LIMITED

REPORT ON

1975 DRILL PROGRAMME

INTRODUCTION

The purpose of the present report is to supplement, with general technical information, the lithological reports which were submitted to the Department of Mines and Petroleum Resources in Victoria on May 26, 1976. The reports concern exploration drilling performed at the Sage Creek Coal Limited property in Flathead Valley, B.C., during the 1975 field season under the supervision of Rio Algom Limited personnel.

LOCATION AND ACCESS

The Sage Creek Coal property lies in lower Flathead Valley in southeastern British Columbia. The centre of activity is 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 longtitude (N.T.S.: 82-G-1,2). The centre of the property is 35 air miles southeast of the town of Fernie, B.C.; 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. 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.

DRILLING

Purpose:

The 1975 drill programme was laid out with a four-fold objective:

(1) To provide geological information to enhance the degree of accuracy in the structural interpretation of North and South Hills, as well as to establish greater control of the subcrop traces of coal seams.

(2) To provide coal samples from locations throughout the property for coal quality determinations and washability studies. Also data were sought on the extent of oxidation of the coal down dip from the outcrop or subcrop of coal seams.

(3) To determine the stability of rock and overburden material for pit design.

(4) To provide hydrological information concerning water quality and rate of flow of subsurface aquifers.

Drilling Techniques:

Three drilling techniques were used: wireline diamond drilling, conventional and reverse-circulation rotary drilling, and hammer drilling. A number of drill holes were drilled by combining two drilling methods, employing different techniques over separate intervals of a given drill hole.

Conventional rotary method using muds, and diamond core drilling were used to obtain geological information and data regarding coal quality and oxidation. In addition, conventional rotary drilling with mud or reverse-circulation rotary drilling with air was used for geotechnical purposes.

Hammer drilling was used for geotechnical information and also, where necessary, for setting of casing in rotary or diamond drill holes.

All drill holes were probed with gamma-ray-neutron probes and, whenever possible, with sidewall density, caliper and E-log probes. Conditions permitting, sperry-sun single shot deviation surveys were done in the drill holes; in deep holes, two or more shots were taken.

Drilling Equipment:

Becker Drills Limited of Calgary, Alberta, provided two rotary and one hammer drilling rigs. The rotary drills were truck-mounted, hydraulically powered Mayhew 1700, equipped with Becker 1000Top Drive, which drilled 5-5/8-inch holes. The hammer rig was a truck-mounted Becker Hammer 180 pile

hammer, which drilled a 6-5/8-inch hole.

H & W Aqua Drilling Limited of Cranbrook, B.C. supplied one Speedstar Koehring, Model SS15THH TopHead, truck-mounted combination hammer/rotary drilling rig which drilled 6-inch holes.

Diamond drilling was done by Connors Drilling Limited of Vancouver, B.C. The rigs were skid-mounted, equipped with wireline equipment to recover HQ core (2.47 inches diameter). The drills were Longyear 38's and Boyles models 25A and 45A. In addition, Connors Drilling also supplied a Longyear underground drill which produced NQ core from the 140-foot hole drilled underground.

Drilling Programme:

During the program 81 drill holes were attempted of which 63 were completed. The total footage drilled amounted to 33,834 feet; a breakdown of this total by drilling techniques shows that 16,777 feet were drilled by rotary methods, 16,194 feet were done by diamond drills, and 863 feet were completed by a hammer rig. The total for diamond drills includes 140 feet drilled by an underground rig in a coal adit.

Toronto, Ontario
June 30, 1976

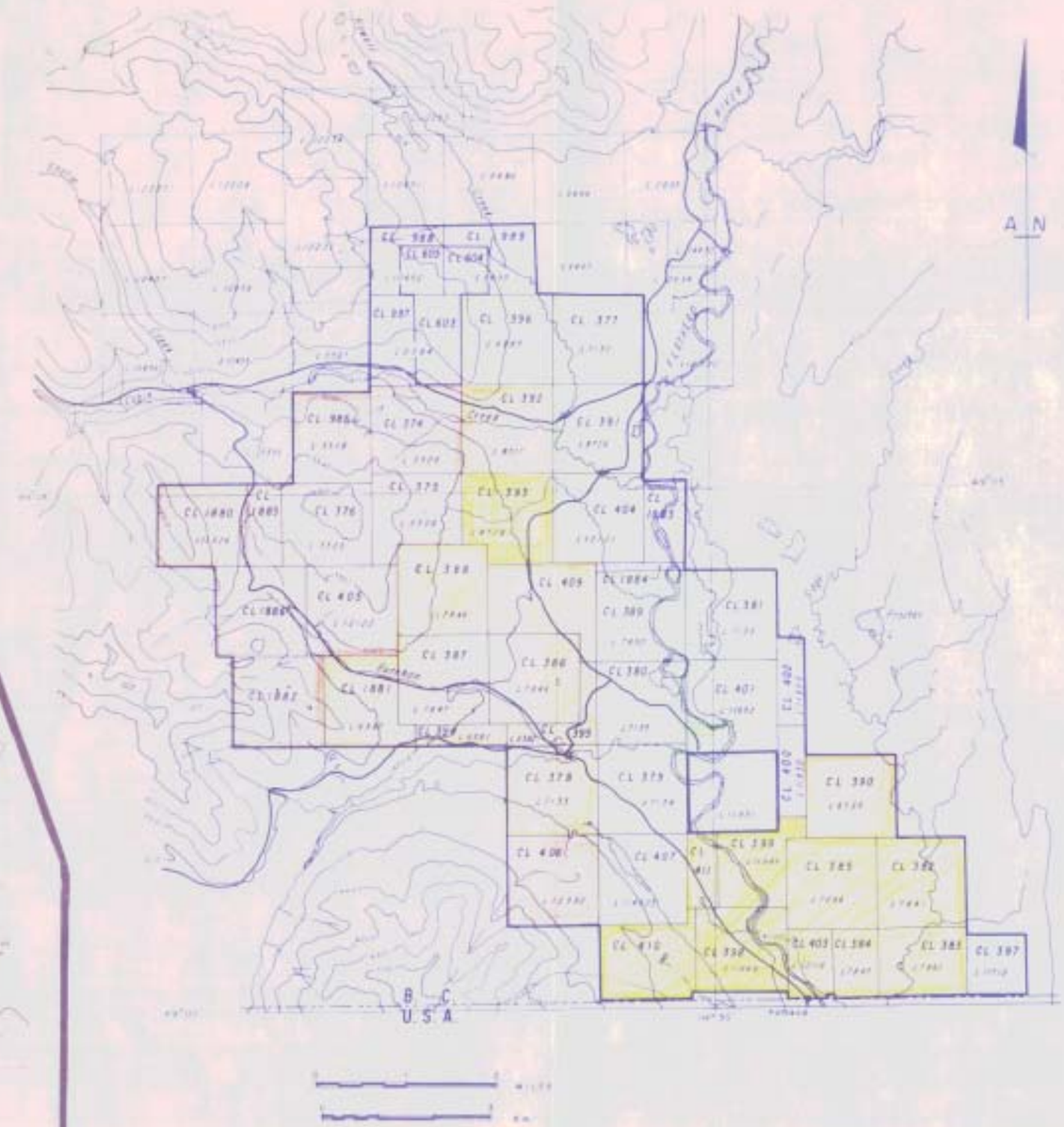
O. Cullingham

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
H. W. MARSH

H. W. Marsh

PROPERTY LOCATION MAP

SHOWING RAILWAYS TO VANCOUVER



LEGEND

Outline of property

L.11712 Lot number

CL 397 Coal Licence

NOTE 603, 604 & 605 purchased from C.N.I. Nov. 1973

K-SAGE CREEK 75(2)D

RIO TINTO CANADIAN EXPLORATION LTD.

SAGE CREEK COAL LIMITED - B.C.

PROPERTY PLAN

FEB 1975 | D.C. / E.S. | DWG L.2692

Figure A-3-1

578,000 E
580,000 E
582,000 E
584,000 E
586,000 E
588,000 E

860,000 N
858,000 N
856,000 N
854,000 N
852,000 N
850,000 N
848,000 N
846,000 N
844,000 N
842,000 N

17,860,260
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845,860
845,460
845,060
844,660
844,260
843,860
843,460
843,060
842,660
17,842,260

LEGEND

7426 ○	Drill hole and number
73-4-N	Adit and number
75-5-III-N	Trench and number
	Coal seam trace
	Fault

CL 988
CL 605
CL 604
CL 989
CL 987
CL 396
CL 603
CL 392
CL 374
CL 986
CL 375
CL 393
CL 376

Fig. 3-2
Fig. 3-3

A. N.

Quaternary - Recent
Till, Gravel

Kishenehn Clays

OLD DRILL HOLE

SEAM 5
SEAM 4L
SEAM 4U
SEAM 2
SEAM 4
SEAM 2

MINING RECORDER
RECEIVED and RECORDED
MAY 28 1976
M.R. #
VICTORIA, B. C.

369 (3) SC 75(2)D

Figure A-3-1

RIO TINTO CANADIAN EXPLORATION LTD.
SAGE CREEK COAL LTD. – B.C.

SURFACE PLAN

DATE: March / 76 | BY- O.C. / L. Nagy | DWG.-

SCALE
FEET 0 400 800 1200 1600
METERS 0 50 100 200 300 400