PR. Mt Spieken 82(1)A



MT. SPIEKER COAL PROPERTY

FINAL REPORT OF EXPLORATION

S. FORK BULLMOOSE CREEK

N.T.S. 93/P/3 DECEMBER, 1982

CL # 3031, 3032, 3035-3037, 3039-3042, 3044-3047, 3049-3060.

GEOLOGICAL BRANCH ASSESSMENT REPORT

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1. SUMMARY AND RECOMMENDATIONS

A two phase diamond drill program to test the upper Gething Formation coal seams along the south fork of Bullmoose Creek was completed in mid October, 1982.

The first phase of the program consisted of two shallow holes drilled with a "Winkie" drill, numbered MS-41 and MS-42 which were completed in early August. These holes were drilled to the north of the main target area with drill site locations chosen with the depth capability of the machine in mind. The results of this drilling plus some geologic mapping were sufficiently encouraging that two areas of speculative resources were outlined and further drilling was recommended.

The second phase of the program, started in late September and completed in mid October, consisted of three HQ diamond drill holes, MS-43, MS-44 and MS-45, in an area of speculative resources immediately adjacent to the creek. The quality of the coal intersected in two of the holes was found to be excellent but was found to be poor in the third hole. As a result of this and the thicker than expected overburden encountered, the open pit potential of this area was found to be low. The underground potential of this area was also found to be low because, although aggregate seam thicknesses were found to be over 2 m, individual seam thicknesses were generally less than 1.5 m.

A second area of speculative resources, immediately east of the above was not tested as any resources within could be exploited only by underground mining and the seam thicknesses are thought to be insufficient for this. Where the seam has been tectonically thickened, as intersected in MS-41, the intense shearing found there could present stability problems during mining. This area will increase in potential as the need for underground resources grows but until then its potential is considered to be low.

1. SUMMARY AND RECOMMENDATIONS, Cont'd...

Therefore, it is recommended that no further work be done in the South Fork area at this time.

2. INTRODUCTION

This target area for upper Gething Formation coals is strategically located from 2 to 3.5 km south of the Bullmoose wash plant site along the south fork of Bullmoose Creek. The plant is expected to be in operation in early 1984. It was thought that any coal reserves developed within the area might be custom washed at this facility with considerable savings in capital outlay to the operators of the Mt. Spieker property.

Accordingly, the area was first tested with two Ax diamond drill holes and limited geologic mapping along the creek.

The holes were drilled in the first two weeks of August, 1982 and the drill sites for these holes were chosen along the north west fringe of the target area with the depth capability of the machine, a "Winkie" drill, in mind. The locations and results of this drilling were outlined in a September 1982 report titled REPORT ON PRELIMINARY DRILLING S. FORK BULLMOOSE CREEK by Marvin A. Mitchell. Most of the raw data from the September report has been included in this report for the sake of convenience.

The conclusions reached in the September report were that there were two areas of speculative resources within the target area. The first area, immediately east of the creek, was thought to contain 3.8 million tonnes in-situ or 2.9 million tonnes of saleable coal suitable for open pit mining to a depth of 30 m along a rolling south westerly dipping dip slope as indicated by sporadic outcrops along the banks of the creek.

The second area, immediately east of the first was thought to contain, to a depth of 400 m, 5.5 million tonnes in-situ or 2.2 million tonnes of saleable coal mineable by underground means.

INTRODUCTION, Cont'd...

Analysis of core samples from the drilling indicated that this coal might equal coal from the Chamberlain seam in quality and might be readily marketable.

It was recommended that the first or open pit resource area be tested with 180 m of diamond drilling in three or four holes followed by further drilling of the whole area if warranted.

The following report includes a revision of the geologic picture for the area and a complete report of the diamond drill and test results.

3. GEOLOGY

(a) PREVIOUS WORK

The area was first mapped in 1974 by personnel employed by the Teck Corp., was subsequently remapped in 1975-76 by Mitsui Mining, consultants to the Nichimen Co. Ltd. and again in 1978 by F. Michael Dawson, then of Robertson Research (N.A.) Ltd. consultants to Ranger Oil Limited. This work plus limited mapping in 1982 by the author forms the background for this brief geologic description.

(b) LITHOLOGICAL SETTING

The lower confines of the south fork of Bullmoose Creek are underlain by Lower Cretaceous rocks of the Gething, Bluesky and Moosebar Formations. The glauconitic and carbonaceous sandstones and siltstones of the Bluesky Formation, 4 to 8 m thick, separate the sandstones of the Gething Formation from the overlying shales of the Moosebar Formation.

Cont'd...

(b) LITHOLOGICAL SETTING, Cont'd...

The whole of the area between grid lines AA to D and between lines 1 to 3 on Fig. 1 is underlain with what appears to be a thin but persistent portion of the basal part of the Moosebar Formation. Outcrops of this, the Bluesky and Gething Formations along the banks of the creek indicate that the top of the Gething Formation could be at a reasonably shallow depth below a large bench east of the creek. This bench has been formed from detritus whose source is the high ridge farther east known as the West Ridge of Mt. Spieker.

The top of the Gething Formation is noted for its many coal measures, i.e. the Bird seams (upper and lower) the Skeeter, and the Chamberlain seams. The Upper Bird Seam is conveniently designated to be the top of the Gething Formation and it may be seen on Fig. 2 that the Upper and Lower Bird seams and outliers occupy a stratigraphic interval averaging 5 m thick near the centre of the target area to between 10 and 15 m to the north east and southeast of the target area.

The Skeeter and Chamberlain Seams are located 30 to 40 m stratigraphically below the Lower Bird Seam but where intersected by drilling on the Mt. Spieker property are not of economic thickness or quality as they are on the Sukunka property to the north.

(c) STRUCTURAL SETTING

A check of the mapping done previous to July, 1982 showed it to be substantially correct and complete although somewhat lacking in interpretation due to the scarcity of outcrops along the banks of the main and tributary creeks. The second phase of the 1982 drilling has added considerably to the structural interpretation of the area and it shows that as well as this panel of rocks having a north - northwest strike and a variable dip to the southwest it indicates that the panel has been thrust faulted, sub-parallel to this strike. The effect of these faults is that the coal measures have been repeatedly down faulted and are rarely within 60 m of the surface (Fig. 3,4,5, & 6).

(c) STRUCTURAL SETTING, Cont'd...

Although the exact number of these faults is not known the same fault was intersected in MS-43 and MS-45 and the closely spaced folding in the southwest part of the panel makes it seem likely that there are at least two.

Mapping along F creek and G creek disclosed only consistently gentle dips in Moosebar Formation so it seems likely that this faulting does not disrupt the northeast resource area which has been interpreted to have the form of a broad anticline.

(d) COAL OUTCROPS

Two outcrops of coal were found along the east bank of the creek during the first phase of the program near grid points (AA, 3) and (A, 2). The first outcrop was partially buried but a measured section was obtained from the second and reported in the preliminary report. For convenience this section is again presented as follows:

True Thickness	Top of Seam
0.17 m	Coal & Carbonaceous shale
0.18 m	Carbonaceous Shale
0.20 m	Mudstone
0.25 m	Coal, bony coal and mudstone
1.48 m	Coal, several plies weathered & sheared
TOTAL - 2.28 m	BOTTOM OF SEAM

This seam is probably the upper Bird seam with the lower Bird seam being obscured by rubble along the creek bank. A discussion of this outcrop is included in the next section.

4. DRILLING RESULTS

The diamond drill logs of all holes and Fig.1, a 1:10,000 location map which may be found in the rear of the report. All of the holes drilled in the two phase program intersected coal seams as follows:

<u>Hole</u>	<u>Depth</u>	Seam	Depth Top Seam	True Thickness
MS-41	37.70 m	U. Bird	16.098 m	4.80 m Tectonically Thickened
MS-42	31.60 m	U. Bird L. Bird	12.301 m 17.575 m	1.94 m 0.670 m
MS-43	78.99 m	U. Bird L. Bird	61.800 m 64.340 m	1.639 m Very Poor Coal
MS-44	87.50 m	U. Bird L. Bird	72.685 m 75.590 m	1.600 m 0.920 m
MS-45	83.58 m	U. Bird L. Bird	71.520 m 75.830 m	Very Poor Coal 0.530 m
Outcrop		U. Bird		1.73 m

These intersections with the exception of that in MS-41, as well as the outcrop on the creek bank indicate that although the seams have an excellent degree of spatial correlation, the coal quality within the seams may be highly variable over a short distance. None of these holes is more than 600 m from its nearest neighbor yet the Upper Bird seam in MS-45 and the Lower Bird seam in MS-43 are of such poor quality that they probably should not be termed coal while adjacent holes have excellent quality coal.

Core recovery although poor in the first or Winkie phase of the program was excellent in the second or H.Q. phase with several intervals being 100% recovered. (See Seam Section and Analytical Data sheets in the rear of the report.)

5. ANALYTICAL RESULTS

Individual raw head analyses were run for each ply from each seam with the exception of the lower Bird Seam from MS-42 which was omitted because of poor core recovery.

The plies from MS-41 and MS-42 were then composited and washed to give a clean coal product from each seam. Unfortunately too little coal was available for a weighted composite for these holes. The seams from MS-43, 44 and 45, however had sufficient coal for a weighted composite. The results of all of this work are presented in the rear of the report.

It would appear that this testing has confirmed the conclusions reached in the preliminary report that the Bird Coals in this particular area are a high quality Western Canadian medium volatile coking coal comparable to that obtained from the Chamberlain seams in areas to the north of the Mt. Spieker property.

A summary of the coking properties of the U & L Bird seam coals is as follows:

Ash	8 - 10%
Washing Yield	80%
Sulphur	0.6 - 0.7%
I. Moist.	0.3 - 0.4%
Vol.	21 - 24%
F.C.	68 - 71%
F.S.I.	6 - 9
c.v.	7000 - 8400 CAL/gm

6. COAL RESOURCES

The top of the Upper Bird seam in holes MS-43, 44 & 45 was intersected at depths of 62, 73, & 72 m respectively. The overburden and rock cover is over twice as thick as was expected for this area and precludes the possibility of open pit mining because for an aggregate coal thickness of slightly over 2 m as intersected in MS-43 and MS-44 this depth of burial would give a stripping ratio of over 16:1.

6. COAL RESOURCES, Cont'd...

Although aggregate thicknesses of 2 m of coal were encountered, the maximum seam thickness was found to be 1.7 m. This thickness is insufficient for underground mining in Western Canada at present. Therefore, the economic potential of this area should be considered to be low and no speculative resource tonnage should be applied to this area.

The second area, immediately east of the first area was not drilled but holds promise for minable underground reserves as it appears that the seams thicken toward the east. If this area is not structurally complex the block should contain an in-situ speculative resource of 5.5 million tonnes or 2.2 million tonnes salable to a depth of burial of 400 m and/or a 20° seam dip.

7. FURTHER EXPLORATION

Unfortunately the only coal resources that seem to have value in the northeast coal block in the short term are those exploitable by open pit mining methods.

Underground reserves and resources such as those in the area under study have a tremendous future value and one day will form the mainstay of production from the northeast.

Until that time, perhaps ten years in the future, the economic potential will be somewhat in question. Therefore, no further work is recommended for this part of the Mt. Spieker property at this time.

Respectfully submitted, RANGER OIL LIMITED

M. A. MITCHELL, P. ENG.

EXPLORATION MANAGER, MINERALS

Marian a Mathelf

HOLE, NO.:

MS-41

July 28, 1982 DATE BEGUN: DATE FINISHED: Aug. 2, 1982

TOTAL DEPTH: HOLE ANGLE:

37,683 M

Vert

BEARING:

ELEV. COLLAR:

Ranger Oil Limited U.T.M.

3039

SHEET NO. 1

COAL LICENSE: CORE SIZE:

LAT.:							LOGG	ED BY: M.A.M. CORE SIZE: AXT	
8.C.A.	UI	NIT	UNITY T	HICKNESS	SAMPLE	MARKER	i	DESCRIPTION	RECOVERY
	From	To	Thick.	True	NUMBER	ļ			m. Rec.
ì	0	3.660	3.660	3.439			CASING		υ
		11.135	7.475	7.024			MUDSTONE:	Medium to dark grey, no apparent bedding Moosebar Fm. very rubbly, contact with following abrupt.	7.475
:		11.320	0.185	0.174			SANDSTONE:	Med. Grained, Light-medium grey salt and pepper. Bluesky Fm. no glauconite noted. 5% Py.	0.185
20° @ 14 .69 9		15.573	4.253	3.997			SANDSTONE:	Fine Grained, Light-medium grey with medium grey siltstone bands, bioturbated and rippled from 14.329 on, minor quartz veining at random angles and occasional "rip up clasts" 5 - 10% Py.	4.253
20° @ 14.854		15.854	0.281	0.264		} 	SANDSTONE:	Medium grained, medium grey, salt and pepper appearance. 5% Py. no glauconite noted.	0.281
		16.098	0.244	0.229			SANDSTONE:	Fine grained, dark grey, silty bands bioturbated and rippled near 16.098. 5% Py.	0.244

Ranger Oil Limited

SHEET NO.: 2

HOLE. NO.:

LAT.:

MS-41

DATE BEGUN: DATE FINISHED:

TOTAL DEPTH: HOLE ANGLE:

LONG.:

BEARING:

ELEV. COLLAR: LOGGED BY: U.T.M,

COAL LICENSE: CORE SIZE:

B.C.A.	UI	VIT	UNITY T	HICKNESS	SAMPLE	MARKER		DESCRIPTION	RECOVERY
	From	To	Thick.	True	NUMBER		<u> </u>		
						[] []		ROOF OF BIRD COAL SEAM	
	16.098	16.677	0.579	0.501	[COAL:	Flour with carbonaceous shale fragments. 0.369 core lost	0.210
		16.768	0.091	0.079	41-1		COAL:	Flour with carbonaceous shale fragments 0.050 core lost	0.041
		17.918	1.150	0.130	4171	 	COAL:	Flour with carbonaceous shale fragments 1.150 core lost	0.000
	ĺ	18.201	0.283	0.245	4		MUDSTONE:	Coal Lenses	0.283
	18.201	18.681	0.480	0.416			COAL:	Flour. 0.200 Core Missing	0.280
	ļ								2 mgr 1
		18.701	0.020	0.017	41-2		COAL:	Dull and Bony	0.020
[,		18.811	0.110	0.095			COAL:	Interbanded dull and bright	0.110
	*	18.906	0.095	0.082	4	18.961	COAL:	Dull, some bony	0.095
	18.906*	19.726	0.820	0.710	41-3 -	18.961 19.726	COAL:	Bright with Dull Bands. 0.415 core missing. Slickensides at 45° at 19.635	0.350
	19.726	20.301	0.575	0.498	41-4		COAL:	Dull with bright bands	0.575
	20.301	20.491	0.190	0.165	1-		COAL:	Bright with dull bands	0.190
		20.531	0.040	0.035	41-5		COAL:	Dull	0.040
				}	41-35				!
]]]		٧j]			

HOLE. NO.:

MS-41

DATE BEGUN: DATE FINISHED:

LAT.:

TOTAL DEPTH:

HOLE ANGLE:

LONG.:

Ranger Oil Limited

SHEET NO.: 3

BEARING:

ELEV. COLLAR:

LOGGED BY:

U.T.M.

COAL LICENSE:

							LOGGED BY: CORE 312E.			
B.C.A.	Ut	ut	UNITY T	HICKNESS	SAMPLE	MARKER		DESCRIPTION	RECOVERY	
	From	To	Thick,	True	NUMBER		<u> </u>	· · · · · · · · · · · · · · · · · · ·	m, Rec,	
30°		21.549	1.018	0.882	41.5		COAL:	Interbanded dull and bright. 0.369 core missing	0.649	
*	21.549	22.211	0.662	0.481	41.6	22,211	COAL:	Dull0.386 core lost	0.276	
								BOTTOM OF BIRD COAL SEAM	!	
30°		22.834	0.730	0.632	ļ		SILTSTONE:	Massive, dark grey	0.623	
30°		23,506	0.672	0.582			SILTSTONE & SANDSTONE:	Interbedded medium grey, medium grained, bioturbated and rippled, occasional coaly partings.	0.672	
		27.348	3.842	3.327			SANDSTONE:	Medium grey, medium grained, salt and peppe appearance, 5%Py throughout, occasional coaly partings.	3.842	
30°		30.964	3.616	3.132		<u> </u> 	SANDSTONE:	Fine grained, medium grey, worm casts 29.051 - 29.421	3.616	
40°		31.432	0.468	0.359	·		SANDSTONE:	Medium grey, medium grained, carbonaceous partings throughout	0.468	
40°		32.835	1.403	1.004			SANDSTONE:	Fine - medium grained, medium grey, worm casts throughout, carbonaceous partings throughout. Quartz filled fractures at 120° at approx. 0.3M intervals 0.040 coal at 32.375.	1.403	
]						

HOLE. NO.: MS-41

DATE BEGUN: DATE FINISHED: TOTAL DEPTH:

HOLE ANGLE:

Ranger Oil Limited

BEARING:

ELEV. COLLAR:

SHEET NO.:

U.T.M.

COAL LICENSE:

LAT.:	MISHED.			ONG.:				ED BY:	CORE SIZE:	
B.C.A.	UI	VIT	UNITY T	HICKNESS	ŞAMPLE	MARKER			DESCRIPTION	RECOVERY
D.C.A.	From	То	Thick,	True	NUMBER		ļ			m. Rec.
38 ⁰		34.146	1.311	1.033			SANDSTONE:		rained, medium grey, coarser fro 33,606 with carbonaceous partin	
40°		37.683	3.537	2.73			SANDSTONE:	Fine - me casts thr @ 130 fr	edium grained medium grey, worm oughout. Quartz filled fractur om 35.488 - 37.683	3.537
	 	İ						END OF HO	LE	
						 	* Sample	footage adj	justed for "Best Fit"	
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	1			·						
						,				
		[-								
<u> </u>							•			
}	1)	}						•	1

HOLE. NO.: MS-42

DATE BEGUN: Aug. 5, 1982

DATE FINISHED: Aug. 9, 1982

TOTAL DEPTH: HOLE ANGLE:

31.646 M

Vert

Ranger Oil Limited BEARING:

ELEV. COLLAR:

SHEET NO.: 1

U,T.M.

3039

COAL LICENSE:

LAT.:	· · · · · · · · · · · · · · · · · · ·						COLLAR: ED BY: M.A.M.	COAL LICENSE: AXT	,	
B.C.A.	Ų	JNIT	UNITY T	HICKNESS	SAMPLE	MARKER	DESCRIPTION			RECOVERY
	From	То	Thick,	True	NUMBER	<u> </u>	ļ			m, Rec
	0	4.733	4.733	4.66			CASING:			
10 ⁰		4.988	0.255	0.251			MUDSTONE:	Dark grey. Moosebar F Bluesky Fm. abrupt @ l	m, contact with	0.255
10 ⁰		6.608	1.620	1.595			SANDSTONE:	Medium grained, medium pepper appearance less glaucanite noted.		1.620
		7.477	0.869	0.856			SANDSTONE:	Medium grained, medium and/or rippled first c @ 6.608, 15% carbonace 7.057 - 7.477 common s partings parallel to b	arbonaceous parting ous partings at lickensides along	0.869
		8.344	0.867	0.854			SANDSTONE:	Medium grained, medium with minor carbonaceou		0.867
10°		10.277	1.933	1.904			SANDSTONE:	Clean, medium grey, me many worm casts	dium grained with	1.933
		12.013	1.736	1.710			SANDSTONE:	Medium grained, medium carbonaceous	grey, slightly	1.736
		12,301	0.288	0.284			MUDSTONE:	Coal on fractures, car	bonaceous shale	0.288
			<u> </u>							
}					Ĭ				1	

Ranger Oil Limited

SHEET NO.:

2

HOLE, NO.:

MS-42

DATE BEGUN: DATE FINISHED: TOTAL DEPTH:

HOLE ANGLE:

BEARING:

ELEV. COLLAR:

U,T.M.

COAL LICENSE:

LAT.:			LC	ONG.:			LOGGE	ED BY: CORE SIZE:	
B.C.A.	U	VIT	UNITY T	HICKNESS	SAMPLE	MARKER		DESCRIPTION	RECOVERY
-	From	То	Thick.	True	NUMBER				m, Rec.
								TOP OF BIRD COAL SEAM	
	12.301	12.641	0.340	0.335	42-1 -	-	COAL:	Dull and mainly dull with bright bands	+
	12.641	13.658	1.017	1.002	42-2	 	COAL:	Dull, oxidized 5%Py. 0.843 coal missing	0.514
	13.658	13.768	0.110	0.108	42-3		COAL:	Coal Flour	+
		14.268	0.500	0.492	\ _		COAL:	Interbanded dull and bright 0.090 coal missing	0.520
]]) 	BOTTOM OF BIRD COAL SEAM	
		15.396	1.128	1.111			SILTSTONE & SANDSTONE:	Fine grained medium to dark grey not carbonaceous. 10 - 15% granular Py. massive, no core angle	1.128
0 ⁰		17.575	2.195	2.162			SANDSTONE:	Fine grained, light-medium grey with non carbonaceous silty sections. Slightly carbonaceous 16.891 - 17.575	2.195
		18.255	0.680	0.670	 		COAL:	Mainly dull with bright bands 0.54 Core Lost	0.140
		18.780	0.525	1.033			MUDSTONE:	Dark grey, 5% Py.	0.525
0°	!	18.920	0.140	0.138			SANDSTONE:	Fine grained, light grey	0.140
		19.906	0.986	0.971			CARBONACEOUS SHALE AND MUDSTONE:	bright coal partings, 1 - 5% Py.	0.986
								,	
		j k							

MS 42

DATE BEGUN: DATE FINISHED:

HOLE. NO :

TOTAL DEPTH:

HOLE ANGLE:

Ranger Oil Limited

SHEET NO.:

3

BEARING:

ELEV. COLLAR:

U.T.M.

COAL LICENSE:

LAT.:	LONG.:						LOGGED BY: CORE SIZE:		CORE SIZE:		
B.C.A.	UI	VIT	UNITY T	HICKNESS	SAMPLE	MARKER		DESCRIPTION		RECOVERY	
ļ	Fram	To	Thick.	True	NUMBER	<u></u>			· · · · · · · · · · · · · · · · · · ·	m, Rec.	
		20.936	1.030	1.014			SANDSTONE:	Medium grey, medium grain and rippled, dark grey si		1.030	
. 1		23.680	2.744	2.702			MUDSTONE:	Some siltstone and fine g medium to dark grey. Coa 22.990 - 23.050	rained sandstone ly partings	2.744	
	 	23.820	0.140	0.138			CARBONACEOUS SHALE:			0.140	
		31.646	7.826	7.707			MUDSTONE:	Dark grey with siltstone carbonaceous partings thre		7.826	
	}							END OF HOLE			
		 		<u> </u>							
		!			·						
·	<u> </u>		ļ								
i											
								•			

29.340

33.370

0.140

0.380

HOLE, NO. MS-43

10⁰ @

30.380

10° @ 33.350

October 7, 1982 DATE BEGUN:

TOTAL DEPTH:

Ranger Oil Limited BEARING:

DATE FINISHED: October 9, 1982 Vertical HOLE ANGLE: ELEV. COLLAR **COAL LICENSE:** LAT.: LONG.: LOGGED BY MARVIN A, MITCHELL CORE SIZE: HQ UNIT UNITY THICKNESS SAMPLE RECOVER MARKER DESCRIPTION B.C.A. NUMBER To Fram Thick. True m, Rec. 16.200 CASING: 0 0.000 23,240 7.040 MOOSEBAR FM, 16.200 16.200 10° @ MUDSTONE: Dark grey, massive, cracked due to 7.040 17.540 17,110 weathering, dark grey to black mudstone 18.640 with 3-5% pyrite, 20.160 - 21.520 10° @ 20.160 dark grey, massive, conchoidal 20.160 23.21 fracture 21.520 - 23.240 5.500 26.26 28.740 MUDSTONE: Dark grey, 3-5% Pyrite as blebs 5.500 11° @ rough fractures @ C.A. 70° with much 26.060 29.200 0.460 28.390 0.460 powdery calcite veining healing brecciated zone.

> @ C.A. 45° approximately 30.830 32.990 3.650 32.350 MUDSTONE: Dark Grey, 3-5% pyrite 3.650

> > Rubbly, slickensides Pyrite throughout

core broken rubbly slikensides

SHEET NO.: 1 of 4

0.140

0.380

TOTAL DEPTH

Ranger Oil Limited

BEARING:

ELEV. COLLAR: LOGGED BY:

U.T.M.

2 of 4

COAL LICENSE: CORE SIZE

SHEET NO.:

DATE FINISHED: LAT:

HOLE. NO.: MS-43

DATE BEGUN:

HOLE ANGLE: LONG

LAT.:			L(ONG.:			LOGGED BY: CORE SIZE:				
B.C.A.	υ	NIT	UNITY T	UNITY THICKNESS		MARKER		DESCRIPTION	SCRIPTION	RECOVE	
	From	То	Thick,	True	NUMBER					m, Rec	
		34.305	0.935				MUDSTONE:	Dark Grey		0.935	
		34.470	0.165			35.100 36.010 38.450	GOUGEY CLAY:	Black and dirty who at 20° and 140°	ite, slickensides	0.165	
7 ⁰ @		49.255	14.785			41.500	MUDSTONE:	Black, massive - 3-	-5% Pyrite	14.785	
10° @ 2.400						44.550 47.59		Gougey white clay a 36.940 - 37.090 Many fractures @ C. Sideritic concretion up to 10% Py. Clay and rubble @ C. Pyrite modules @ 41 BENTONITE BAND 42.3 COALY PARTING @ 47. BENTONITE BANDS 48 C.A. 10° 48	A. 70° to 38.590 ons 38.800 with C.A. 5° 1.580 395 - 42.400		
	,										

Ranger Oil Limited

MS-43 HOLE, NO.:

DATE BEGUN:

TOTAL DEPTH:

DATE FINISHED: .

HOLE ANGLE:

BEARING:

FILEV. COLLAR:

SHEET NO .:

3 of 4

Ų,T.M.

COAL LICENSE:

		LO	NG.:			LOGGED	BY: CORE SIZE:	
U	INIT	UNITY T	HICKNESS	SAMPLE	MAHKER		DESCRIPTION	RECOVERY
From	Ťο	Thick.	Tive	NUMBER				m. Rec.
	61.800	12.545			50.640	SANDSTONE:	Fine - medium grained, medium grey with dark grey siltstone	12.545
					53.690		x-bedding @ C.A. 30° and	
					57.740		SILTSTONE	
					59.79		toward 61.800	
Bird							TOP BIRD COAL SEAM	
61.800	62.830	1.030		43-1	62.22 62.830	COAL:	Dull with bright bands cleat @ C.A. 45°	0.610 0.609
62.830	63.439	0.609		43-2	63.439	COAL:	Dull with bright bands sheared throughout @ random angles	
	63.800	0.361				CARBONACEOUS SHALE:	and agree	0.281
	64.320	0.520			64.052	SILTSTONE:	Dark grey - black	0.520
	64.340	0.020				CARBONACEOUS SHALE:	· :	0.020
	(5.000						· -	
64.340	65.232	0.892		43–3	65.272	COAL:	Boney and carbonaceous shale	0.660
65.232	66.110	0.878		43-4		COAL:	Boney and carbonaceous shale	0.190
							BOTTOM BIRD SEAM	
			·					
	From 3ird 61.800 62.830 Bird 64.340	61.800 61.800 62.830 63.439 63.800 64.320 64.340 Bird 64.340	UNITY TO Thick. 61.800 12.545 61.800 62.830 1.030 62.830 63.439 0.609 63.800 0.361 64.320 0.520 64.340 0.020 Bird. 64.340 65.232 0.892	From To Thick True 61.800 12.545 61.800 62.830 1.030 62.830 63.439 0.609 63.800 0.361 64.320 0.520 64.340 0.020 Bird 64.340 65.232 0.892	UNIT UNITY THICKNESS SAMPLE NUMBER From To Thick. True 61.800 12.545 61.800 62.830 1.030 43-1 62.830 63.439 0.609 43-2 63.800 0.361 64.320 0.520 64.340 0.020 Find 64.340 65.232 0.892 43-3	UNIT UNITY THICKNESS SAMPLE NUMBER MAHKER From To Thick. True 50.640 61.800 12.545 50.640 53.690 57.740 59.79 59.79 8ird 62.830 1.030 43-1 62.22 62.830 63.439 0.609 43-2 63.439 63.800 0.361 64.320 6.520 64.340 65.220 64.340 0.020 43-3 65.272	UNIT UNITY THICKNESS SAMPLE NUMBER MAHKER 61.800 12.545 50.640 50.640 53.690 57.740 59.79 61.800 62.830 1.030 43-1 62.22 62.830 62.830 63.439 0.609 43-2 63.439 COAL: 64.320 0.520 64.340 0.020 CARBONACEOUS SHALE: 64.340 65.232 0.892 43-3 65.272 COAL:	UNIT UNITY THICKNESS SAMPLE NUMBER NUMBER SANDSTONE: Fine - medium grained, medium grey with dark grey siltstone x-bedding @ C.A. 30 and CARBONACEOUS SHALE, MINOR SILTSTONE Coaly partings @ toward 61.800 CARBONACEOUS SHALE, MINOR SILTSTONE Coaly partings @ toward 61.800 TOP BIRD COAL SEAM CARBONACEOUS SHALE, MINOR SILTSTONE Coaly partings @ toward 61.800 TOP BIRD COAL SEAM CARBONACEOUS SHALE CARBONACEOUS SHALE: CARBONACEOUS SHALE: COAL: CARBONACEOUS SHALE: COAL: CARBONACEOUS SHALE: COAL: COA

Ranger Oil Limited

SHEET NO.:

4 of 4

HOLE. NO.:

MS-43

DATE BEGUN: DATE FINISHED:

TOTAL DEPTH

HOLE ANGLE

BEARING:

ELEV. COLLAR:

U.T.M.

COAL LICENSE:

LAT,:	, MIGHED.			ONG.:			LOGGE	D BY: CORE SIZE:	
B.C.A.	U	NIT	UNITY	UNITY THICKNESS		МАНКЕП		DESCRIPTION	RECOVER
—	From	To	Thick.	True	NUMBER				m. Rec
30° @ 65.740		69.670	3.560		·	68.630	SILTSTONE:	Dark grey - black with minor fine grained sandstone with salt and pepper appearance, no Pyrite	3.560
40° @								Carbonaceous Shale 66.232 66.282 66.592 66.602	
68.63	þ					71.67 74.873		Many coaly partings toward 69.670	
0		78.990	9.320			78.050	SANDSTONE:	Clean, fine grained 1-3% Pyrite throughout Minor coaly partings to 70.160	9.320
20° @ 74.693								Thin Quartz vein @ 74.178 Worm castings, bioturbation and ripple marks	
i		İ						76.313 - 77.280	
	! 			i i				END OF HOLE 78.990	
		,							
·					i				
	;			 					

Ranger Oil Limited

MS-44

DATE BEGUN: Oct. 10, 1982

TOTAL DEPTH: HOLE ANGLE:

87.50 M Vertical

BEARING:

FLEV. COLLAR:

SHEET NO.:

1 OF 4

U.T.M.

COAL LICENSE:

DATE FINISHED:	Oct.	14,	1982
LAT,:			

HOLE, NO.:

LAT.:		· · · · · · · · · · · · · · · · · · ·		ONG.:			Loggi	ED BY: COR	E SIZE: HQ	
B.C.A.	L	INIT	UNITY	UNITY THICKNESS		MARKER		DESCRIPTION		RECOVER
	From	То	Thick,	True	NUMBER	<u> </u>				m. Rec.
	0	58.520	58.520	58.520		60.050	CASING:			
16° @ 60.465		62.270	3.750			60.050	MUDSTONE:	Dark grey - black, slightly coaly partings @ 60.365, 61 to 62.06 No Pyrite noted	silty .880	3.750
51.880	T	64.470	2.200			62,480	SILTSTONE:	Black and SANDSTONE, fine g light grey interbedded and minor pyrite throughout ver pyritic @ 62.330	cross bedded	2.200
		71.480	7.010			65.84	SANDSTONE:	Fine - medium grained, mediand pepper appearance. No poccasional coaly parting, eappears to be crossbedded. Section is quite carbonaceo 68.62 - 68.89, contact with	yrite noted; ntire section us from	7.010
1		ļ					1	following gradational		0.080
		71.560	0.080	,	:	68.89	SILTSTONE:	Black, very carbonaceous		
14 ⁰		71.740	0.180					CARBONACEOUS SHALE & MINOR	COAL	0.180
.										
								•		

Ranger Oil Limited

HOLE. NO.: MS-44

DATE BEGUN: DATE FINISHED:

LAT.;

TOTAL DEPTH:

HOLE ANGLE:

BEARING:

ELFV. COLLAR: LOGGED BY:

SHEET NO.: 2 of 4

U.T.M.

COAL LICENSE:

						,	control size.				
	B,C.A.	Ų,	VIT	UNITY T	HICKNESS	SAMPLE	MARKER		DESCRIPTION	HECOVEH,	
	 	From	To	Thick.	True	NUMBER		<u> </u>	m. Aec.		
			72.625	0.885	<u> </u>		71.930	SILTSTONE:	Dark grey to black	0.885	
			72.685	0.060				CARBONACEOUS SHALE:		0.060	
Œ.					•				TOP OF BIRD COAL SEAMS	0.250	
Sn	C	72.685	73.150	0.465		44-1		COAL:	Mainly dull, minor dull with bright band	5	
	!	73.15	73.360	0.210		44-2	73.15	COAL:	Dull with bright bands	0.210	
		73.36	73.500	0.140		44-3		COAL:	Bright	0.140	
		73.500	73.640	0.140	:	 		COAL:	Dull		
		73.64	73.845	0.205		44-4		COAL:	Bright, very rubbly	0.335	
	!	73.845	73.935	0.090			73.93	COAL:	Dul1		
	ı	73.935	74.360			44-5		COAL:	Bright with dull bands	0.425	
	İ	74.360	74.570	0.210			74.54	CARBONACEOUS SHALE:		0.210	
	18 ⁰	74.570	75.590	1.020			75.30	SILTSTONE AND CARBONACEOUS SHALE:		1.020	
							j				
-											
		J									

HOLE. NO.: DATE BEGUN:

LAT.:

DATE FINISHED:

MS-44

TOTAL DEPTH:

HOLE ANGLE:

LONG.:

BEARING:

ELEV. COLLAR:

LOGGED BY:

Ranger Oil Limited
SHEET NO.: 3 Of 4 SHEET NO .:

3 Of 4

U.T.M.

COAL LICENSE:

									COME SIZE:		
	B.C.A.	U	NIT	UNITY	HICKNESS	SAMPLE	MARKER		DESCRIPTION	RECOVEH'	
	1	From	То	Thick.	True	NUMBER					
Kira	•	75.590	76.255	0.665		44-6	75.91 76.52	COAL:	Dull with bright bands	0.665	
		76.255	76.555	0.300		44-7	76.98	COAL:	Interbanded dull and bright	0.300	
	}		Ì	1	}		}	1	BOTTOM OF BIRD SEAM	ĺ	
	<u> </u> 	76.555	77.19	0.635				SILTSTONE:	Dark grey - black with carbonaceous shale bands	0.635	
			77.36				,	COAL:		0.000	
			78.61	1.250			78.35	SILTSTONE:	Dark grey - black with carbonaceous bands	1.250	
			83.19	4.580			81.40	SANDSTONE:	Fine grained interbedded with siltstone many areas of carbonaceous cement. No Py noted Silty 79.01 - 79.33 79.48 - 80.10 Bioturbated 80.33 - 80.50 with worm castings Coaly partings 81.72 - 81.73 82.17 - 82.55	4.580	
									83.00 - 83.19		
			83.90	0.710	·		;	SANDSTONE:	Fine grained	0.710	

HOLE, NO.: MS-44

DATE BEGUN:

DATE FINISHED:

TOTAL DEPTH:

HOLE ANGLE:

Ranger Oil Limited

SHEET NO.

BEARING:

ELEV. COLLAR:

U,T,M.

COAL LICENSE:

ION RECOVE
m. Rec
ey, coaly partings 2.020
, medium grey, minor py. 0.520
grey carbonaceous partings 1.010
.500
1

HOLE, NO.:

MS-45

DATE BEGUN: Oct. 15, 1982

DATE FINISHED: Oct. 17, 1982

TOTAL DEPTH: HOLE ANGLE:

83.580M

Vert.

BEARING:

ELEV. COLLAR:

Ranger Oil Limited

U.T.M.

SHEET NO. 1 of 3

COAL LICENSE:

	υ	NIT	UNITY T	HICKNESS	SAMPLE	МАНКЕЛ		DESCRIPTION	RECOVE
B.C.A.	Fram	To	Thick.	True	NUMBER	3 MAINEY		DESCRIPTION	m, Re
14° @	0	59.540	- 				CASING:		
120 @		60.440	0.900				MUDSTONE:	Dark grey to black coaly partings 59.84 - 60.00	0.900
60.50		61.430	0.990				SILTSTONE & SANDSTONE:	Fine grained banded light and dark grey sheared with calcite veining at random angles from 61.43 to 61.55	
		65.290	3.860				MUDSTONE:	Black with pronounced medium grey siltstone bands 0.002 M wide @ C.A. 14° calcite veining @ 63.63 64.55 core very rubbly and faulted from 63.29 to 63.91	3.860
2 ⁰ @ 64.15 2 ⁰ -5 ⁰ @ 68.04		68.040	2.750				MUDSTONE:	* C.A. @ 64.15 is 2° Dark grey to black coaly partings 67.41 to 68.01 C.A. @ 8°	2.750

Ranger Oil Limited

HOLE. NO.: MS-45

DATE BEGUN: DATE FINISHED: TOTAL DEPTH

HOLE ANGLE:

FLEV. COLLAR:

REARING:

U.T.M.

2 of 3

COAL LICENSE:

LAT.:			L(ONG.:			LOGGED	HY: CORE SIZE:	
B.C.A.	U	NIT	UNITY T	HICKNESS	SAMPLE	MARKER	DESCRIPTION		RECOVER
0.0,74	From	То	Thick.	True	NUMBER	<u> </u>			m. Rec.
	; ; ;	69.590	1.550		} } }		SILTSTONE AND SANDSTONE:	Fine grained, dark grey, cross bedded interbedded	1,550
		71.520	1.930		Ì	,	MUDSTONE & CARBONACEOUS:	Shale, coaly partings toward 71.520	1.930
Yeze	j	ĺ			;			TOP BIRD SEAM	
Jager. Co.	71.520	71.960	0.440	1	45-1		COAL:	Very boney with bright bands	0.280
;	71.960	72.290	0.330		45–2		COAL:	Dull and boney with bright bands	0.190
	72.290	72.660	0.370		45–3		COAL:	Boney	0.370
j	· . 	73.120	0.460		!		MUDSTONE:		1
	73.120	73.560	0.440		45-4		COAL:	Mainly interbanded dull and bright	0.440
		73.910	0.350				MUDSTONE:	Black	
10 [°] @ 77. 7 50	·	74.130	0.22		; ;		CARBONACEOUS SHALE & COAL:		0.220
	ı								
							1 1 1 1		
	,				1				
	- 			·		, , , , , , , , , , , , , , , , , , ,			

MS-45

HOLE, NO.: DATE BEGUN:

DATE FINISHED:

TOTAL DEPTH:

HOLE ANGLE:

BEARING: ELEV. COLLAR: LOGGED BY:

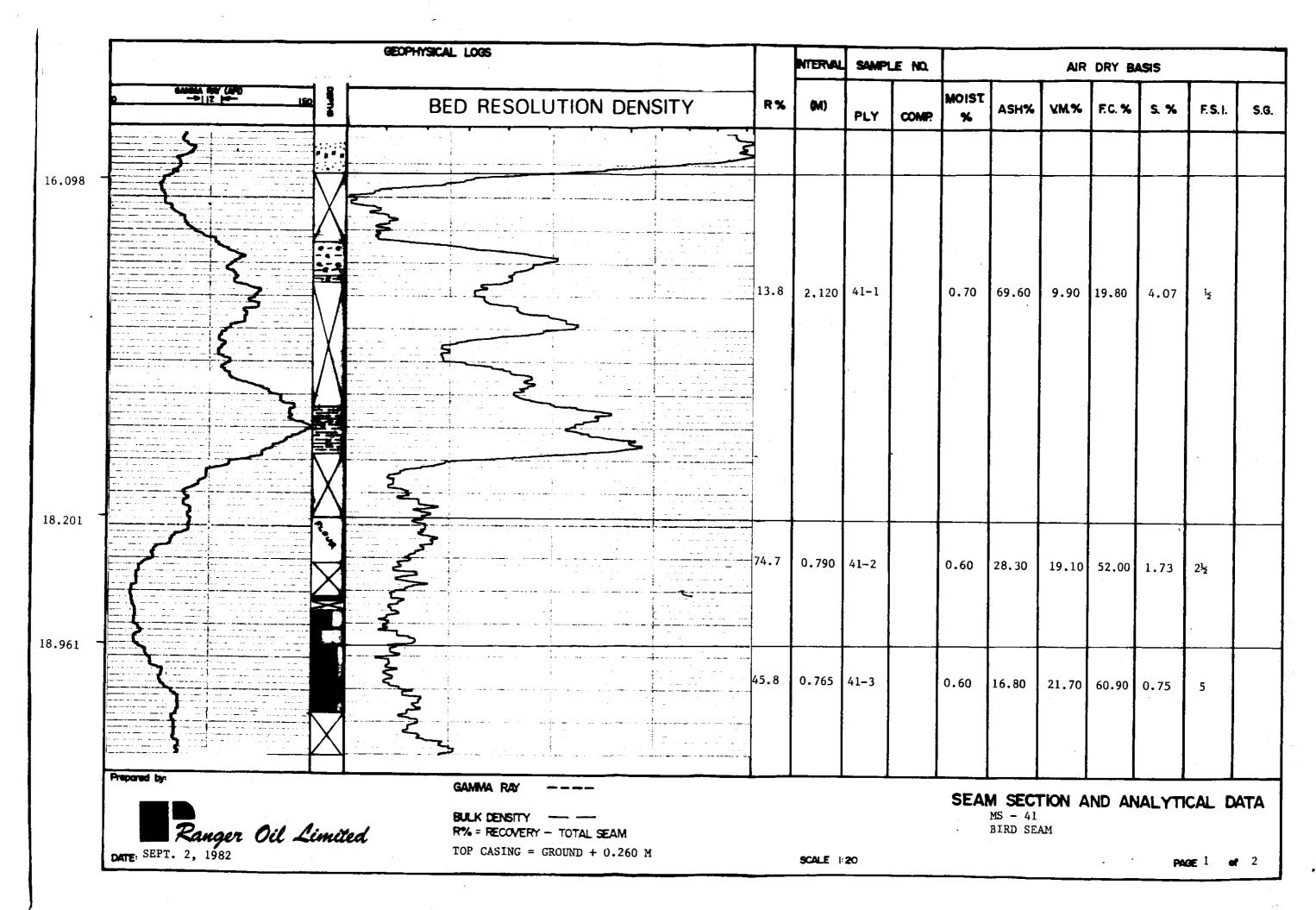
Ranger Oil Limited SHEET NO .:

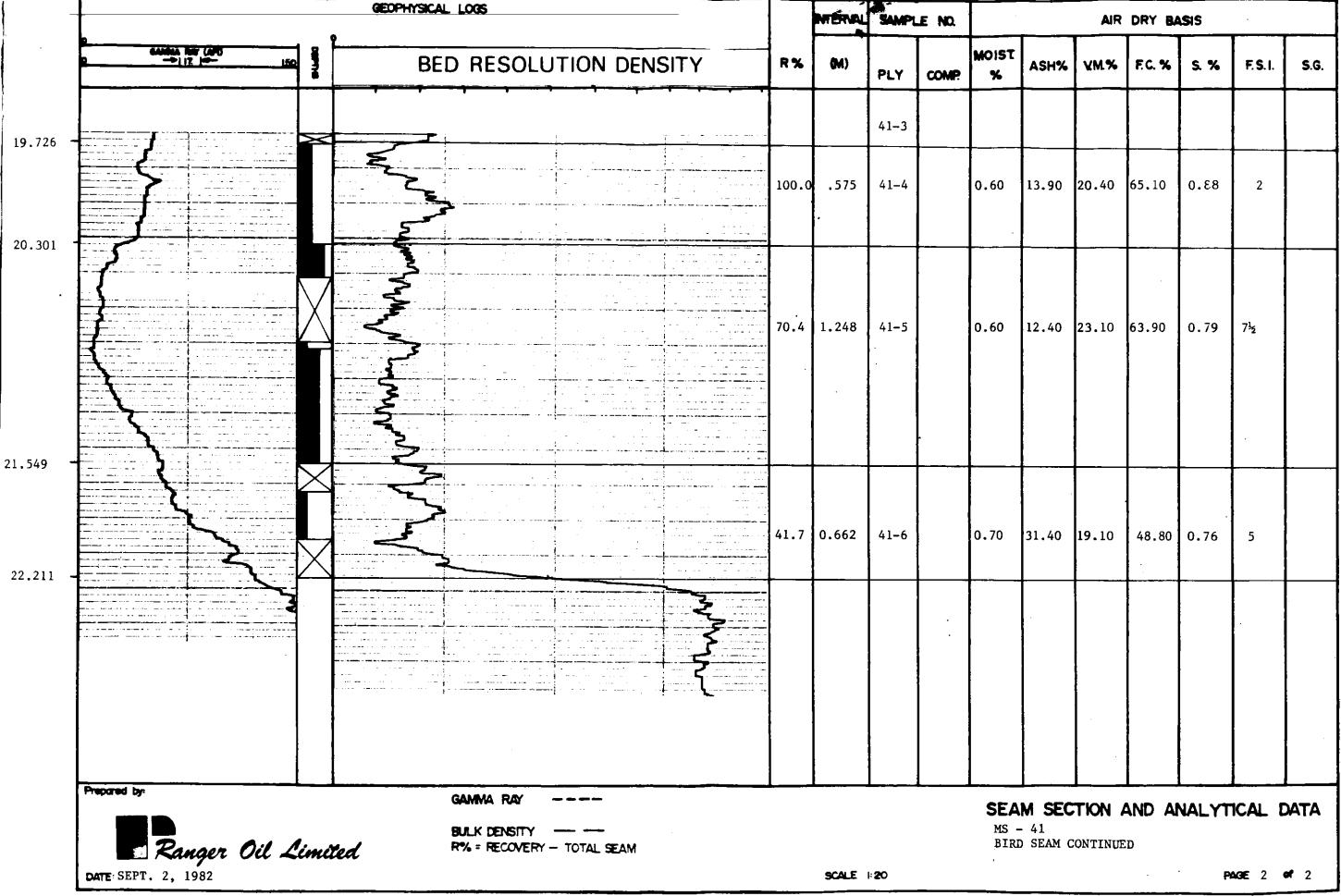
U.T.M.

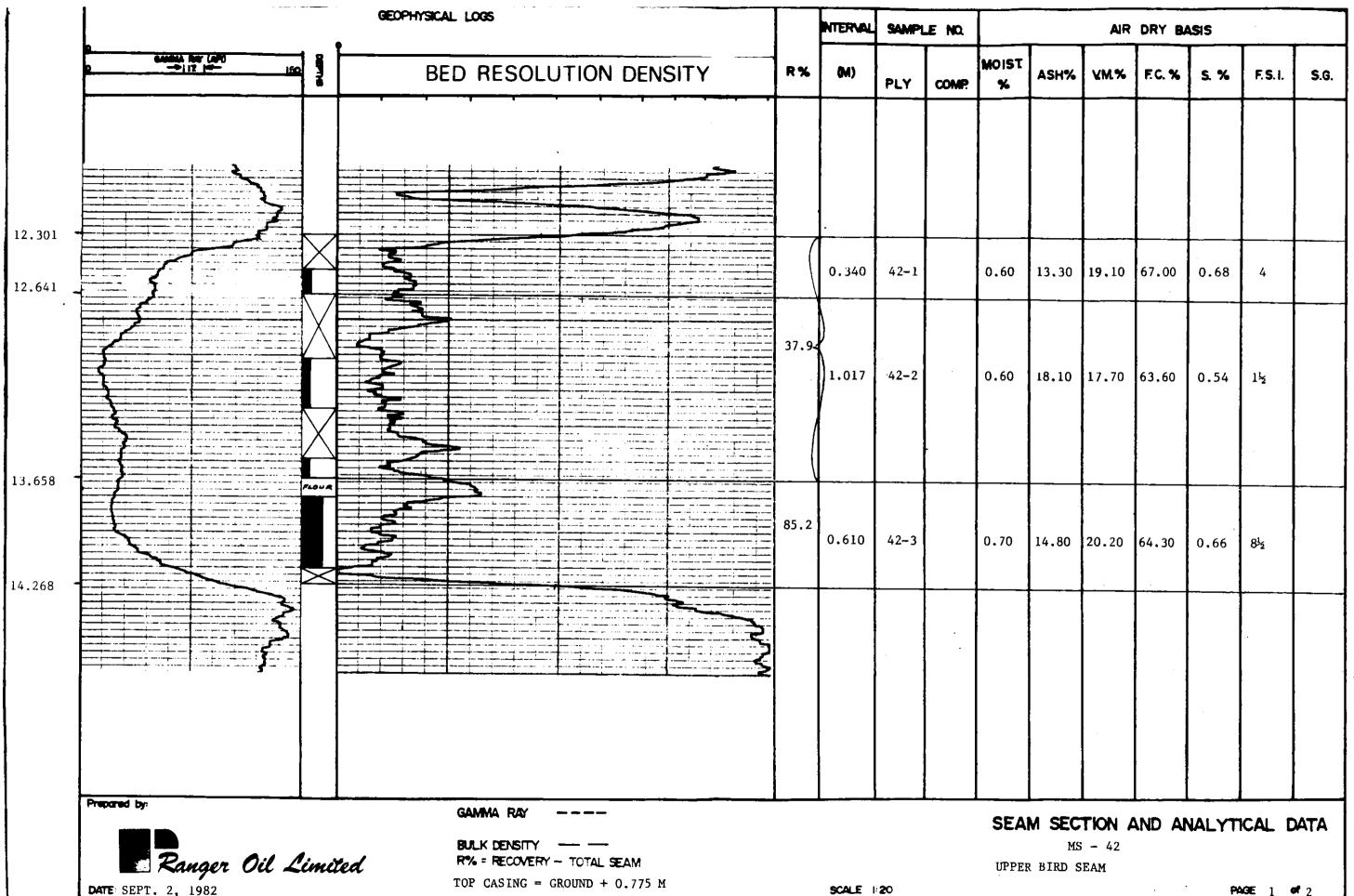
COAL LICENSE:

LAT,:			L	ONG.:			LOGGED B		
B.C.A.	υ	NIT	UNITY T	HICKNESS	SAMPLE	SAMPLE MARKER		DESCRIPTION	RECOVERY
0.0.4	Fram	To	Thick,	True	NUMBER			m. Rec.	
Lower		75.830	1.700				MUDSTONE WITH SILTY SECTIONS:		1.700
Bood	75.800	76.370	0.540		45-5		COAL:	Bright with dull bands	0.510
		}			}	}		BOTTOM BIRD SEAM -	}
		76.870	0.500			!	SANDSTONE:	Very dark grey carbonaceous cement	0.500
		83.580	6.710				SANDSTONE WITH SILTY AND MUDDY SECTIONS:	81.30 - 83.55. 1 - 3% Pyrite throughout possible	6.710
		 - -						ripple marks. END OF HOLE 83.58	
,								•	
					F			•	

3

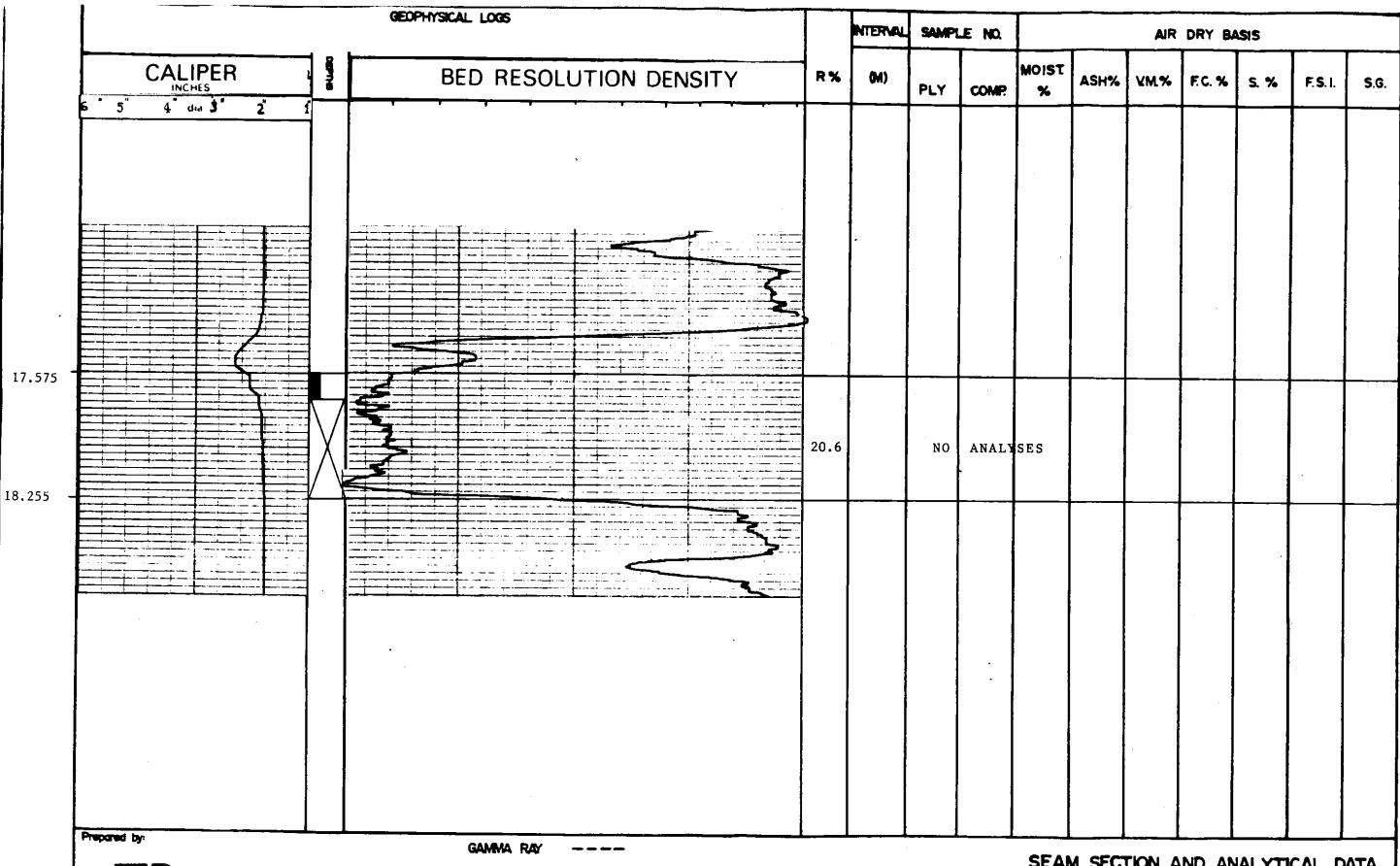






SCALE 1:20

PAGE 1 of 2



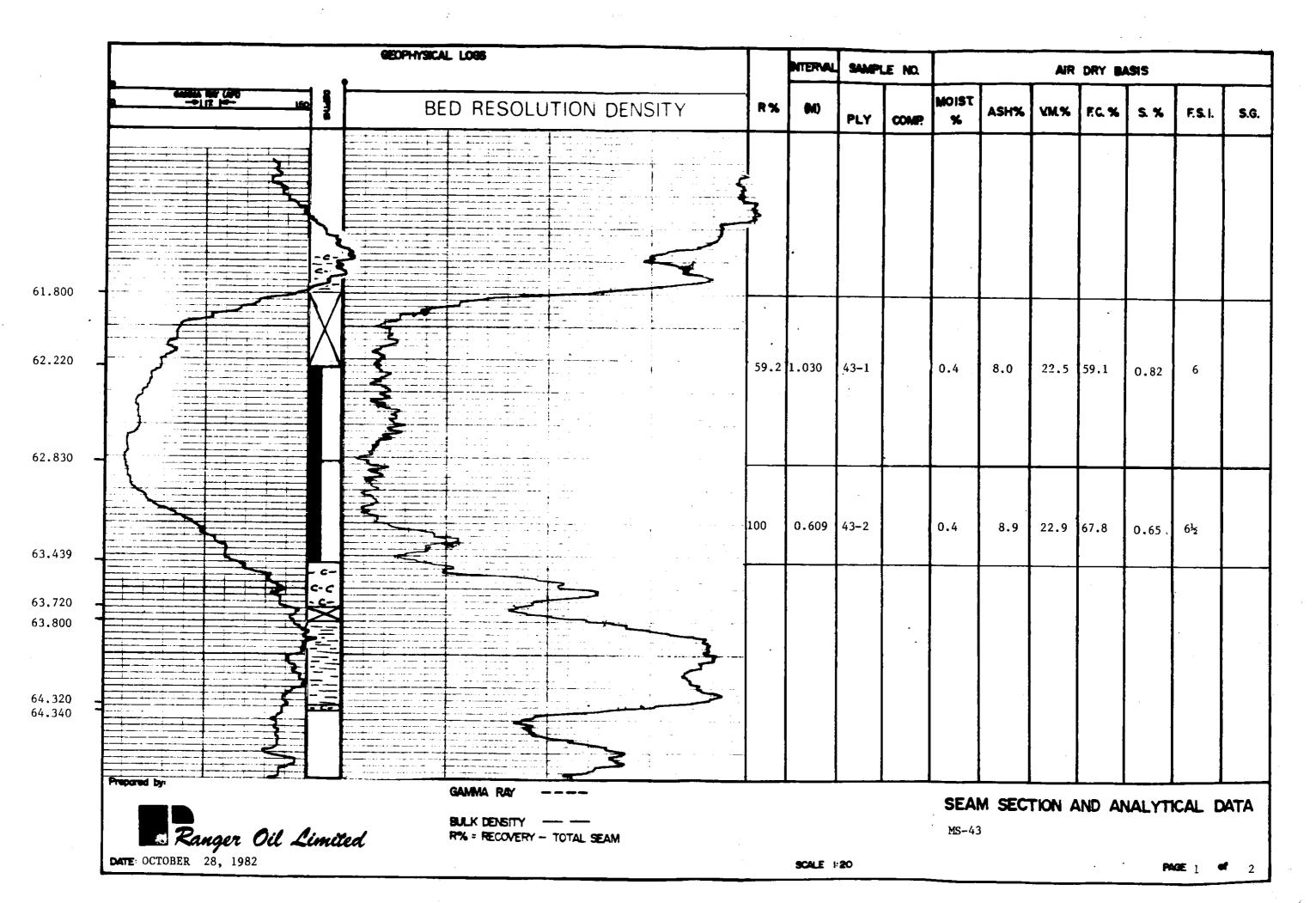
Ranger Oil Limited DATE SEPT. 2, 1982

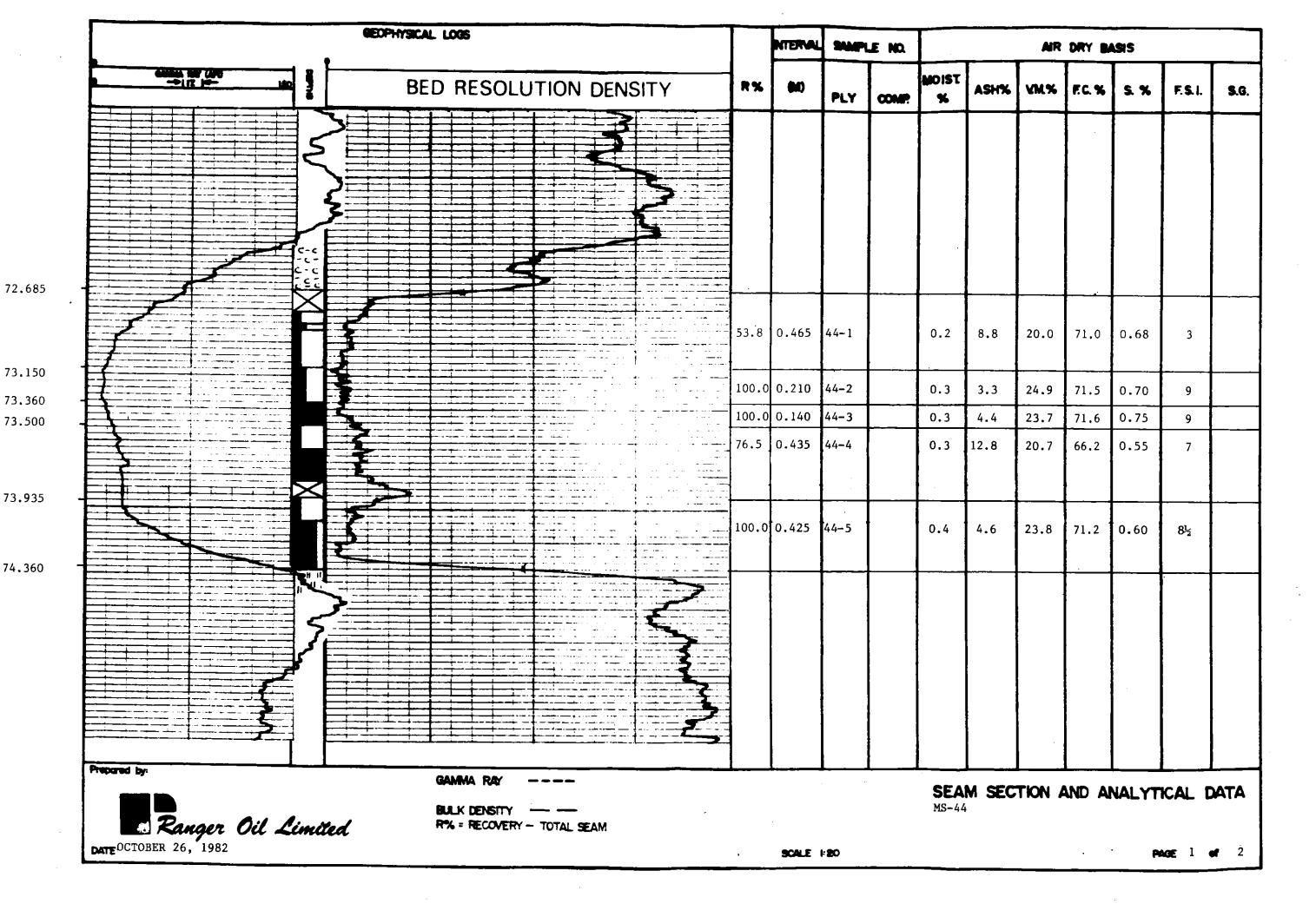
BULK DENSITY ----R% = RECOVERY - TOTAL SEAM SEAM SECTION AND ANALYTICAL DATA

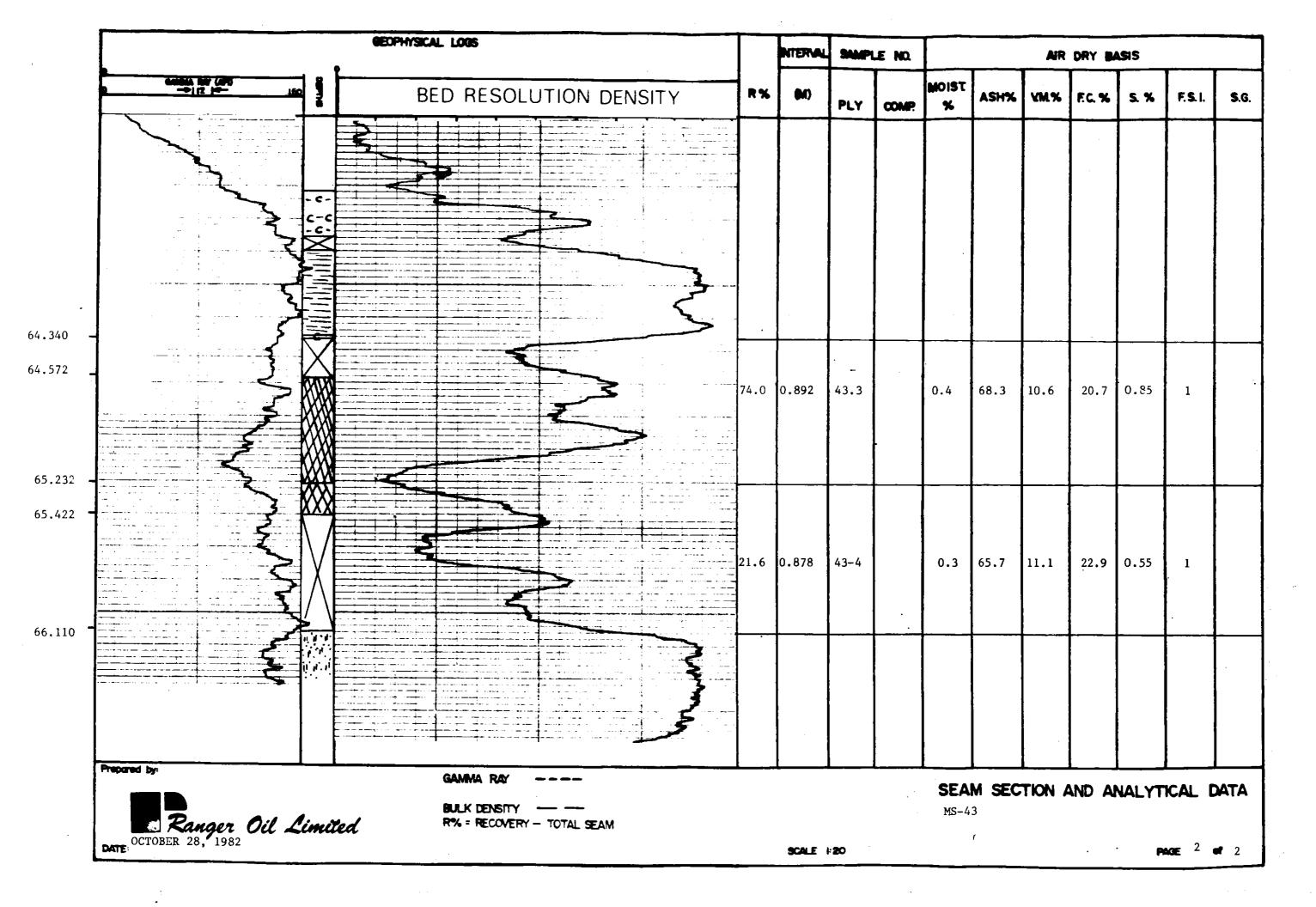
MS - 42LOWER BIRD SEAM

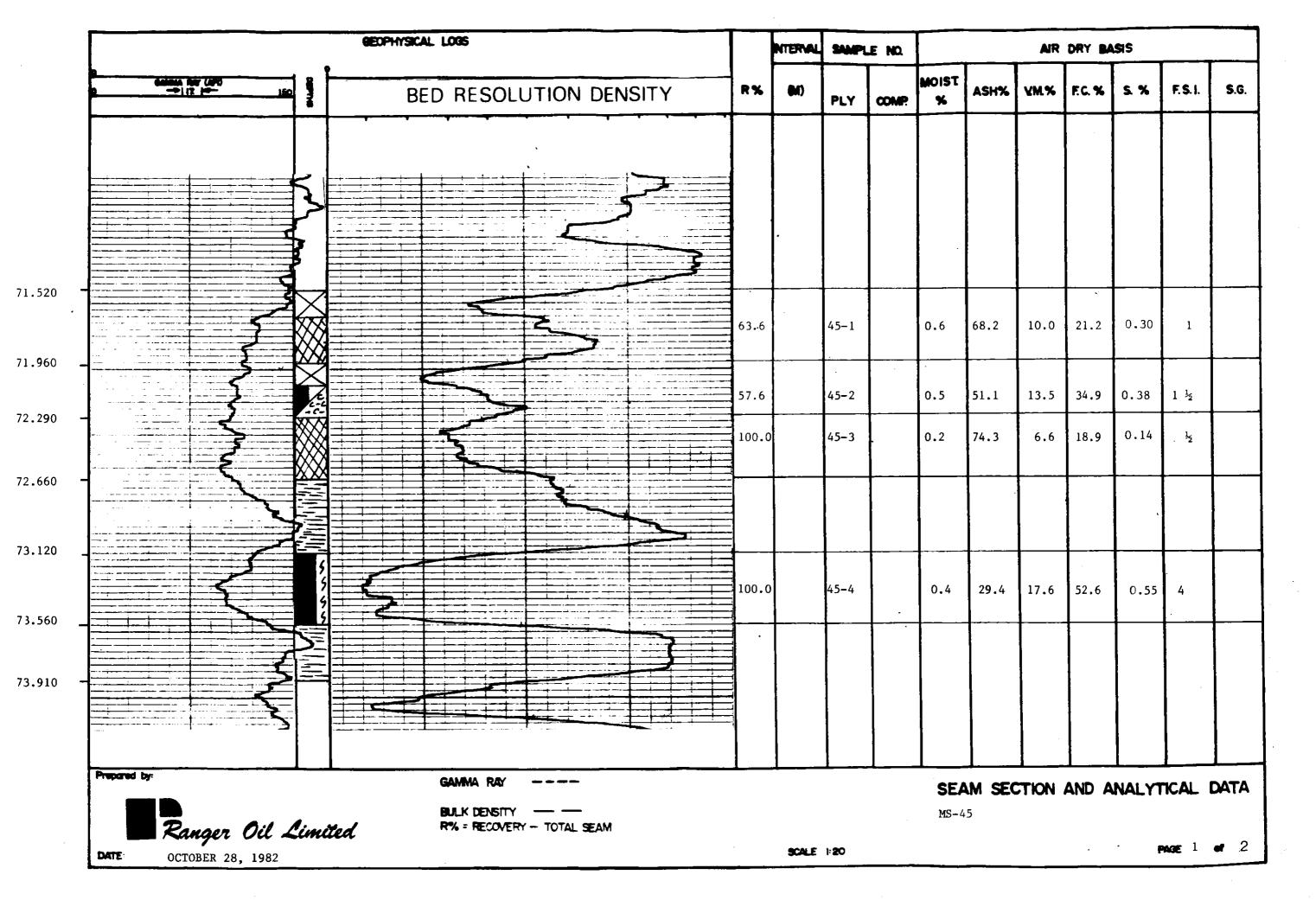
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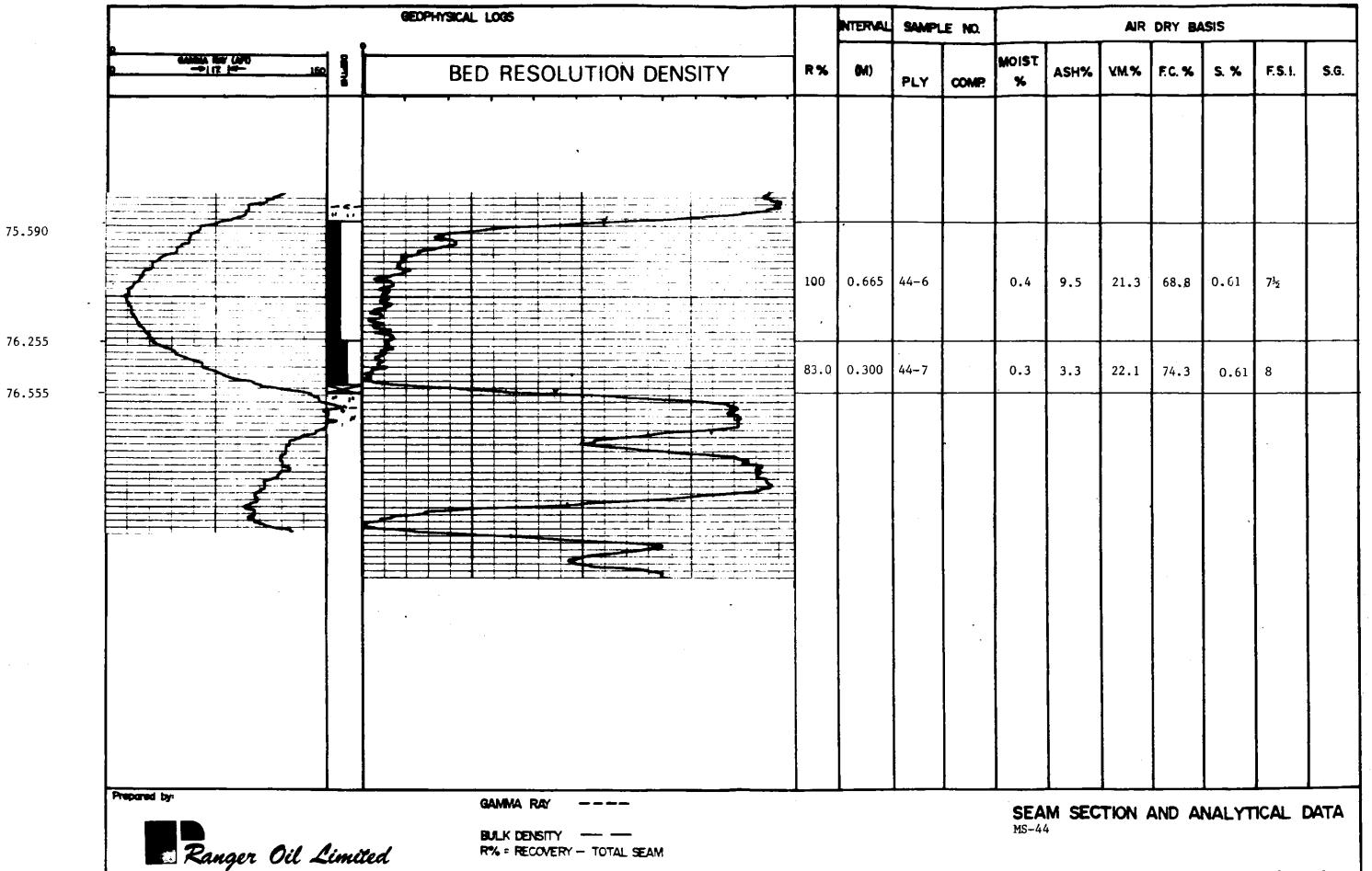
PAGE 2 of 2







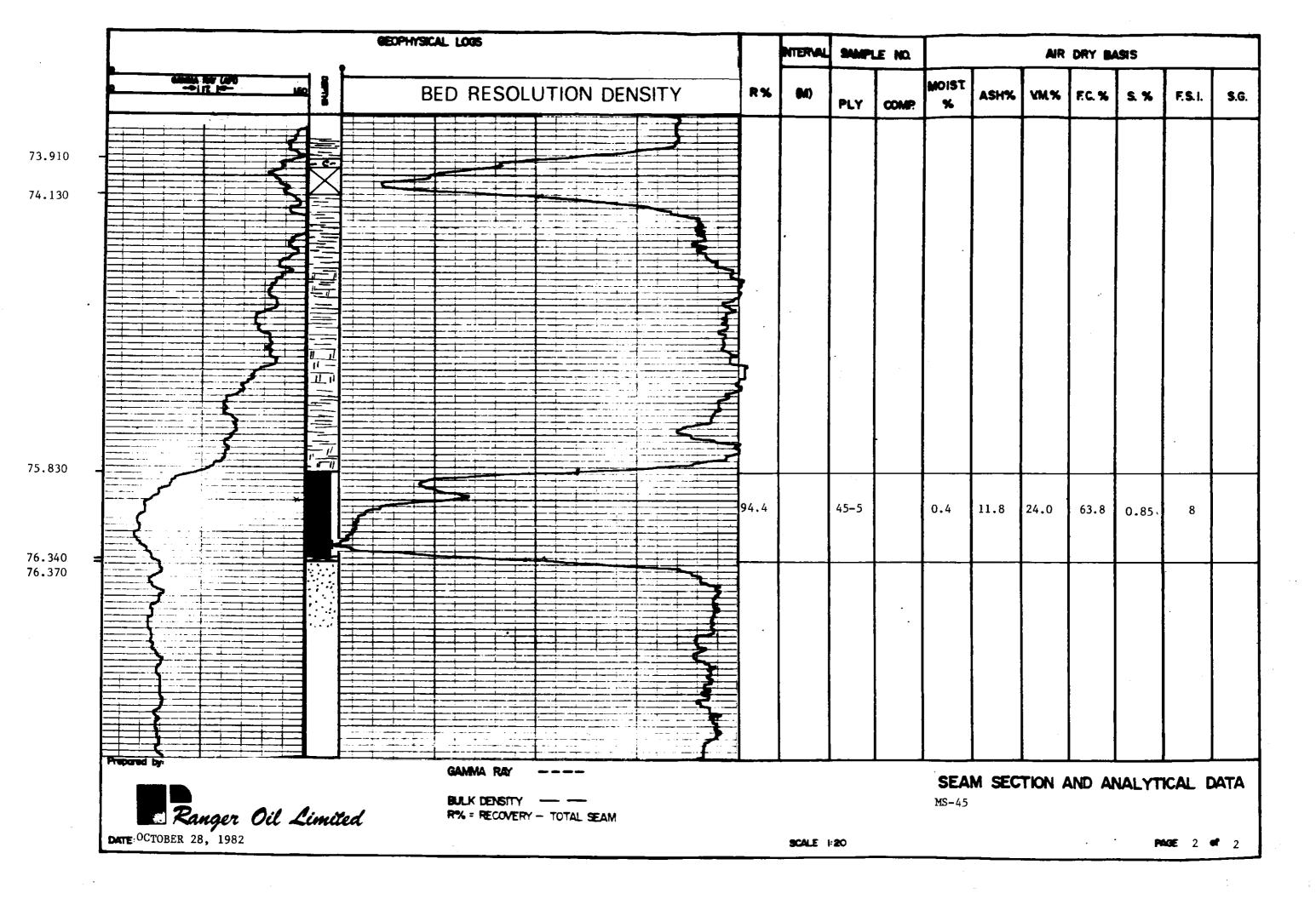


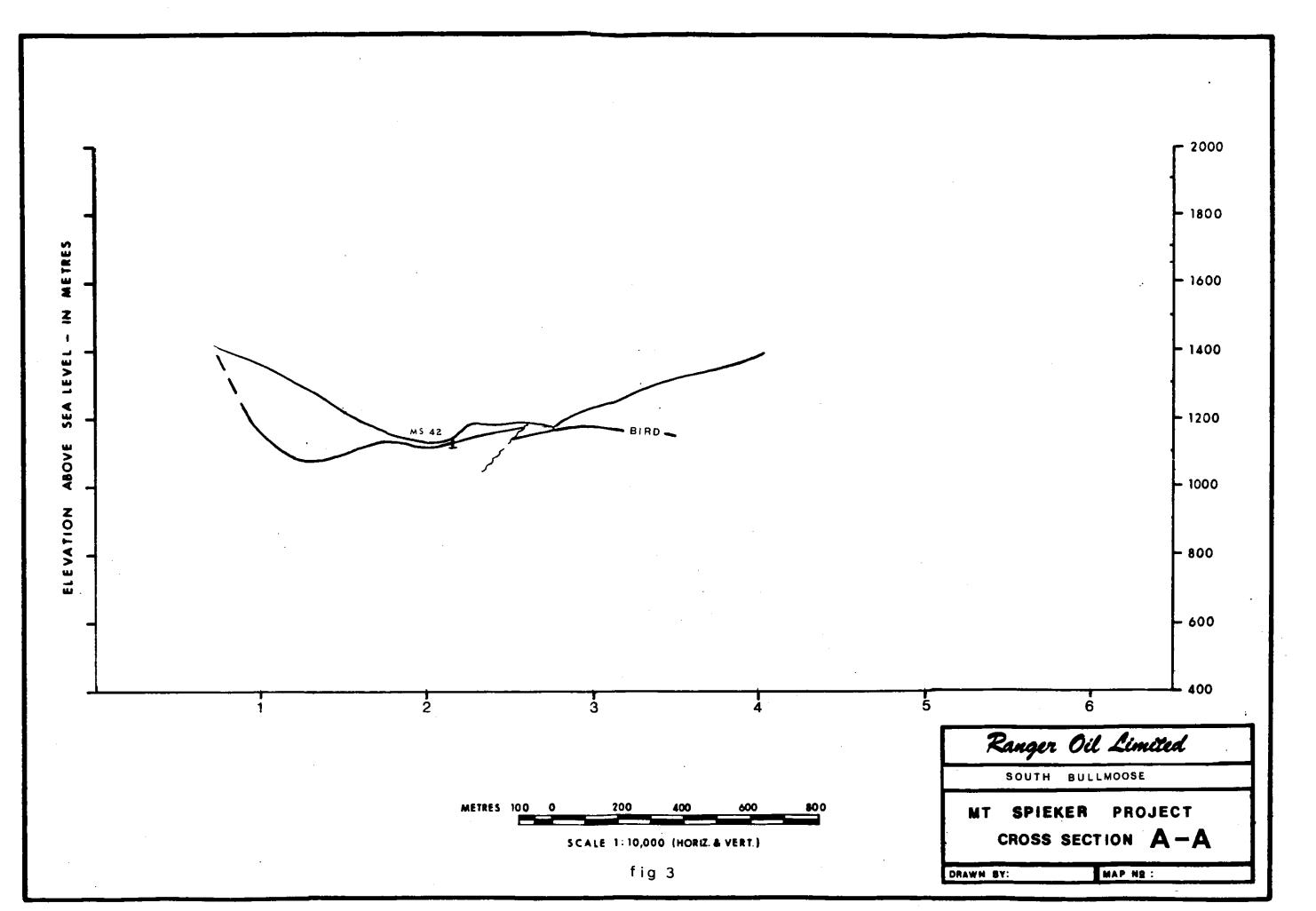


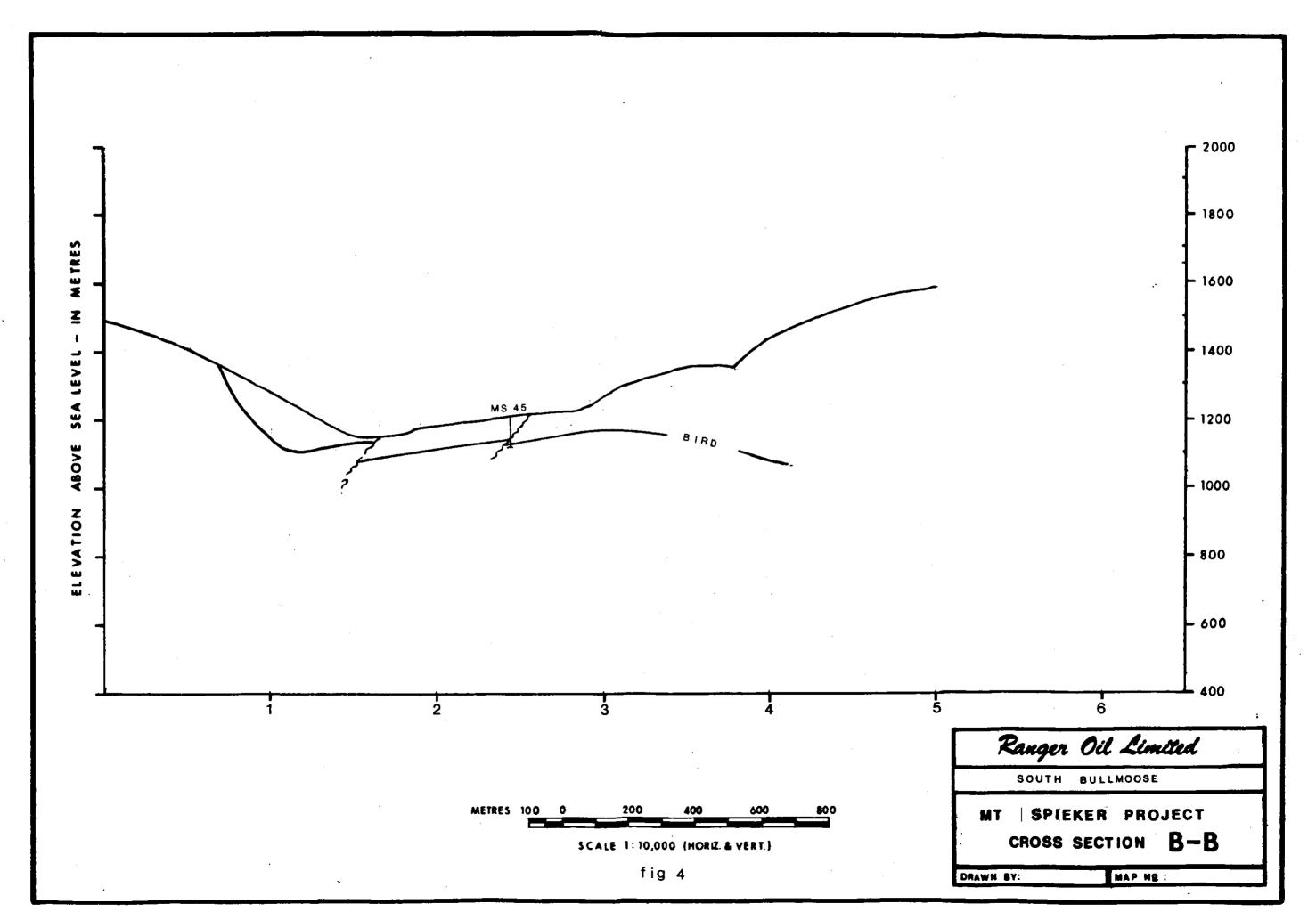
DATE OCTOBER 27, 1982

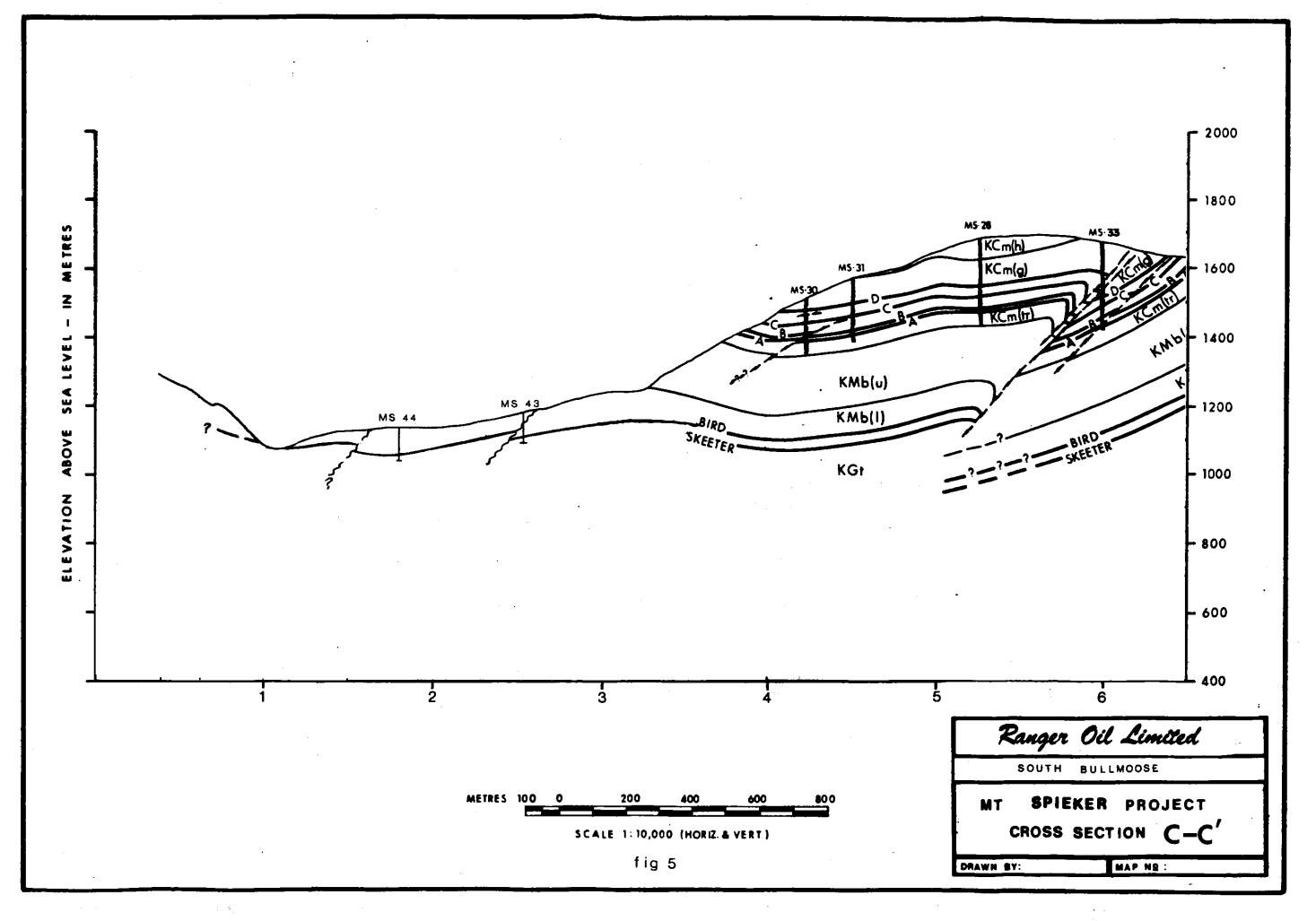
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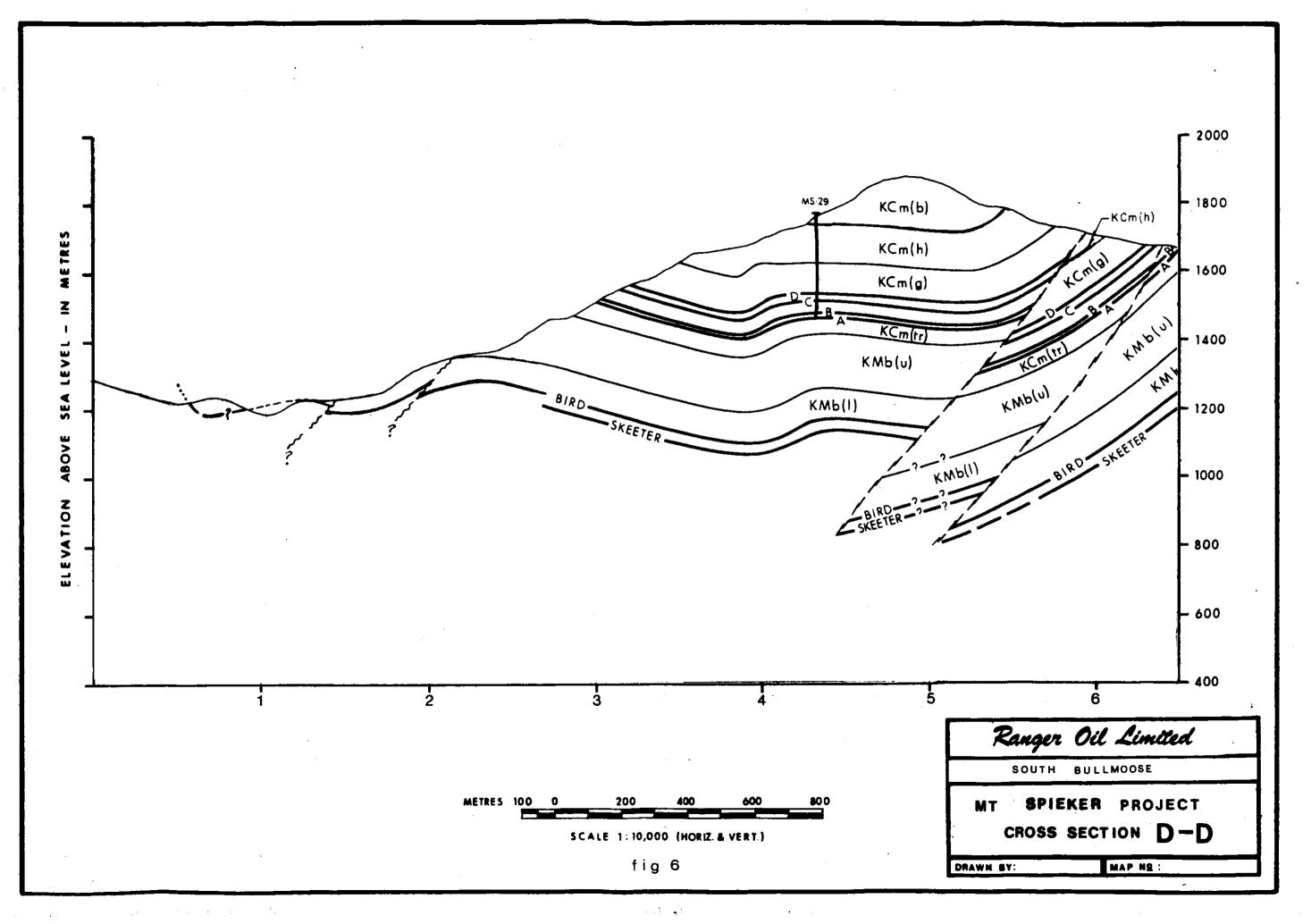
PAGE 2 of

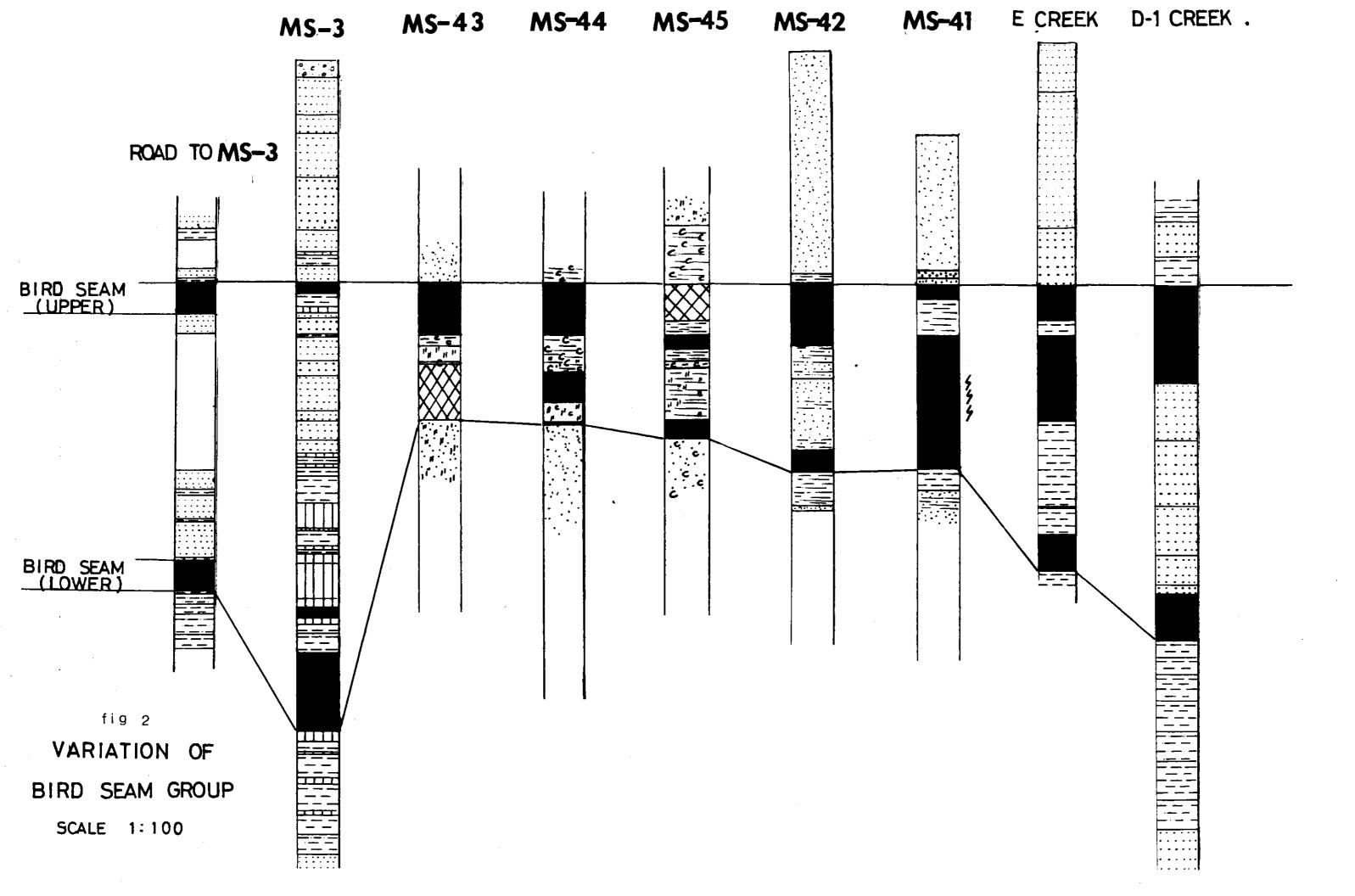


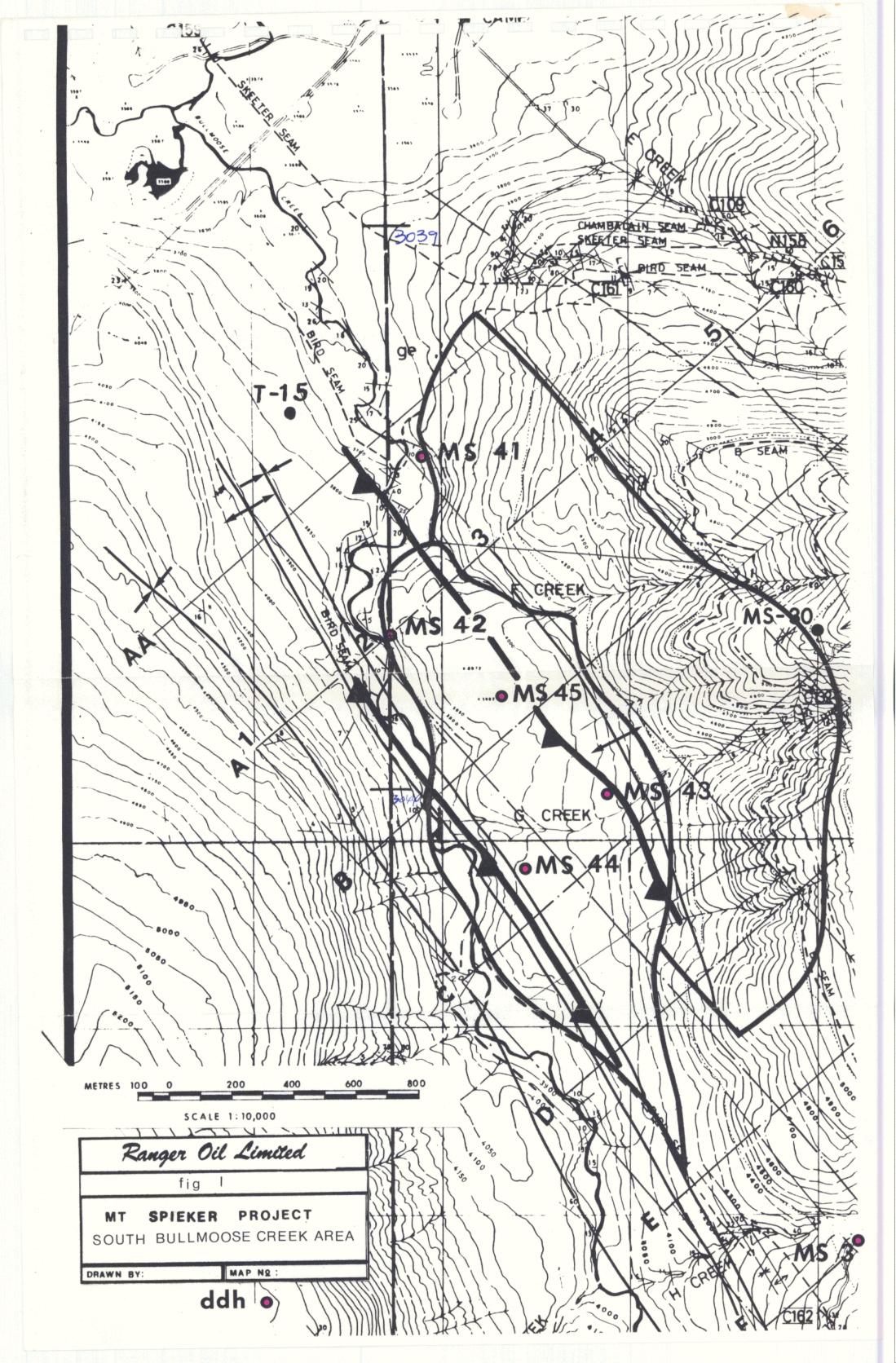












CLIENT: Ranger Oil

PROJECT: Raw Coal Analysis

Samples Received August 25, 1982

HEAD RAW ANALYSIS

	1								
BASIS	F.S.I.	C.V.	s/	F.C.%	V0L%	ASH%	MOISTX	ADM%	LAB/ID
ADE ARE DE	1/2	0	4.07 3.97 4.10	19.80 19.31 19.94	9.90 9.65 9.97	69.60 67.86 70.09	0.70 3.18	2.50	3363/ 41-1
ADE AFIE DE	2 1/2	6023 5975 6059	1.73 1.72 1.74	52.00 51.58 52.31	19.10 18.95 19.22	28.30 28.07 28.47	0,60 1,40	0.80	3364/ 41-2
ADE ARE DE	5	7126 7105 7169	0.75 0.75 0.75	60.90 60.72 61.27	21.70 21.63 21.83	16.80 16.75 16.90	0.60 0.90	0.30	3365/ 413
ADE ARE DE	: 2	7364 7349 7408	0.88 0.88 0.89	65.10 64.97 65.49	20.40 20.36 20.52	13.90 13.87 13.98	0.40	0.20	3366/ 41-4
ADE ARE DE	7 1/2	7506 7476 7551	0.79 0.79 0.79	63.90 63.64 64.29	23.10 23.01 23.24	12.40 12.35 12.47	0.60 1.00	0.40	3367/ 41-5
ADE ARE DE	5	5808 5767 5849	0.76 0.75 0.77	48.80 48.46 49.14	19.10 18.97 19.23	31.40 31.18 31.62	0.70 1.40	0.70	3368/ 41-6
ADE: ARE: DE:	4	7470 7418 7515	86.0 86.0	67.00 66.53 67.40	19.10 18.97 19.22	13.30 13.21 13.38	0.60 1.30	0.70	3369/ 42-1
ADE ARE DE	1 1/2	6957 6943 6999	0.54 0.54 0.54	63.60 63.47 63.98	17.70 17.66 17.81	18.10 18.06 18.21	0.60 0.80	0.20	3370/ 42-2
ADE ARE DE	8 1/2	7296 7128 7347	0.66 0.64 0.66	64.30 62.82 64.75	20.20 19.74 20.34	14.80 14.46 14.90	0.70 2.98	2.30	3371/ 4 2-3

Birtley Coal & Minerals Testing

A DIVISION OF GREAT WEST STEEL INDUSTRIES LTD

RANGER OIL LIMITED CLIENT:

PROJECT:

Raw Coal Composites of Samples Received Composite of Samples #41-2 to 41-6 Inclusive

LAB NO:

3379

DATE:

August 31, 1982

FLOAT - SINK ANALYSIS, adb										
S.G. FRACTION	WT%	RM%	ASH%	VOL%	FC%	S%	CV CAL/GM	FSI	CUM ASH	
FLOAT - 1.40	62.0	0.7	4.7	23,5	71.1	0.63	8245	88	4.7	
1.40 - 1.50	13.0	0.7	17.4	19.9	62.0	0.56	6273	1	6.9	
1.50 - 1.60	8.2	0.6	26.6	19.4	53.4	0.53	6029	1	8.8	
1.60 - SINK	i6.8	0.8	54.8	15.0	29.4	2.37	3250	1 2	16.6	

Composite Clean Coal - Float @ _1.60 S.G.

DILATATION TEST									
ST (°C) MDT (°C) MC% MD% G FSI									
383	470	21	28	1.015	7				

GIESELER FLUI	DITY TEST	
	DDPM	TEMP(°C)
START	1.6	426
MAXIMUM	143.3	472
FINAL	0	506
RANGE	80	

COMPOSITE MA	COMPOSITE MAKE-UP							
SAMPLE NO.	GRAMS							
41-2	335							
-3	258							
-4	434							
-5	644							
-6	66							

PROJECT: Raw Coal Composites of Samples Received

Composite of Samples #42-1 to 42-3 Inclusive

LAB NO: 3380

DATE: August 31, 1982

	FLOAT - SINK ANALYSIS, adb										
S.G. FRACTION	WT%	RM%	ASH%	VOL%	FC%	S%	CV CAL/GM	FSI	CUM ASH		
FLOAT - 1.40	68.2	0.7	4.6	21.6	73.1	0.60	8241	8	4.6		
1.40 - 1.50	15.1	0.7	17.6	17.0	64.7	0.51	6984	. 1	7.0		
1.50 - 1.60	5.2	1.0	25.1	16.6	57.3	0.57	6213	1	8.0		
1.60 - SINK	11.5	0.8	62.7	12.9	23.6	0.71		1	14.3		

Composite Clean Coal - Float @ 1.60 S.G.

DILATATION TEST									
ST (°C)	G	FSI							
404	494	21	5 .	0.942	71				

GIESELER FLUIDITY TEST								
	DDPM	TEMP(°C)						
START	1.3	454						
MAXIMUM	16.1	475						
FINAL.	0	506						
RANGE	52							

COMPOSITE MA	COMPOSITE MAKE-UP							
SAMPLE NO.	GRAMS							
42-1	275							
-2	93							
-3	304							

NOTE: Samples precrushed to approximately 6M top size.

PROJECT: SAMPLES RECEIVED OCTOBER 21, 1982

RAW COAL AMALYSIS

DATE: NOVEMBER 8, 1982

							CV	,	
LAB/IO	ADH%	MOISTX	ASHZ	VOLZ	F.C.X	5%	CAL/GH	FSI	BASIS
3744/	1.00	0.40	8.00	22.50	69.10	0.83	7917	6	ADE:
43-1		1.40	7,92	22.28	68.41	0.82	7838	_	ARB
			8.03	22.59	69.38	0.83	7949		DB
-			•						
3745/	3,20	0.40	8.90	22.90	67 .80	0.67	7784	5 1/2	ADB
43-2		3.59	8.62	22.17	65.63	9.65	7535		ARB
		- •	8.94	22.99	68.07	0+67	7815		08
3746/	6.60	0.40	68.30	10.60	20.70	0.91		1	ADE:
43-3		6.97	63,79	9.90	19,33	0.85	8		ARE
,			68.57	10.64	20.78	0.91	6	•	DE
1				•					
3747/	1.90	0.30	65.70	11.10	22.90	0.56		1	ADB
43-4		2.19	64,45	10.89	22,46	0,55	9		ARB
1			65.90	11.13	22.97	0.56	0	1	3G
3748/	2.00	0.20	8.80	20.00	71.00	0.69	7858	3	ADB
44-1		2.20	8.62	17.60	69.58	86.0	7701		are
1			8.82	20.04	71.14	0.69	787 4		DB
((•				
3749/	1.50	0.30	3.30	24,90	71.50	0.71	8408	9	ADE
44-2		1.80	3,25	24.53	70.43	0.70	8282		ARE
			3,31	24.97	71.72	0.71	8433		DB
•						154	,		
3750/	1.80	0.30	4.40	23.70	71.60	0.76	8287	9	ADE
44-3		2.69	4.32	23,27	70.31	0.75	8138		arb
:			4.41	23.77	71.82	0.76	8312		₽₽
i 1	•						•	_	
3751/	4.50	0.30	12.80	20.76	66.20	0.58	748 4 '	7	ADB
44-4		4.79	12.22	19.77	63.22	0.55	7147		ARB
!			12.84	20.76	66.40	0.58	7507		DE

PROJECT: SAMPLES RECEIVED OCTOBER 21, 1982

RAW COAL AMALYSIS

DATE: NOVEMBER 8, 1982

LAE/ID	ADMX.	MOISTX	ASHX	VOLX	F.C.X	S%	CV CAL/GM	FSI	BASIS
3752/ 44-5	6,50	0,40 6,87	4.60 4.30 4.62	23.80 22.25 23.90	71.20 66.57 71.49	0.64 0.60 16.0	8294 7755 8327	8 1/2	ADE ARB DB
3753/ 44-6	4,70	0.40 5.08	9.50 9.05 9.54	21.30 20.30 21.37	68,80 65,57 69,08	0.64 0.61 0.64	7798 7431 7829	7 1/2	ade: Are: De
3754/ 44-7	3,50	0.30 3.79	3.30 3.18 3.31	22.10 21.33 22.17	74.30 71.70 74.52	0.63 0.61 0.63	840 <i>7</i> 8113 8 4 32	8	ade Are De
3755/ 45-1	9.60	0.60 10.14	68,20 61,65 68,61	10.00 9.04 10.06	21.20 19.16 21.33	0.33 0.30 0.33	 0 0	1	ADE ARB DB
3756/ 45-2	11.00	0.50 11. 4 5	51.10 45.48 51.36	13.50 12.02 13.57	34.90 31.06 35.08	0.43 0.38 0.43	; 0 0	1 1/2	ADE ARE DB
3757/ 45-3	5,10	0.20 5.29	74.30 70.51 74.45	6.60 6.26 6.61	18,90 17,94 18,94	0.15 0.14 0.15	0	1/2	are De
3758/ 45-4	7.80	0.40 8.17	29.40 27.11 29.52	17.60 16.23 17.67	52.69 48.50 52.81	0.60 0.55 0.60	5913 5452 5937	4	ade are de
3759/ 45-5	8.70	0.40 9.07	11.80 10.77 11.85	24.00 21.91 24.10	63.80 58.25 64.86	0.93 0.85 0.93	7572 6913 7602	8	ADE ARB DE

FROJECT: RAW COAL COMPOSITE* OF SAMPLES 43-1 TO 43-2

(INDIVIDUAL SAMPLES ORIGINALLY PRECRUSHED TO APPROXIMATELY 3/8" X 0)

LAS NO: 3810

DATE: NOVEMBER 17, 1982

FLOAT-SINK ANALYSIS, AIR DRIED BASIS

							CV		CUMULA	TIVE
S.G. FRTN	итх	RMX	ASH%	VOL%	FC%	S%	CAL/GM	FSI	HTZ	ASH%
FLT1.40	85.60	0.40	5,30	23.40	70.90	0.70	8154	7	85.60	5.30
1.40-1.50	9.00	0.40	14.80	19.60	65.20	04.0	7217	1 1/2	94.60	6,20
1.50-1.60	1,30	0.50	17.00	22.50	60.00	1.54	692 9	1 1/2	95 .90	6.35
1.60-SINK	4.10	0.60	63,10	13.70	22.60	2.77	2713	1/2	100.00	8+68

DILATATION TEST

ANALYSIS OF COMPOSITE FLOAT @

ST MDT (DEG.C) (DEG.C) MC% MD% G FSI

S.G.

GIESELER FLUIDITY TEST

TEMP

DDFM

(DEG.C)

START MAXIMUM FINAL

RANGE

* COMPOSITE MAKE-UP

SAMPLE NO. WEIGHT

PROJECT: FAN COAL COMPOSITEM OF SAMPLES 44-1 TO 44-5

(IROTVIDUAL SAMPLES GRIGHMALLY PREGRUSHED TO ASTROXIMATELY 3/8" X 0)

LAS NO: 3811

DATE: NOVEMBER 17, 1982

FLOAT-SINK ANALYSIS, AIR DRIED BASIS

	-						CV		CUMULA	TIVE
S.G. FRTN	WTX	RHX	ASH%	VOL%	FC%	5%	CAL/GM	FSI	HT%	ASHX
FLT1.40	83.50	0.30	5,20	22,70	71.80	0.61	8191	8	83.50	5.20
1.40-1.50	8.40	0.50	15.10	19.30	65,10	0.75	7196	1 1/2	91.90	6.10
1.50-1.60	5.60	0.50	23.60	16.60	59.30	0.51	6435	1	97.50	7.11
1.60-SINK	2,50	0.70	46.10	15,50	37.70	0.60	4151	1	100.00	8.08

ANALYSIS OF COMPOSITE FLOAT @ S.G.

DILATATION TEST

ST (DEG.C) (DEG.C) HC% · HD% G **FSI**

GIESELER FLUIDITY TEST

DOPM (DEG.C)

START KAXIKUM FINAL

RANGE

* COMPOSITE MAKE-UP

SAMPLE NO. WEIGHT

PROJECT: RAN COAL COMPOSITEM OF SAMPLES 44-6 TO 44-7

(INDEVIDUAL SAMPLES ORIGINALLY PRECRUSHED TO APPROXIMATELY 3/8" X 0)

LAB NO: 3812

DATE: NOVEMBER 17, 1982

FLOAT-SINK	ANALYSTS.	ATR	DRITED	BASTS

							CA		CUMULA	TIVE
S.G. FRTN	MLX	RHZ.	ASH%	VOL%	FCX	5%	CAL/GM	FSI	HT%	ASHX
FLT1.40	85.20	0.40	2.60	22.70	74.30	0.61	8430	.8	85,20	2.60
1,40-1,50	6.80	0,40	13.70	18.00	67.90	0.56	7374	1 1/2	92.00	3.42
1.50-1.60	2.00	0.50	24.20	17.20	58.10	0.82	6297	1 1/2	94.00	3,86
1.60-SINK	6.00	0.70	67.40	10.70	21,20	0.52	2488	1 1/2	100.00	7.67

ANALYSIS OF COMPOSITE FLOAT @

S.G.

DILATATION TEST

ST	TOK				-
(DEG.C)	(DEG.C)	MC%	KDZ	G	FSI

GIESELER FLUIDITY TEST

TEMP DDPM (DEG.C)

START MAXIKUM FINAL

RANGE

* COMPOSITE MAKE-UP

SAMPLE NO. KEIGHT

PROJECT: RAW COAL COMPOSITEM OF SAMPLES 43-1 TO 43-2

(INDIVIDUAL SAMPLES ORIGINALLY PRECRUSHED TO APPROXIMATELY 3/8" X 0)

LAS NO: 3810

DATE:

NOVERSER 17, 1982

FLOAT-SINK ANALYSIS, A	IR DRIED	BASIS
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7	·····						CA		CUMULA	TIVE
S.G. FRTN	W1%	RHZ	ASHZ	VOL%	FCX	S7	CAL/GM	FSI	MTX	ASHZ
FLT,-1,40	85,60	0.40	5.30	23.40	70.90	0.70	815 4	7	85.60	5.30
1,40-1,50	9.00	0.40	14.80	19.60	65.20	0.60	7217	1 1/2	94.60	6.20
1,50-1,60	1.30	0.50	17.00	22,50	60.00	1,54	692 9	1 1/2	95.90	6.35
1.30-SINK	4.10	0,60 .	63.10	13.70	22,60	2,77	2713	1/2	100.00	8,48

ANALYSIS OF COMPOSITE FLOAT @ 1.60 S.G.

DILATATION TEST

ST (DEG.C)	MDT (DEG.C)	HCZ	MDZ	G	F.S.I.
386	467	- 20	2	•928	6

GIESELER FLUIDITY TEST

•	DDF M	TEMP (DEG.C)
START	1	441
MAXIKUM	52	474
FINAL	8	508
RA	ANGE.	67

COMPOSITE MAKE-UP:	SAMPLE NO.	WEIGHT Z
	43-1	62.8
	43-2	37.2

PROJECT: RAN COAL COMPOSITEM OF SAMPLES 44-1 TO 44-5

(INDIVIPUAL SAMPLES ORIGINALLY PRECRUSHED TO APPROXIMATELY 3/8" X 0)

LAB NO: 3811 '

DATE: NOVEMBER

NOVEMBER 17, 1982

FLOAT-SINK	ANALYSIS.	. AIR DRIED	EASIS

							CŲ		CUMULA	TIVE
S.G. FRTN	WTX	Rh7	XH2A	VOL%	FCX	S7.	CAL/GM	FSI	HTX	ASHX
FLT1.40	83,50	0.30	5,20	22.70	71.80	0.61	81 91	8	83,50	5,20
1.40-1.50	8.40	0.50	15.10	19.30	. 65.10	0.75	7196	1 1/2	91.90	6.10
1.50-1.60	5,60	0.50	23.60	16.60	59.30	0.51	6435	1	97.50	7.11
1.60-SINK	2.50	0.70	46.10	15,50	37.70	0.60	4151	1	100.00	8.08

ANALYSIS OF COMPOSITE FLOAT @ 1.60 S.G.

DILATATION TEST

ST (DEG.C)	MDT (DEG.C)	MCX	MD%	G-	F.S.I.
38 9	470	19	· 6	∙95 3	7

GIESELER FLUIDITY TEST

	DDFM	TEMP (DEG.C)
START	i	440
MUMIXAH	45	474
FINAL	0	506
RA	INGE	66

COMPOSITE MAKE-UP:	SAMPLE NO.	WEIGHT %
	44-1	27.8
	44-2	12.5
	4 1- 3	8.3
•	44-4	26.0
	41- 5	25.4

PROJECT: RAN COAL CONFOSITEX OF SAMPLES 44-6 TO 44-7

(THOTVIDUAL SAMPLES ORIGINALLY PRECRUSHED TO APPROXIMATELY 3/8" X 0)

LAS NOT 3812

DATE: MOVEMBER 17, 1982

FLOAT-SINK AMALYSIS, AIR DRIED BASIS

			•				CV		CUMULA	ATIVE
S.G. FRTN	HTX	RMZ	ASHZ	VOLX	FC%	S%	CAL/GH	FSI	¥T%	ASH%
FLT1.40	85.20	0.40	2.60	22.70	74.30	0.61	8460	8,	85,2 0	2,60
1,40-1,50	6.80	0.40	13,70	18.00	67.90	0.56	737 4	1 1/2	92.00	3,42
1.50-1.60	2.00	0.50	24.20	17.20	58.10	0.82	6297	1 1/2	94.00	3.86
1.60-SINK	6.00	0.70	67.40	10.70	21.20	0.52	2488	1 1/2	100.00	7 + 67

ANALYSIS OF COMPOSITE FLOAT @ 1.60 S.G.

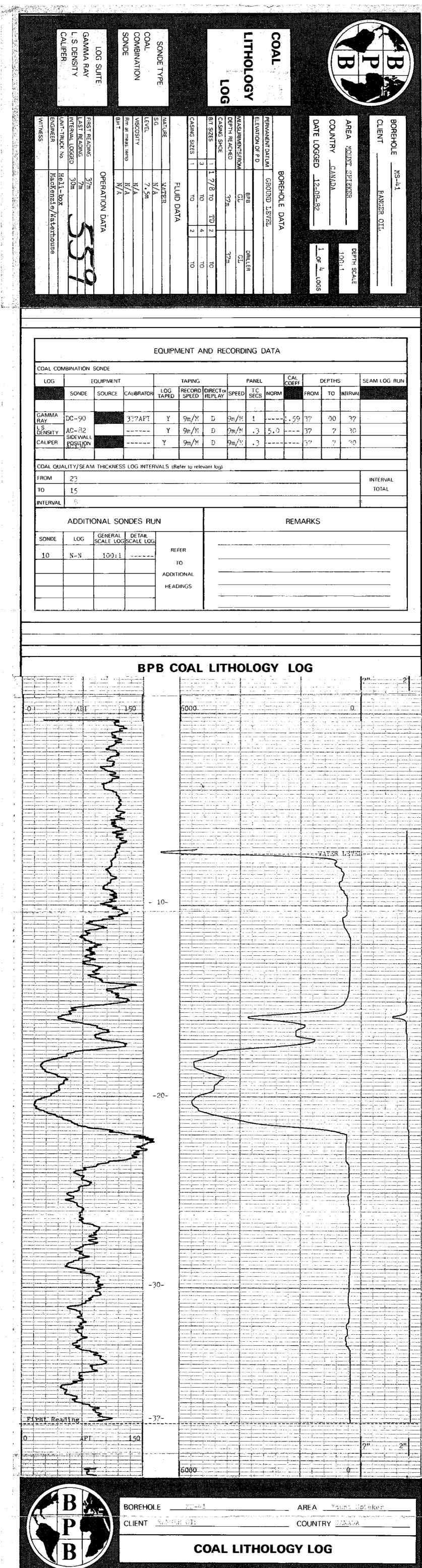
DILATATION TEST

ST (DEG.C)	MDT (DEG.C)	HCX	nd%	£	F,S,I
395	473	21	12	, 976	7 1/2

GIESELER FLUIDITY TEST

•) DDPM	TEMP (DEG.C)
START MAXIMUM FINAL	1 18 0	443 481 505
R	ANGE	62

COMFOSITE MAKE-UP:	SAMPLE NO.	WEIGHT %
•		
	44-6	68 .9
,	44-7	31.1



MY A50261 R

 $W_{-}:$

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HOLDS PRINCE

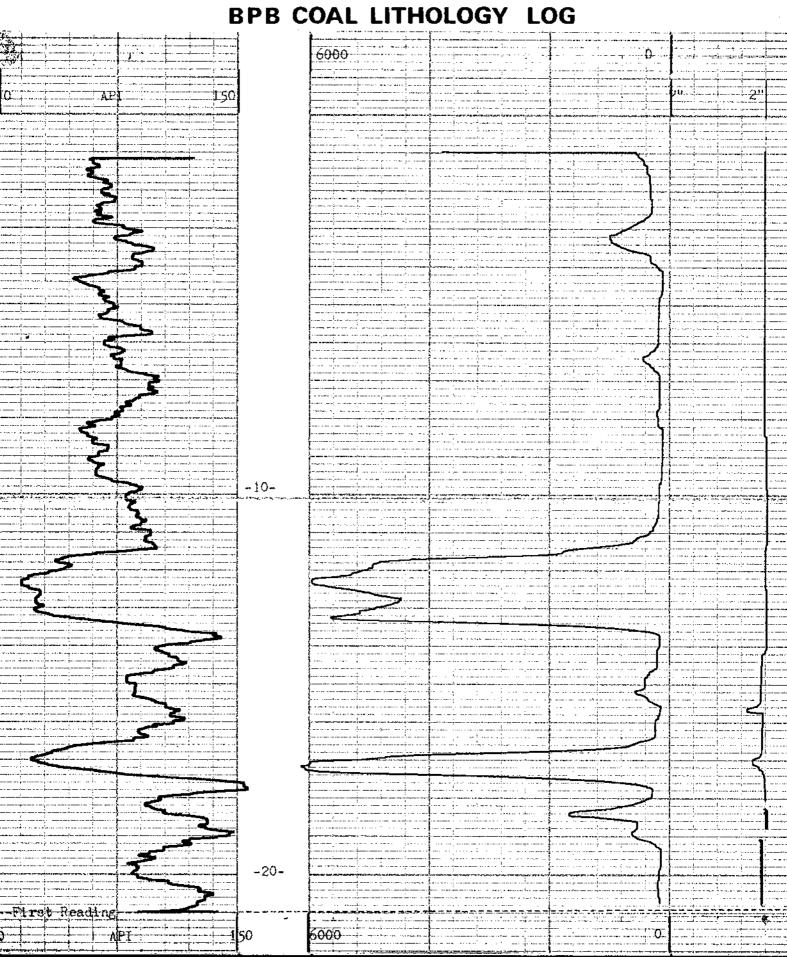
Spieller B2(3)A

SONDE CALIPER L.S. DENSITY GAMMA RAY COAL COMBINATION LITHOLOGY SONDE TYPE LOG SUITE LOG Rm at meas temp 8.H.T NATURE S.G LEVEL WITNESS ENGINEER UNIT-TRUCK No INTERVAL LOGGED FIRST READING VISCOSITY CASING SIZES BIT SIZES DEPTH REACHED ELEVATION OF P.D. CASING SHOE MEASUREMENTS FROM PERMANENT DATUM AST READING DATE LOGGED 12-08-82 COUNTRY CANADA AREA CLIENT BOREHOLE SOUTH BULLMOSE 21m 21m OPERATION DATA BOREHOLE DATA MacKenzie /Waterhouse Heli-Box 7/8 10 WATER N/A N/A BANCER OIL FLUID DATA THANK TRANSPORT MS-42A 8P8 0 211 DEPTH SCALE DRILLER _OF_lt__LOGS 100:1 ಠ ಠ ಠ .\. ∃

NS42A

Pe-Mt. Spieker 82(3*) A*(1)

				<u> </u>	MENT A	MD KE	CORD	ING L	жта ——					
COAL CO	MBINATION :	SONDE	·				1							,
LQG	E	QUIPMENT			TAPING	* ·		PANEL		CAL. COEFF		DEPTH	5	SEAM LOG RUN
	SONDE	SOURCE	CAUBRATOR	LOG TAPED	RECORD SPEED	DIRECTOR REPLAY	SPEED	T C SECS	NORM		FROM	TO	INTERVAL	
													45	
GAMMA RAY	DC-90		337AP	Y	9n/Y	<u> </u>	976/7	١	<u></u>	1, 3	- :		+ 3	
L S DENSITY	SIDEWALL			Y	$2m_0/N$	D	(m;/?/	. 1	5,00		- / f	93		
CALIPER	POSITION			<u> </u>	9ry/X	5	95/2			~ ·- ·- ·	٠٠:		:	
	1.2								~ -		 · · · -			
	ALITY/SEAM	THICKNES	S LOG INTER	VALS (R	efer to rele	vant log)								
FROM	15		<u> </u>											INTERVAL
TO	10		· · · · ·						· 		<u> </u>			TOTAL
INTERVAL	8					1							-	- 3a
	ADDITIO	DNAL SC	NDES RU	IN						REMA	ARKS			
SONDE	LOG	GENERAL SCALE LOC	DETAIL SCALE LOG	[-	1								
10	3-1.	19751		1	FER					•		•	•	
				1	ro									
			 	ADDIT	IONAL	_								•





BOREHOLE

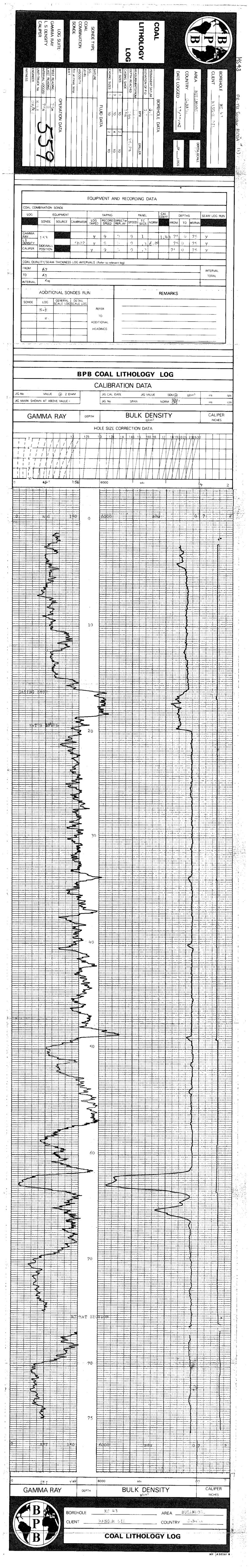
CLIENT RANGER OIL

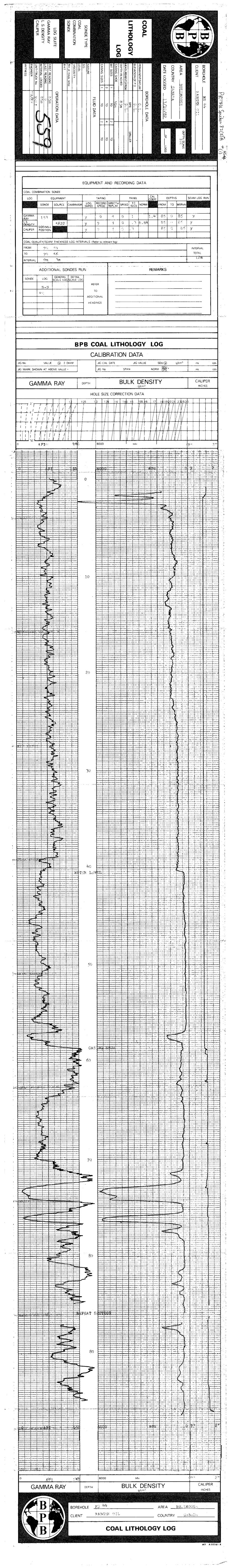
MI WIA

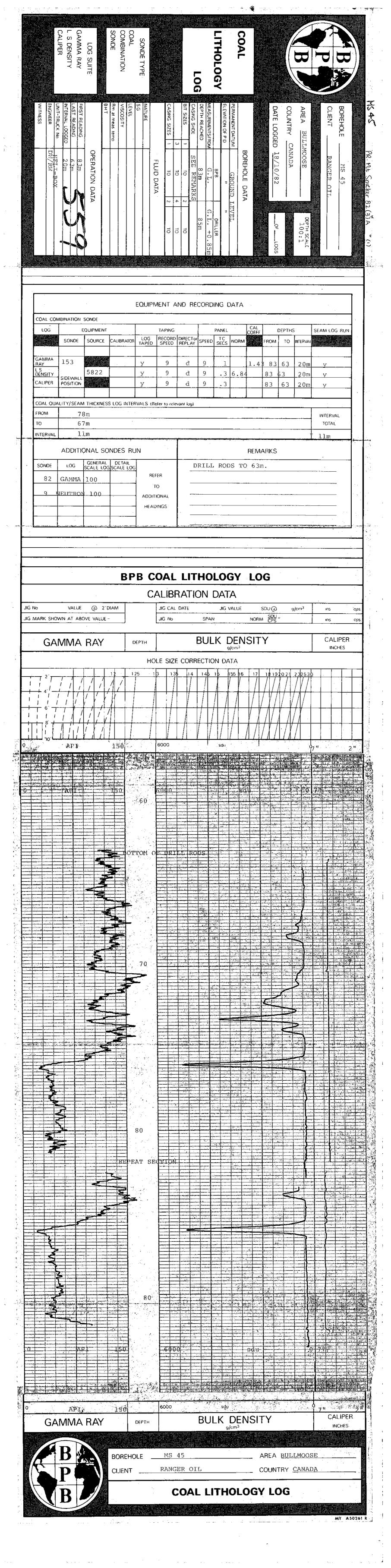
AREA BOURT STATEMOOSE

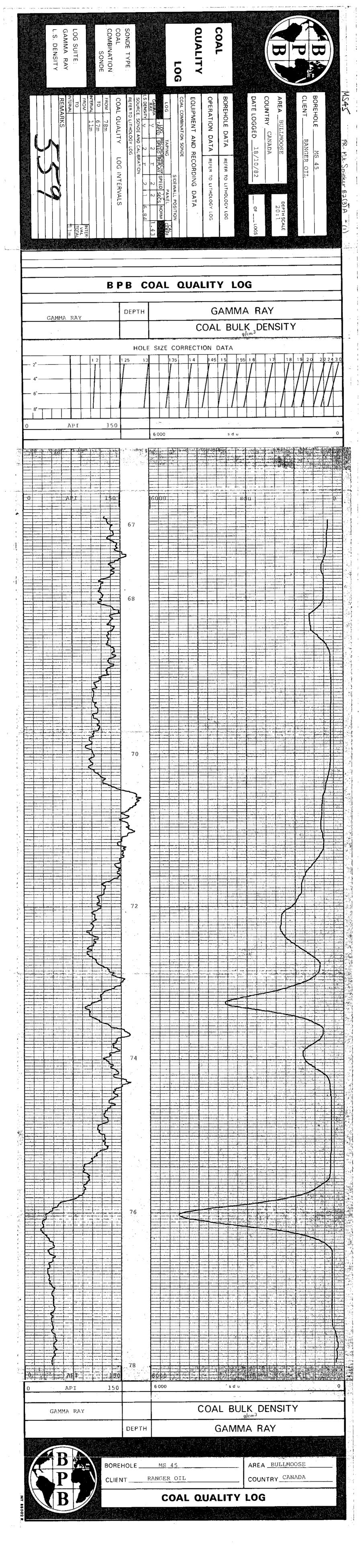
COUNTRY CANADA

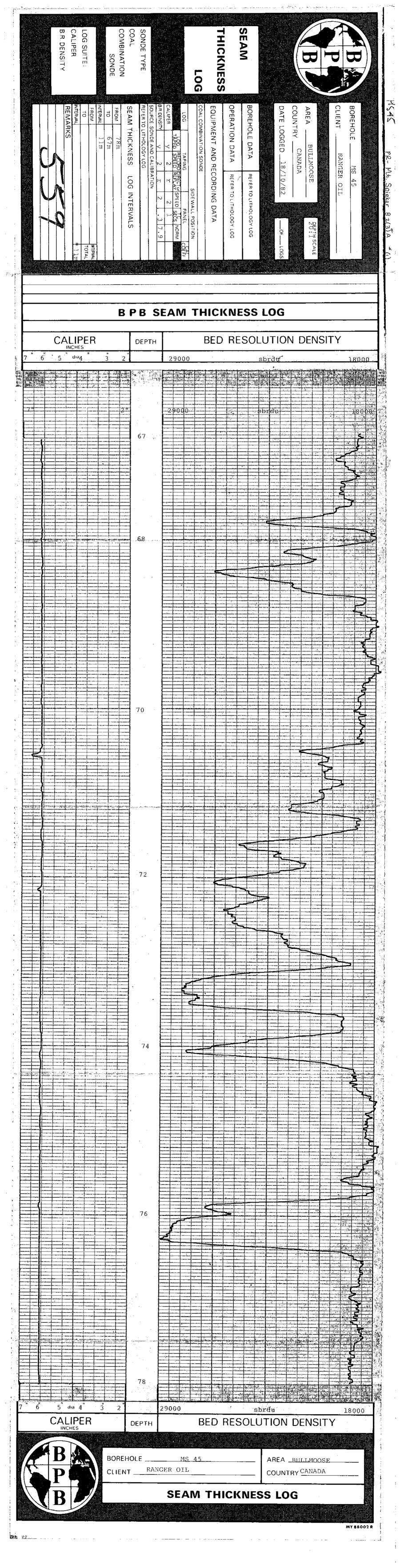
COAL LITHOLOGY LOG

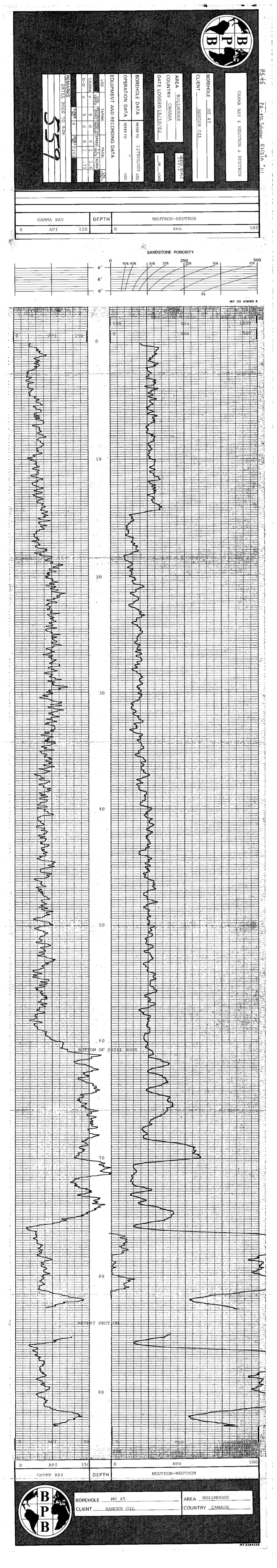


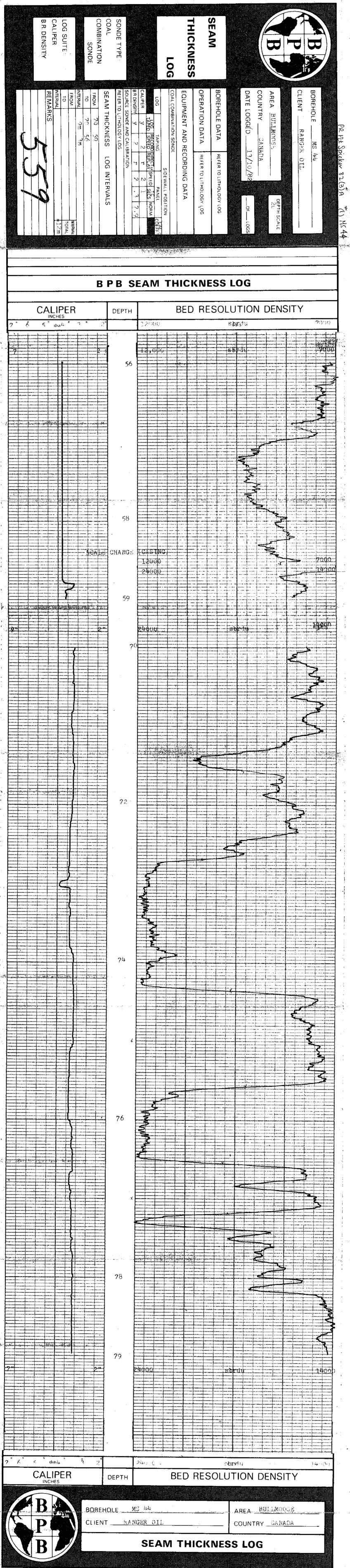




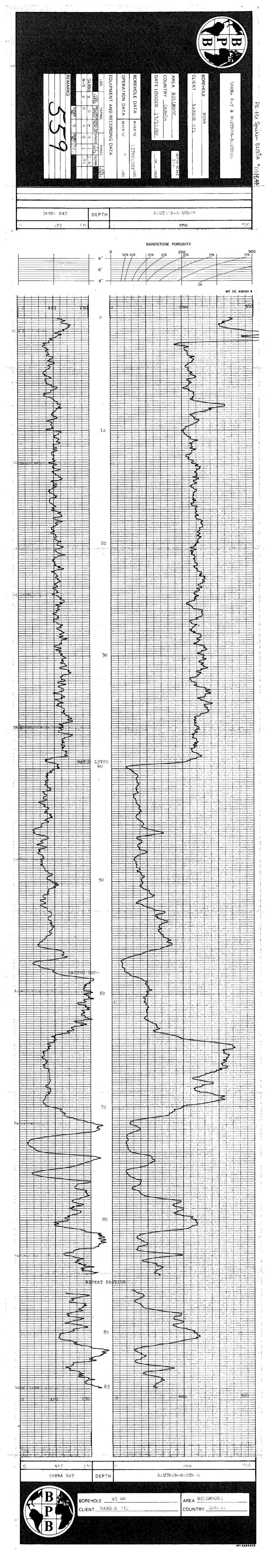


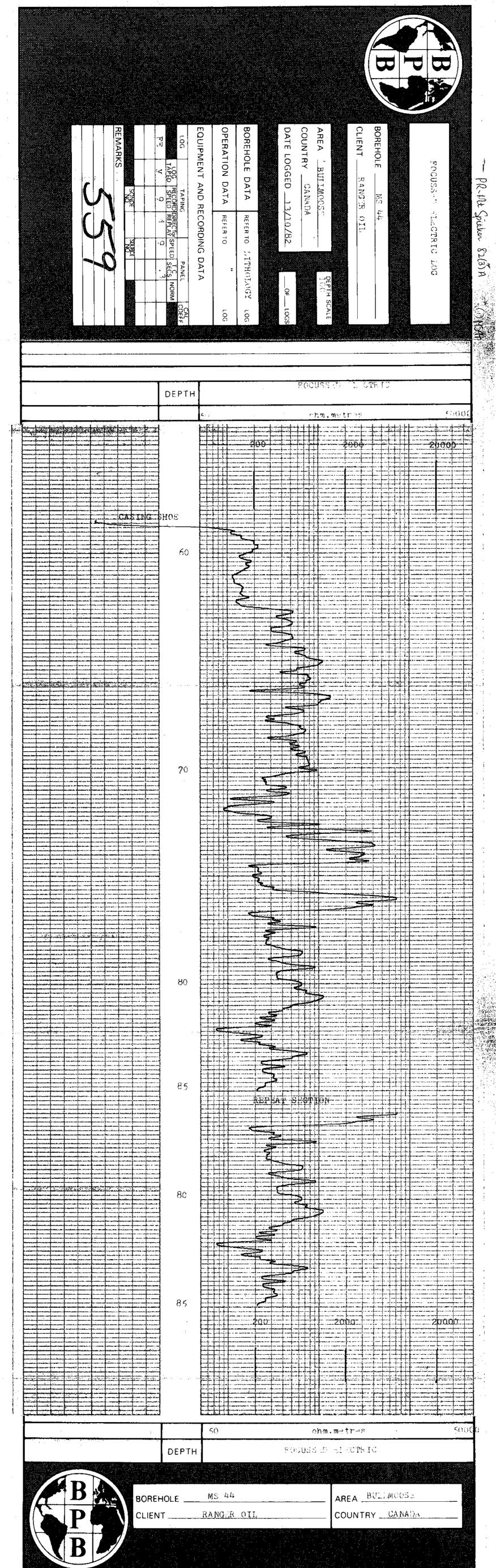


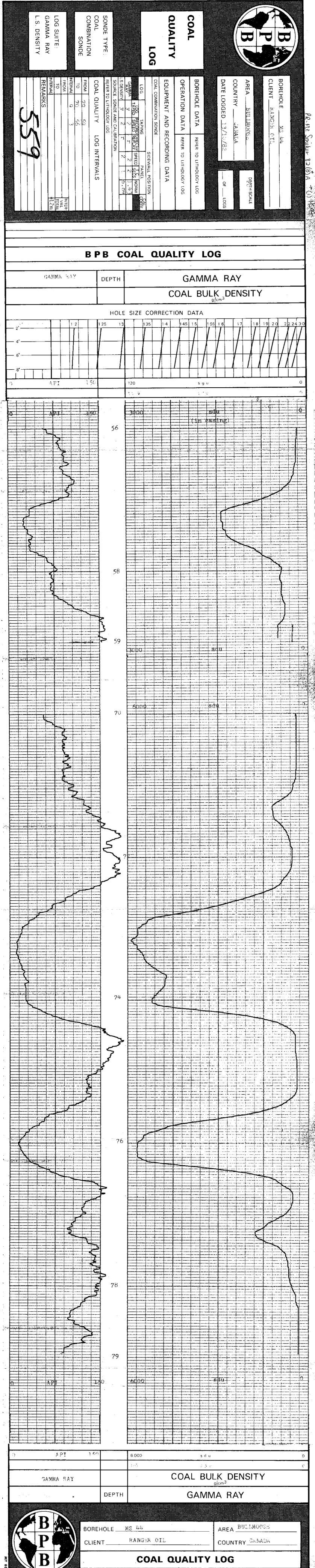


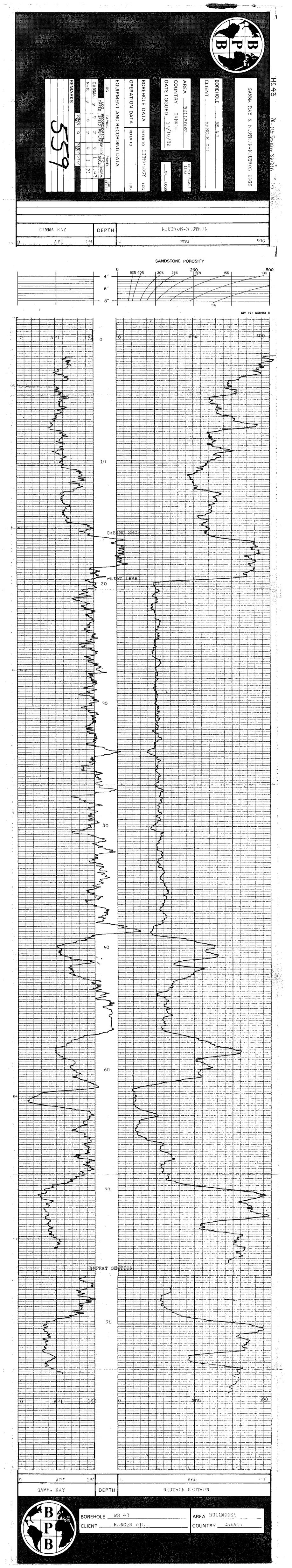


MY 88002 R

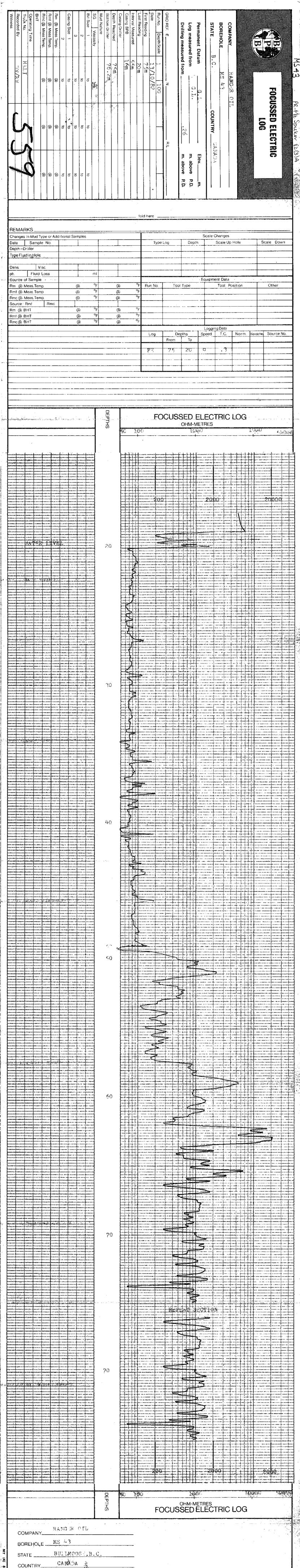


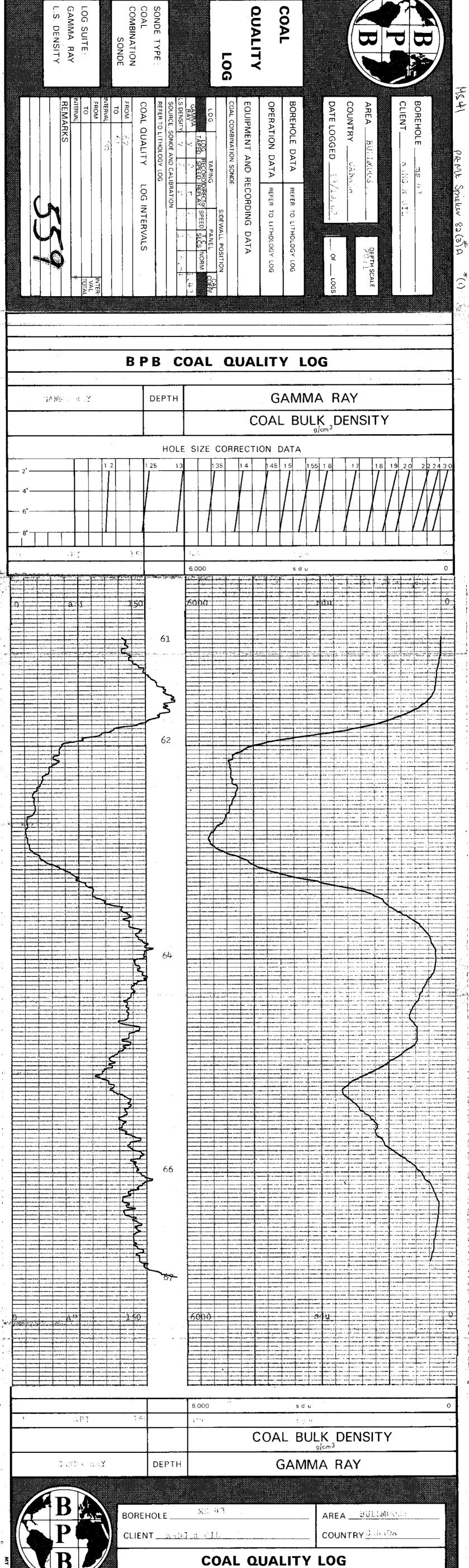




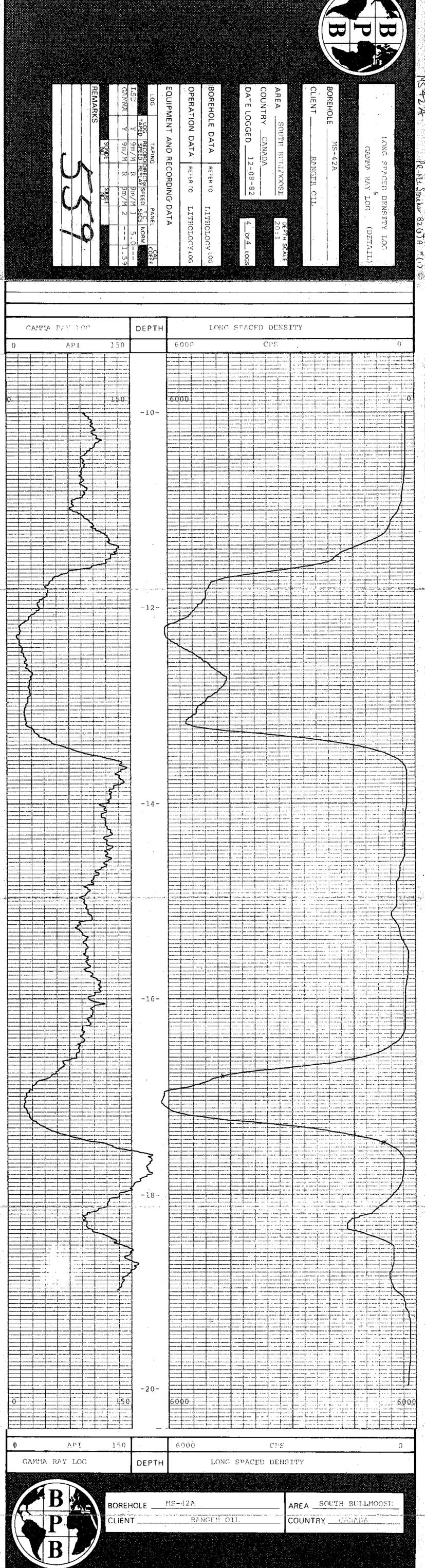


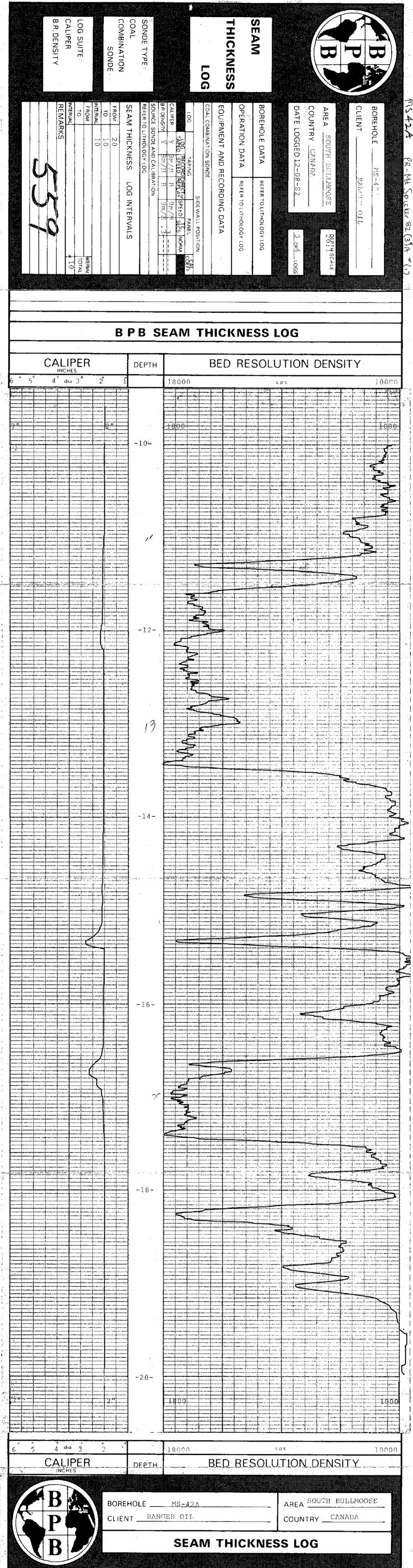
BOREHOLE WITH A CONTINUE COLUMN CONTINUE CONTINU	SONDE LOG SUITE: CALIPER B.R. DENSITY	SONDE TYPE: COAL	THICKNESS LOG	SEAM	B	B
B P B SEAM THICKNESS LOG CALIPER DEFIN BED RESOLUTION DENSITY SOPRE SEAM THICKNESS LOG CALIPER DEFIN BED RESOLUTION DENSITY SOPRE SEAM THICKNESS LOG CALIPER DEFIN BED RESOLUTION DENSITY SOPRE SEAM THICKNESS LOG CALIPER DEFIN BED RESOLUTION DENSITY SOPRE SEAM THICKNESS LOG CALIPER DEFIN BED RESOLUTION DENSITY	FROM 6 TO 6 INTERVAL FROM TO INTERVAL REMARKS	CALIPER V 2 TAPED SPEED REGIAN THICKNESS LOG	EQUIPMENT AND RECORT	·	BULLWOCS TRYOAN	OLE RO
CALIPER DEPTN BED RESOLUTION DENSITY STATE AND STAT	MITERVAL TOTAL	CS NORM	TION		DEETH SCALE	
SECULTION DENSITY	E	PB SEAN	A THICK	IESS LO)G	· · · · · · · · · · · · · · · · · · ·
602 602 603 604 605 605 606 607 607 608 608 608 608 608	INCHES			"	.	
65. 67 2000 PH BED RESOLUTION DENSITY CALIPER CALIPER DEPTH BED RESOLUTION DENSITY		M:343				
67 CALIPER DEPTH BED RESOLUTION DENSITY		61				
66 67 2210D SPETIN BED RESOLUTION DENSITY						
66 67 22000 SEPTU HOSS CALIPER INCHES DEPTH BED RESOLUTION DENSITY						
67 ZEGOD SEPTU HIGGS CALIPER INCHES DEPTH BED RESOLUTION DENSITY						
67 ZEQUID SEPTH BED RESOLUTION DENSITY RECALL PER INCHES.						
Zhaon Sordu 14099 Zhaon Sordu 14099 CALIPER DEPTH BED RESOLUTION DENSITY		66				
Zhaon Sprau 14090 CALIPER DEPTH BED RESOLUTION DENSITY						
CALIPER DEPTH BED RESOLUTION DENSITY						
CALIPER DEPTH BED RESOLUTION DENSITY NO. 9.2 PRO 19.2 AND 19.2 PRO 19.2		1)				
B BOREHOLE MS 43 AREA BUILMOOGE T	7 6 Qia 4 3				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
CLIENT RANGER OIL COUNTRY CANADA		MENULE			AREA	

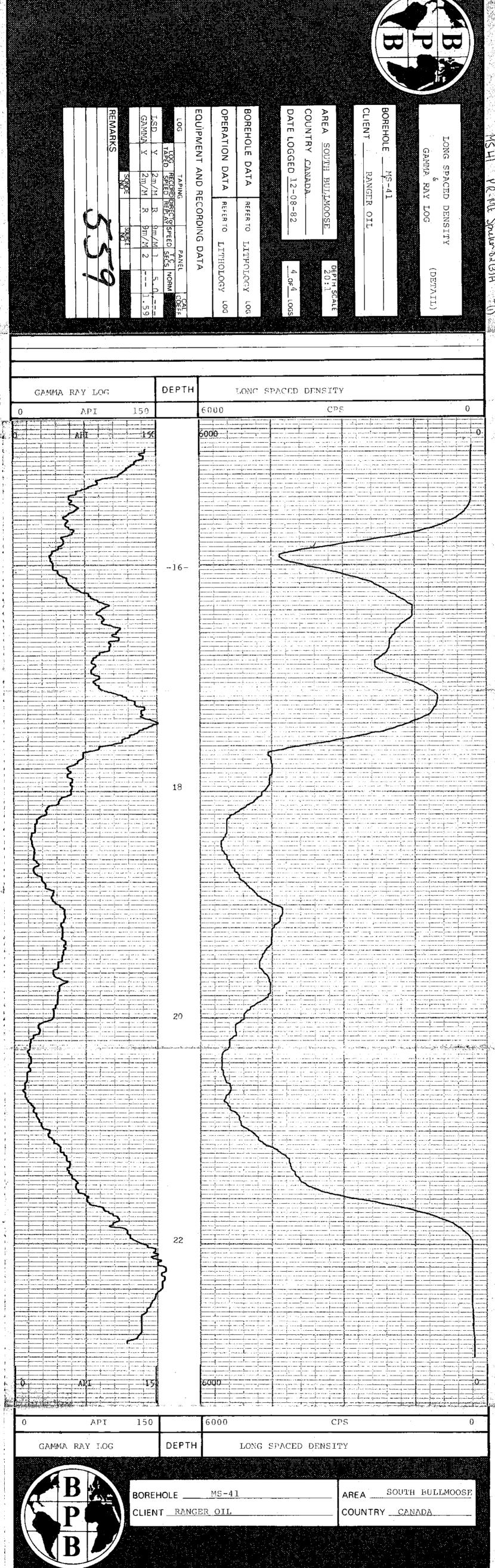




MY 88002







MY A58452R

