RESULTS OF EXPLORATORY DRILLING FROM FEBRUARY 1992 TO JULY 1992,
COAL RESOURCE EXPLORATION AND ASSESSMENT PROGRAM (COALREAP),
THAR DESERT, LAKHRA SOUTH, INDUS PLAIN, AND ADJACENT AREAS,
SINDH PROVINCE, PAKISTAN

Part IIb - Lithologic and geophysical logs for
the Lakhra south area

compiled by

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Open-File Report 94-596-B

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and the U.S. Geological Survey, under the auspices
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This report is preliminary and has not been reviewed for
conformity with U.S. Geological Survey editorial standards
and stratigraphic nomenclature. Any use of trade names is
for descriptive purposes only and does not imply endorsement
by the USGS.

PREFACE

This report was originally one portion of a proprietary administrative report that was prepared by the Geological Survey of Pakistan and the U.S. Geological Survey (USGS) for the U.S. Agency for International Development. As such it received a limited distribution within Pakistan as Geological Survey Project Report (IR)PK-108. Because of its length, (IR)PK-108 has been divided into five parts for its release to the public by USGS. This part of the report contains only the basic drill-hole data for the Lakhra south area. The companion volumes that contain the introductory text from (IR)PK-108 and the basic data for the other drilling areas are:

Open-File Report 94-595	Text
Open-File Report 94-596-A	Indus plain area
Open-File Report 94-596-C	Meting-Jhimpir extensions
Open-File Report 94-596-D	Thar Desert area

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DRILLING LOGS AND LITHOLOGIC DESCRIPTIONS

by

Altaf H. Chandio, Shafique A. Khan, Abdul Rahim Memon,
Ghulam Sarwar Lashari, Altaf A. Khan, and Zamer M. Khan

GEOPHYSICAL LOGS

by

Mehtab-ur-Rahman, Nizamani, and Huda

EXPLANATION OF LITHOLOGIC SYMBOLS USED

Sandstone

Shale/Claystone

Limestone

Coal
Dirty coal

Siltstone

Mudstone

Carbonaceous shale

Underclay

Alluvium

Fossil shell fragments

Fossil plant fragments

Pebbles / lithic fragments

Glauconite

Pyrite

Calcareous

Core loss

Roots

Carbonaceous material

Pelecypods

Siderite

Burrows

Gastropods

Mica

Foraminifera

modified from Thomas and others, 1988

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Form 1 of 5

DRILLING RECORD
COAL REAPDrill hole LS-1

Topo Sheet 40C/3
 Grid ref 855380 m N 2159165 m E
 Surface elev. (m) 56.0 (surveyed)
 Drill rig Acker-wa III C DR-2

Drilling started Date 19TH FEB 1992 Time 11.00 HRS
 Drilling completed Date 11 MAR 92 0400

Drill Bit Surface to 1.80 m HQ DIAMOND
1.80 to 9.19 m TRICONE ROLLER 4 7/8"
9.19 to 241.88 m HQ DIAMOND No. 298759
241.88 to 402.64 m 11Q DIAMOND No. 89876
 _____ to _____ m _____
 _____ to _____ m _____
 _____ to _____ m _____

Fluids used KWIK THIK (BENTONITE)

Casing set Surface to 13.10 m H.W
 _____ to 242.13 m N.W
 _____ to 242.13 m _____

Lith logged by ZAMEER MUHAMMAD KHERI AND
ALTAF ALI KHERI

* Geophysical logs:

1) XAP Probe From _____ m to _____ m through drill pipe/casing
Natural gamma 158 m 400 m
Gamma gamma near 158 m 400 m
Gamma gamma far 158 m 400 m
 2) JLP Probe _____ m _____ m
N. gamma 0 m 396.80 m using open hole
Neutron 0 m 400.00 m

REMARKS:

** 3) XAP Probe
Natural gamma 0 m 396.40 m
Gamma Gamma Far 0 m 400.00 m
Gamma Gamma Near 0 m 400.00 m } Casing/Open Hole.

* REMARKS - Probe was stuck at 158m. Cable had to be cut to fish.

** CALIPER ARM OPENED IN CASING 175-242m. Above 185m GGNR log shows effects of tool swinging like pendulum.

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COAL REAP

Drill Hole LS-1

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
02-19-92	11.00/11.00	00.00 m	Drilling started.
"	14.00/14.30	1.00	Prepared mud with Kwik Tulk
02-20-92	19.00/19.30	13.10	Drilled.
02-21-92	09.00/12.30	13.10	H.W. casing.
02-22-92	16.30/17.00	16.90	Drilling.
02-23-92	17.00/12.30	25.95	checked the oil, redrilled.
"	12.30	32.10	Wire line stuck in wire line drum and pulled out wire line and rejointed it with over shot.
"	14.00/15.00	32.10	Wire line cable + I/T changed
"	17.00/17.30	33.62	Cleaned mud pump plunger, mud pump was not working properly, tightened the Hydraulic line of chuck.
02-24-92	21.15/22.00	81.0	Pulled rods up to casing III shift - could not work due to no availability of vehicle at site.
02-25-92	14.00/14.30	81.0	Pulled inner tube and latched the tube.
"	-	95.62	Engine has no air lock, checked and cleaned the fuel filter, fuel pump is not working. So cleaned its filter main.

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COAL REAP

Drill Hole LS-1

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
"	21.15/22.00	99.29	Drilled
02-26-92	14.00/15.00	105.08	Pulled out Inner Tube and latched the tube, washed the hole, packed the manila rope around the H.C. casing
02-27-92	20.00/21.00	128.12	Drilled
02-28-92		131.90 M	Maintenance day, drilled up to
02-29-92	14.00/15.30	128.12	Inner Tube stuck, pulled out short with reloader, washed the hole, lowered the shot.
"	20.00/20.30	135.86	Repaired generator.
"	20.30/21.30	"	Pulled out string with bit.
"	21.30/22.00	"	Prepared mud with KWIK THIK
03-01-92	06.00-10.00	"	washed the hole & redrilled up to 128.12 m.
"	18.30/21.00	"	Inner tube stuck, pulled out rods with C/B and bit, then found cutter at about 7m
"	21.00/22.00	"	lowered string with C/B and step type diamond bit

COAL REAP

Drill Hole L.S-1

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
"	22.00/22.30	153.79 m	Lowered H.Q rods up to 153.79 m
"	22.30/23.15	154.15 m	Drilled
03-02-92	06.00/06.30	160.25	Pulled out and latched the
"	20.15/21.35	181.58	Tube. wire line stuck in wire line
			drum. released it and connected
			with over shot, lower, over shot
			pulled out tube
"	21.35/22.00	"	Lowered the H.Q rods
"	22.00/22.00	187.68	Drilled
03-03-92	15.45/18.00	218.11	Discarded dirty mud, prepared
			fresh mud, with KWIK THICK
"	03.00/	221.15 m	Wire line broken, pulled out
			H.Q rods with core barrel
			and bit
03-04-92	06.30/10.30	"	Lowered H.Q rods, washed
			the hole up to 207.26 m, redrilled
			up to 221.15 m
"	20.20/22.00	241.88	Drilled
"	22.00	241.88	Screwed N.W casing 5 x 6 m =
03-05-92	-	242.13	121.92 m
			lowered N.W casing
03-06-92	-	"	Cleared all the drilling Machinery
			and drilling equipment

Drill Hole LS-1

DATE	TIME	DEPTH	REMARKS
------	------	-------	---------

03-07-92	06:00/14:00	"	Prepared water swivel LY 25k Connected with N-Q Series. Lowered N-Q rods with C/B inner tube, and step type diamond bit No: 808755 Reaming shed No. L-14287 up to 74.06M.
"	22:30/02:00	247.80	Drilled with N-Q rods.
03-08-92	22:00/15:00	293.66M	Drilled
03-09-92	23:30/00:03	347.21	Drilled
03-10-92	22:30/00:00	388.67	Drilled
03-11-92	04:00/15:00	402.64M	Drilling completed.

DRILL-HOLE NO LS-1

	CORE RECOVERY				WATER LOSS	DEPTH METRES 00.00	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
	FROM	TO	CORE	CORE %					
CORING	00.00								SURFICIAL COVER - with Mating Limestone and shale interbedded
		1.80	1.80	100				1.80	LIMESTONE - Pale yellowish orange 10YR 8/6 and Grayish orange 10YR 7/4 to very pale orange 10YR 8/2. Nodular, hard, fossiliferous. Nodules 5 to 10 cm thick, interbedded with shale.
	1.80								SHALE - Moderate yellowish brown 10YR 4/2, soft, mixed with small pieces of limestone, quartz sand fine to coarse grained, poorly sorted, shale calcareous.
NON-CORING		3.0						1.20	LIMESTONE - very pale orange 10YR 8/2 to Grayish orange 10YR 7/4. Cullings of limestone with fossils forams, and shale. Limestone not very hard looking chalky.
	4.50							1.50	LIMESTONE/SHALE - INTERBEDDED. Same as above
		6.0						1.50	LIMESTONE/SHALE - INTERBEDDED. Same as above
		7.50						1.50	LIMESTONE/SHALE - INTERBEDDED - LIMESTONE - very pale orange 10YR 8/2, cullings of limestone with fossils forams, few iron oxide grains and few pellets of shale.
									SHALE - Dark yellowish orange 10YR 6/6 moderately hard, sticky, interbedded with limestone, shale calcareous.
CORING		9.19						1.69	LIMESTONE/SHALE - INTERBEDDED. LIMESTONE - Same as above
		10.26	0.82	0.82	100			0.49	SHALE - Light brown 5YR 5/6 to Dark yellowish orange 10YR 6/6. Moderately hard, sticky and calcareous.
								0.28	LIMESTONE/SHALE INTERBEDDED LIMESTONE. Pale yellowish orange 10YR 8/6 very pale orange 10YR 8/2 and white N-9. Argillaceous limestone, fossiliferous, forams mottled, weathered, grades into shale.

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
10.06	0.91 10.97	0.91	100				0.91	SHALE - Pale yellowish orange 10YR 8/6, Dark yellowish orange 10YR 6/6 and moderate yellowish brown 10YR 5/4, compact, thin laminations, fossiliferous, calcareous.
10.97	1.53 12.50	1.14	74				0.39 1.14	SHALE / LIMESTONE - INTERBEDDED Same as above. CORE LOSS: LIMESTONE - very pale orange 10YR 8/2 and pale yellowish orange 10YR 8/6, limestone argillaceous fossiliferous, mostly forams, weathered, few calcite veins about 2 to 3 mm thick. Brown colour is due to iron oxidation.
12.50	0.60 13.10	0.60	100				0.60	LIMESTONE - Same as above.
13.10	0.84 13.94	0.25	29				0.59 0.25	CORE LOSS LIMESTONE - Same as above, lower portion grades into Marl
13.94	3.05 16.99	3.05	100				3.05	MARL - Pale yellowish orange 10YR 8/6, very pale orange 10YR 8/2, weathered, few forams which are also weathered, few solution cavities. The marl is also looks like sandy limestone or arenaceous limestone. few black grains at places.
16.99	3.05 20.04	3.05	100				1.97 0.43 3.65	MARL - Same as above LIMESTONE - very pale orange 10YR 8/2, Pale yellowish orange 10YR 8/6, Grayish orange 10YR 7/4, limestone highly fossiliferous, mostly forams, hard and compact, pale orange colour is due to oxidation, few solution cavities. MARL - Pale yellowish orange 10YR 8/6, fossiliferous forams, few solution cavities and few black grains.

8.08.49

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
20.04	23.08	3.04	100		0		3.04	LIMESTONE. Very pale orange 10YR 8/2, Pale yellowish orange 10YR 8/6, Dark yellowish orange 10YR 6/6 and Grayish orange 10YR 7/4. Limestone highly fossiliferous, mostly forams. At places limestone is very hard and compact, and have abundant forams.
23.08	26.09	3.01	95		3		0.13	CORE LOSS.
23.08	26.09	2.98			4		2.10	LIMESTONE - Same as above, grades into claystone.
26.09	29.13	3.04	100		5		0.78	CLAYSTONE. Dark yellowish orange 10YR 6/6, Grayish orange 10YR 7/4, light olive gray 5Y 6/1 and Moderate red 5R 4/6. Claystone med. compact, few watered forams, silicified sides. Pale orange colour is due to oxidation.
26.09	29.13	3.04	100		6		1.19	CLAYSTONE. Moderate brown 5YR 4/4, Dark yellowish orange 10YR 6/6 and Dusky red 2.5/4, Claystone med compact, few cavities filled with ferruginous inclusions. Reddish brown and yellowish orange colour is due to oxidation. Claystone grades into siltstone.
29.13					7		1.85	SILTSTONE. Light bluish gray 5B 7/1, Dark yellowish orange 10YR 6/6, Dusky red 5R 3/4. Siltstone mostly bluish gray in colour, yellowish orange and dusky red colours are due to oxidation, siltstone fractured, fractures filled with the leaching material of iron oxide or limonite. few cavities filled with iron balls or inclusions. few silicified sides. Non calcareous.
					8			CLAYSTONE. Pale yellowish orange 10YR 8/6, Dark yellowish orange 10YR 6/6 and Medium bluish gray 5B 5/1.

METING LST MEMBER

SONIARI MEMBER

DRILL-HOLE NO LS-1

SONHARI MEMBER

LAKHRA FORMATION

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE%					
		32.05	100		1			Typical multicoloured Sonhari Claystone, highly laminar, with abundant iron inclusions, cavities filled with foreign material. weathered.
	32.18				2		0.15	CORE LOSS
32.18	33.63	1.45	90				0.40	CLAYSTONE - Same as above.
	33.63	1.30			3		0.90	MARL - pale yellowish orange 10YR 8/6 and dark yellowish orange 10YR 6/6, medium compact highly fossiliferous, few hard bands of fossiliferous limestone, mostly forams, few clay balls. The rock is laminar.
33.63	35.23	1.60	82		4		2.28	CORE LOSS
	35.23				5		1.32	MARL - Same as above, silicified at top, marl grades into mudstone.
35.23	38.27	3.04	91		6		0.28	CORE LOSS
	38.27	2.76			7		0.25	MUDSTONE - Dark yellowish orange 10YR 6/6 - Highly fossiliferous, forams abundant, med hard and compact, weathered; yellowish colour is due to lemnite.
38.27	40.84	2.57	93		8		2.51	MUDSTONE / SILTY / SANDY - light gray N-7 to med light gray. Highly fossiliferous, forams abundant, very rare pyrite grains, few silicified, few glauconite grains well preserved in the chambers of forams. few calcite crystals at places, mudstone is medium compact.
					9		0.17	CORE LOSS
					10		2.40	MUDSTONE / SILTY / SANDY Same as above.

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
40.84	2.69	2.69	100		1		2.69	LIMESTONE/SILTY/SANDY AND MUDDY Same as above.
43.53	0.89	0.89	100		2		0.89	LIMESTONE. Same as above
44.42	3.05	3.05	100		3		3.05	LIMESTONE/SILTY/SANDY Same as above
47.17	3.05	3.05	100		4		3.05	LIMESTONE/SILTY/SANDY Same as above.
50.52					5			
					6			
					7			
					8			
					9			
					10			
					11			

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
56.52	3.05	3.05	100		1		3.05	LIMESTONE/SILTY/SANDY/MUDDY Same as above, the rock looks like fossil hash.
53.57	3.05	3.05	100		2			
53.57	3.05	3.05	100		3			
53.57	3.05	3.05	100		4		3.05	LIMESTONE/SILTY/SANDY/MUDDY May be fossil Hash? rest is same as above
56.62	3.04	2.60	85		5			
56.62	3.04	2.60	85		6			
56.62	3.04	2.60	85		7		0.144	CORE LOSS
59.66	3.04	2.60	85		8		2.60	LIMESTONE/SILTY/SANDY Same as above
					9			
					10			
					11			

DRILL-HOLE NO 25-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
	3.05	3.05	100		1		3.05	LIMESTONE/SILTY/SANDY Same as above
62.71	62.71				2			
	3.05	3.05	100		3		3.05	LIMESTONE/SILTY/SANDY/MUDDY May be fossil Hash, rest, same as above.
	3.05	3.05	100		4		3.05	
	65.76				5			
65.76	65.76				6			LIMESTONE/MUDDY/SANDY Light gray N-7 to very light gray N-8 highly fossiliferous, may be fossil Hash, abundant forams and mega gastropods, glauconite grains well preserved in clammers of forams, disseminated pyrite grains. Rock fractured, fractures filled by mud and sandy material, Bioturbated.
	3.04	3.04	100		7		3.04	
	68.80				8			
68.80	68.80				9			LIMESTONE/MUDDY (FOSSIL HASH) Same as above
	3.05				10			

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION	
FROM	TO	CORE	CORE %						
	3.05	3.05	100		1		3.05		
71.85	71.85				2			LIMESTONE/MUDDY (FOSSIL HASH)	
	3.05	3.05	100		3		3.05	Same as above.	
74.90	74.90				4				
74.90	74.90				5			LIMESTONE/MUDDY (FOSSIL HASH)	
	3.05	3.05	100		6		3.05	Same as above	
77.95	77.95				7				
77.95	77.95				8			SILTSTONE -	
	3.05	3.05	100		9		1.44	Greenish grey 56% ₁ , highly fossiliferous, abundant forams, few gastropod shell fragments, few grains of glauconite. A band of claystone about 10 cm thick, with pecten shell of <i>Platystrophia</i> .	
	3.05	3.05	100		10		1.22	CLAYSTONE -	
81.0	81.0				11		0.39	SILTSTONE/MUDDY	
								Same as above	

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
81.01	84.04	3.04	2.75	90	1		0.20 0.75 0.42 0.29 1.38	<p>SILTSTONE Same as above.</p> <p>CLAYSTONE Light olive gray 54%, disseminated Pyrite, few fossil shell fragments, med. Compact, few Siderite nodules.</p> <p>SILTSTONE/MUDDY/SANDY Greenish gray 56%, highly fossiliferous, abundant forams, few shell fragments, few grains of glauconite well preserved in the chambers of forams, siltstone, muddy, and sandy. Grades into mudstone, silty and sandy.</p> <p>CORE LOSS</p> <p>LIMESTONE/SILTY/SANDY/MUDDY Light bluish gray 58%, highly fossiliferous, abundant forams with well preserved glauconite grains, few shell fragments, few fine grained Pyrite grains, med. hard and Compact.</p>
84.04	87.09	3.05	3.05	100	4		3.05	<p>LIMESTONE/SILTY/MUDDY (FOSSIL HASH) Light bluish gray 5B 7/1. Limestone highly fossiliferous, abundant forams, glauconites well preserved in the chambers of forams, rare Pyrite. Limestone med. hard and Compact, may be fossil hash. A 10 cm band of siltstone in the middle of the run, Medium bluish gray 5B 5/1, highly Pyritic, few forams and fossil shell fragments.</p>
87.09	90.14	3.05	3.05	100	7			<p>LIMESTONE (FOSSIL HASH)/SILTY/MUDDY Same as above.</p>

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
90.14								LIMESTONE (FOSSIL HASH) SILTY/SANDY Same as above, grades into siltstone
	3.05	3.05	100				2.20	SILTSTONE Medium bluish gray SB 5 1/2, fossiliferous, fossil shell fragments, few well preserved impressions of bivalve (Pelecypod). Abundant glauconite grains, few well developed. Pyrite grains. Siltstone, med. Compact, Calcareous.
	93.19						0.42	LIMESTONE/SILTY
							0.43	Light bluish gray SB 7 1/2, highly fossiliferous, forams, fossil shell fragments, few glauconite grains, rare pyrite grains, fractured, fractures are filled by silty material
93.19							0.60	
	3.05	3.05	100				0.65	SANDSTONE/SILTY AND MUDDY Light bluish gray SB 7 1/2, highly fossiliferous, abundant forams, fossil shell fragments, abundant glauconite grains, disseminated. Fine pyrite grains, Sandstone grades into claystone.
							0.75	
	96.24						1.05	CLAYSTONE Light gray ST 4 1/2, to olive gray ST 4 1/2, fossiliferous, forams, fossil shell fragments of bivalve are very common, disseminated pyrite grains, few siderite nodules, slickensided at top, claystone grades into siltstone, non-calcareous.
96.24							1.25	SILTSTONE Light olive gray ST 4 1/2, to olive gray ST 4 1/2, fossiliferous, fossil shell fragments, rare pyrite and glauconite grains, med. Compact, non-calcareous, grades into limestone
	3.05	1.25	41				1.80	LIMESTONE/SILTY/SANDY AND MUDDY olive gray ST 4 1/2, to light olive gray ST 4 1/2. Limestone silty, sandy and muddy, highly fossiliferous, forams, fossil shell fragments, highly glauconitic, rare pyrite grains, med. hard and compact
	99.29							SANDSTONE/MUDDY/SILTY greenish gray SB 1 1/2, forams, fossil shell fragments med to fine grained, in the middle bioturbated, burrows filled with fossil shell fragments, glauconite and coarse grained quartz. The unit is highly glauconitic. The sandstone is poorly sorted at top & bottom but in the middle of the run it is fine grained and moderately sorted, rare pyrite fine grained
99.29								CORE LOSS

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
	2.74	2.74	100		1		1.40	SANDSTONE - Greenish gray 5G 1/4, to greenish gray 5G 1/2, med to fine grained, equigranular, well to moderately bedded, abundant glauconite and fossil shell fragments, disseminated pyrite grains, few traces of Carby material, medium hard and compact.
	102.03				1		0.65	
	102.03				2		0.69	MUDSTONE/SILT/SANDY Greenish gray 5G 1/2, to greenish gray 5G 1/4, highly fossiliferous, mega bioclastic shell fragments, Pecten and Plicapods. Abundant glauconite grains. Sandstone concretions about 2 to 6 cm in dia. Present, rare pyrite and siderite nodules of about 6 cm near the bottom.
					2		0.65	SANDSTONE Same as above.
	3.05	2.40	79		3			CORE LOSS
	105.08				4		2.40	SANDSTONE Greenish gray 5G 1/4, to greenish gray 5G 1/2, med to fine grained, quartz grains sub angular to sub rounded moderately to well sorted. Abundant glauconite, fossiliferous, fossil shell fragments, disseminated fine grained pyrite, lower half of the unit is bioturbated or affected by torrent-current, rare siderite nodules. Sandstone is non-calcareous.
	105.08				5			
					6		1.99	SANDSTONE Same as above.
	2.51	2.51	100		7		0.52	SILTSTONE olive gray 5Y 4/1, to med light gray N-6, rare fossil shell fragments, rare siderite nodules, few Carby traces. Non calcareous, medium compact.
	107.59				8			
	2.34	2.34	100		9			SILTSTONE Same as above.
	109.93				10			
	3.04				11			

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE NO.	CORE NO.					
								CLAYSTONE. Olive gray 5Y 4/1 to light olive gray 5Y 6/1, rare fossil shell fragments, rare pyrite grains disseminated, rare siderite nodules, burrows filled with silty material along with glauconite grains, med. compact.
	3.04		3.04				2.29	MUDSTONE. Med. bluish gray 5B 5/1, fossiliferous, fossil shell fragments, forams, rare pyrite and glauconite, med. compact.
	112.97						0.45	CLAYSTONE Same as above.
							0.30	CORE LOSS
							0.16	MUDSTONE/SILTY/SANDY Greenish gray 5GY 4/1, fossiliferous, fossil shell fragments, forams, abundant glauconite grains, rare pyrite grains, med. compact, calcareous.
	112.97						0.30	CLAYSTONE/SHALE Greenish gray 5GY 4/1, silty, sandy, broken shell fragments, glauconitic, non-calcareous, med. compact, rare pyrite grains, slickensided.
	156		140				0.75	MUDSTONE/SILTY/SANDY Same as above.
	114.53						0.35	MUDSTONE/SILTY Greenish gray 5GY 4/1, fossiliferous, fossil shell fragments, forams, abundant glauconite grains, grades into limestone.
							0.35	LIMESTONE/SANDY Medium light gray N-5, fossiliferous, well preserved forams, limestone is arenaceous, rare pyrite grains fractures filled with calcite crystals.
	114.53						1.30	CLAYSTONE/SILTY Med. gray N-5, rare fossil shell fragments, few siderite nodules, rare pyrite grains. Slickensided in the middle, claystone, silty and grades into mudstone, with carbony traces.
	3.04		3.04				0.37	MUDSTONE/SILTY Same as above.
	117.57						0.80	SILTSTONE/MUDDY Greenish gray, 5GY 4/1, highly fossiliferous and glauconitic, well preserved forams, rare pyrite, disturbed, may be forams hash.
							1.38	SANDSTONE/SHALE (FLAZER LAMINATIONS) Med. dark gray N ₄ to dark gray N-3. Sand: for. 2, fine grained, equigranular, moderately to well sorted, glauconitic, finely laminated with shale. Shale carbony abundant carbony material, few grains of rain and pyrite. few wooden fossils, current disturbances at places shows flaser lamination.
	3.05		3.05				0.87	CORE LOSS
	120.82							

DRILL-HOLE NO 25-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
		3.05	3.05	100	1			SANDSTONE/SHALE CARBONACEOUS INTERLAMINATED Same as above.
		3.05	3.05	100	2			
		3.05	3.05	100	3			
123.67		123.67			4	X	0.35	CORE LOSS
		3.05	2.70	88	5		1.90	SANDSTONE Greenish grey 5/16", fine grained, equigranular, moderately to well sorted, highly glauconitic, few fossil shell fragments, rare Pyrite grains, non-calcareous, med Compact.
		3.05	2.70	88	6		0.80	SHALE/SANDSTONE INTERLAMINATED Olive gray 5/16", rare Carbonaceous specks, few burrows filled with fine sand and Pyrite grains, few siderite nodules or laminated with fine sandstone, highly glauconitic, disseminated Pyrite grains. med. Compact.
126.72		126.72			7	X	0.95	CORE LOSS.
		3.05	2.10	89	8		0.82	SHALE/SANDSTONE INTERLAMINATED Same as above.
		3.05	2.10	89	9			SILTY CLAYSTONE Olive gray 5/16", few siderite nodules, few species of Carby material, disseminated Pyrite grains, few fossil shell fragments, non-calcareous.
129.77		129.77			10			SILTY CLAYSTONE.
		2.21			11			

DRILL-HOLE NO. 25-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								SILTY CLAYSTONE Med. dark grey N-4; scattered fossil shell fragments, rare disseminated Pyrite, abundant siderite nodules 1 to 5 cm in diameter, non-calcareous, few worm burrows filled with silt and sand, siliceous shelled near the bottom.
131.98	131.97	0.83	2.21	100			0.70	CLAYSTONE Olive gray, S.Y., fossil, shells & shell fragments, few siderite nodules 1 cm to 6 cm in dia. glauconitic near bottom, siliceous shelled.
132.81							0.13	CORE LOSS
								CORE LOSS
							2.25	CLAYSTONE/SILTSTONE Olive gray S Y ⁴ / ₁ , to Greenish gray SGY 6 ¹ / ₁ . Rare fossil shell fragments, rare Pyrite grains. Siltystone with abundant fossils & shell fragments, abundant glauconite grains.
135.81	135.88						0.80	SANDSTONE/SHALE INTERLAMINATED Light gray - N-7 to Dark gray - N ₃ . Sandstone, fine to med. grained, mainly quartz grains clean sand. rare glauconite, burrows filled with fine grained clean sand, moderately to well sorted, few shell fragments, rare disseminated Pyrite grains. Shale, Dark gray N ₃ , Carbonaceous, Hozer laminated with few siderite nodules.
137.16	137.16							SILTY SHALE AND SANDSTONE INTERLAMINATED/FAZER LAMINATED. Silty shale, Dark gray N-3, Carbonaceous, few resin grains, disseminated Pyrite Patches, fine grained. Sandstone, Greenish gray SGY 6 ¹ / ₁ , to light gray N-7, fine grained, well sorted, Hozer laminated with silty shale, abundant glauconite grains and siderite nodules, disseminated fine grained Pyrite.
138.91							0.33	CORE LOSS
							0.96	SILTY SHALE/SANDSTONE INTERLAMINATED Same as above
							1.16	SILTY CLAYSTONE Olive gray S Y ⁴ / ₁ , contains fossils and fossil shell fragments, burrows filled with glauconite grains and shell fragments, disseminated Pyrite grains and patches, scattered siderite nodules, 1 to 5 cm in dia., non-calcareous.

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DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
151.10	2.67	2.67	100		1			SHALE, SILTY Olive gray 5Y 4/1, scattered fossil shell fragments and fossils, siderite nodules, traces of carbonaceous material, burrows filled with glauconitic grains and fossil shell fragments, disseminated pyrite grains & patches, grades into siltstone
153.77	0.38	0.38			2			
154.15	3.05	3.05	100		3			
153.77	0.38	0.38			4		0.78	LIMESTONE, SILTY Greenish gray 5GY 4/1, highly fossiliferous, mollusks, may be forams, hard, glauconitic, few discoidal forams, hard and compact, disseminated pyrite grains, hardness increases downward.
154.15	3.05	3.05	100		5			
157.20	3.05	3.05	100		6		2.27	LIMESTONE Limestone same as above. Grades into shale. Shale at the contact about 15 cm contains burrows filled with glauconite & fossil shell fragments & siderite nodules
157.20	3.05	3.05	100		7		0.25	SHALE Dark gray N ₃ , scattered fossils & shell fragments, fossils are mostly of bivalves, corals & Pecten, few siderite nodules, few patches of fine grained pyrite, siderite nodules are calcareous, shale is non-calcareous, few glauconite grains
157.20	3.05	3.05	100		8		2.12	SILTSTONE Greenish gray 5G 4/1 to dark greenish gray 5GY 4/1, highly fossiliferous, fossils hard, glauconitic, sideritic, burrows filled with shale sand and siderite nodules, siltstone grades into sandstone.
160.25	3.05	3.05	100		9		0.68	SANDSTONE/SHALE INTERLAMINATED Dark greenish gray 5GY 4/1, dark gray N-3 & grayish orange 10YR 7/4, fine grained sandstone & shale interlaminated, lamination are 1 mm to 1 cm thick, sandstone grains are equigranular, moderately to well sorted, highly glauconitic, rare pyrite and fossil shell fragments, shale fine, laminated, siderite material is laminated with sandstone and shale.
					10			SANDSTONE Dark greenish gray 5GY 4/1, fine grained, highly glauconitic, quartz grains and glauconite are 50-10% equigranular, moderately to well sorted. Sandstone grades into shale.

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
160.25	163.30	3.05	3.05	100				SHALE / SILTY / SANDY Dark gray N-3, shale is silty & sandy with abundant siderite nodules, ranges in size from 2 mm to 10 cm in dia; few of them are calcareous, others may be clay balls that do not react with HCl acid. Burrows filled with med. to fine grained quartz sand along with glauconite grains, Carby Traces and specks are abundant, disseminated. Pyrite grains & patches, few fossil shell fragments, roots pyritized, grades into sandstone.
163.30	166.34	3.04	3.04	100			1.04	SANDSTONE Light gray N-7, fine to med. grained, mostly Quartz grains, sub-angular to sub-rounded, moderately to well sorted, abundant glauconite grains. Sandstone laminated with fine partings of shale; few siderite nodules. Sandstone grades into shale.
166.34	168.34	2.00	2.00	100			2.0	SHALE / SILTY / SANDY Dark gray N-3. Shale, silty, sandy with few siderite nodules, burrows filled with glauconitic sand. Fine laminations of glauconitic sand with shale. Quartz sand, fine grained, well sorted, equigranular, abundant Carby specks, rare Pyrite grains and patches, med compact.
168.34	169.34	1.00	1.00	0			0.75	CORE LOSS
169.34	171.34	2.00	2.00	75			1.02	SHALE / SILTY / SANDY Same as above.
171.34	172.62	1.28	1.28	100			1.28	SILTSTONE Olive gray SY 4/1 & Dark greenish gray SG 4/1, highly glauconitic sand, sideritic, abundant angular siderite nodules shows the stormy depositional environment, rare Carbonaceous specks, rare resin grains, non-calcareous matrix, med compact, rare fossil shell fragments.
172.62	175.14	2.52	2.52	100			2.52	SHALE / SILTY / SANDY Dark gray N-3, contains siderite nodules, burrows filled with fine Quartz and glauconite grains, shale & sand fine lamination, at places flaser lamination, few burrows filled with fossil shell fragments and glauconite grains, few well preserved bivalve fossils. Shale, silty and sandy, med compact.

DRILL-HOLE NO 25-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	RECOVERY %					
	2.52	2.52	100					
171.91	171.91							
171.91	3.04	3.04	100				2.33	GLAUCONITIC SANDSTONE, ARGILLACEOUS Dark greenish gray s.g. 4. Sandstone, highly glauconitic and fossiliferous, fossil shell fragments, forams, silty matrix, glauconite is medium to coarse grained, abundant siderite nodules, looks like storm deposition. Lower 0.25 m contains coal patches, rare pyrite grains, burrows filled with glauconite grains & shell fragments, grades into shale.
174.95	174.95						0.71	SHALE Dark gray N-3, burrows filled with glauconite grain and pyrite grains, corby material.
174.95	2.92	2.92	100				1.75	SHALE/SANDY/SILTY Med. dark gray N-4, siderite nodules in the form of lamination, root pyritized fine quartz sand, glauconitic, burrows filled with siderite material or clayey material.
177.87	177.87						1.00	GLAUCONITIC SANDSTONE Same as above.
177.87	177.87						0.17	SHALE Same as above.
177.87	3.05	3.05	59				2.10	SANDSTONE Med. dark gray N-4, fine to med. grained, sub-angular to sub-rounded quartz grains, moderately to poorly sorted, burrows filled with sand, disseminated pyrite, few corby rocks. Sst becomes coarse at the bottom, fining upward.
180.92	180.92						0.95	CORE LOSS

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
180.92	181.58	N/A			1	X	0.66	CORE LOSS
181.58	184.63	3.05	24.7		2		2.47	SANDSTONE Med. dark gray N-4, fine to med. grained, quartz grains subangular to subrounded, moderately sorted, burrows filled with clear sand; glauconite grains, pyrite grains, Carbonaceous material as traces and specks abundant; fine fine lamination of shale at places.
184.63	184.63				4	X	0.58	CORE LOSS
184.63	187.68	3.05	3.05		5		2.50	SANDSTONE Same as above.
187.68	187.68				6			SHALE, CARBONACEOUS Dark gray, N3 to med. dark gray N4. Burrows filled with clear quartz sand, rare corby specks, contains fine lami- nation of clay, rare glauconite in hand, rare pyrite grains, non-calcareous.
187.68	190.73	3.05	3.05		7		0.55	
190.73					8			SANDSTONE Med. dark gray N4 to Med. gray N5. Fine to medium grained, subangular to subrounded moderately to well sorted, abundant glauconite grains, very thin laminations of shale at places, few siderite nodules, corby specks & traces.
					9			
					10			
					11			

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
190.73					1		0.42	CORE LOSS
					2		1.72	SANDSTONE Same as above
	3.04	7.62	86		3		0.90	SHALE/SANDY/SILTY Med. dark grey N-4, fine laminations of sandstone, fine grained, shale contains rare carbony material & pyrite, rare glauconite grains in sand, few siderite nodules.
193.77	193.77				4			SHALE/SANDY/SILTY Same as above.
	3.05	7.88	92		5		1.96	SILTSTONE/SHALE Med. bluish gray SB 5/1, glauconitic, glauconite is fine grained, pyrite grains, roots pyritised, few siderite nodules, few thickened beds near bottom, rare carbony species or traces.
	196.82				6		0.84	
					7		0.25	CORE LOSS
198.82					8			SILTSTONE/SHALE Same as above.
	3.05	3.05	100		9			
199.87	199.87				10		1.15	SHALE/SILTY/CARBONACEOUS Dark gray N-3, shale, silty, carbonaceous, pyrite grains, burrows filled with quartz sand, glauconite grains, few plant fossils, roots pyritised.

DRILL-HOLE NO 25-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								SANDSTONE/SILTSTONE Dark gray N-3, fine to med grained, Carbonaceous, Pyrite grains & patches, glauconitic, soft. Grades into Coal.
	3.05	3.05	100		1		0.79	COAL Black, N-1, Pyritic, resinous, light in weight, med. hard, banded, streak dark brown, grades into Sandstone.
2.02.92	2.02.92				2		0.80	SANDSTONE Dark gray N-3 to black N-1, fine to med. grained, upper 10 cm highly Carbonaceous, probably Coal replaced with Sandstone due to weathering effect grades into Sandstone, disseminated Pyrite and resin grains, soft.
2.02.92					3		0.31	
	3.05	3.05	100		4			SANDSTONE Med. light gray N-6 to Med. gray N-5, Mostly Quartz grains, fine to med. grained, sub angular to sub rounded moderately to well sorted, fining upward sequence matrix silty, Carby specks & traces, disseminated Pyrite & glauconite grains.
2.05.97	2.05.97				5			
2.05.97					6			SANDSTONE/SHALE INTERBEDDED Medium gray N-5 to Medium bluish gray SB 5/1, Sandstone, fine to med. grained, moderately to well sorted, Coarsening upward, glauconitic, siderite nodules, fossiliferous in the middle & at bottom, shale, finely laminated, Carby specks & traces, Pyrite grains, burrow filled with sand.
2.05.97	3.05	3.05	100		7			
2.09.02	2.09.02				8			
2.09.02					9			SHALE/SILTY/SANDY Med. bluish gray SB 5/1, fossiliferous, fossil shell fragments, glauconite grains, disseminated Pyrite grains, Carby traces, siderite nodules range in size from 2mm to 10 cm. Shale grades into Sandstone.
2.09.02	3.04	3.04	100		10		2.0	

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								GLAUCONITIC LIMESTONE Med. gray N5, arenaceous, glauconitic, spinitic to micritic, fossiliferous, fossil shell fragments, rare corby material.
212.6	212.06						1.04	
							0.30	CORE LOSS
		3.05	2.75	90			2.75	SANDSTONE Greenish gray SG 4/ to Med light gray N-6, fine to med grained, carbonaceous, glauconitic, burrows filled with coarse sand, rare rasin, disseminated pyrite grains, upper 50 cm is more fossiliferous, fossil shell fragments.
215.11	215.11							SANDSTONE Same as above.
		3.00	3.00	100			1.40	SHALE, CARBONACEOUS Dark gray N3, highly carbonaceous, lamination of fine sand i.e. fine grained, glauconitic. Disseminated fine grained pyrite, rasin grains, few fossil shell fragments, few pyritized roots, grades into dirty coal.
							0.35	
							0.25	
							1.00	DIRTY COAL Grayish black N-2, plant fossils, pyrite, few rasin grains, grades into shale.
218.11	218.11							SHALE Dark gray, N-3, shale, silty, sandy, burrows filled with fine grained, glauconitic sand. Corby material abundant, few siderite. Small nodules, disseminated pyrite, roots pyritized.
		3.04	3.04	100				SHALE, CARBONACEOUS Same as above. Lower 10 cm for fossils and abundant siderite nodules.
211.15								

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
221.07	223.03	1.0	53		0.88			CORE LOSS
					1.0			SHALE, SILTY. Dark gray N-3 to Med. light gray N-6, shale Contains traces & specks of Carbonaceous material, rare disseminated fine grained Pyrite, small gastropod fossils, fossil shell fragments, abundant siderite nodules.
223.03	226.08	3.05	100		1.08			SHALE / SILTY / SANDY Med. dark gray N-4, gastropod fossils, shell fragments, traces of Carby material, silty, sandy, pyritic and Carby near the bottom, rare resin grains.
					1.05			COAL Black-N-1. Coal with rare Pyrite grains, disseminated resin grains, banded, med. hard, light in weight, streak brown.
					0.92			SHALE SILTY Same as above. grades into sandstone lower 0.30m in Sandstone.
226.08	227.30	1.22	NIL					CORE LOSS Due to loose sand.
227.30	230.35	3.05	97		2.95			CORE LOSS SANDSTONE Med. light gray N-6, med. to coarse grained, moderately sorted, dominantly Quartz grains, sub-angular to sub rounded, Carby material abundant, few glauconite grains, burrows filled with clear sand.

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE NO.	CORE %					
23035							1.33	CORE LOSS Due to Loose sand
	3.05		1.72	56			1.72	SANDSTONE Same as above.
23340							0.62	SANDSTONE/SHALE INTERBEDDED Sandstone, same as above. Shale, Med dark gray N-4, disseminated Pyrite, few slickensides, few carby traces, resin grains
	3.05		2.78	91			1.10	LIMESTONE Greenish gray, 5/8 to light gray N-7, micritic, fossiliferous - forams & gastropods, glauconitic, arenaceous, grades into shale
23645							1.06	SHALE/SANDSTONE INTERBEDDED Dark gray N-3 to Med light gray N-6. Shale contains Pyrite, resin grains, few Carby traces, sandy & silty, fossiliferous
23847							0.27	Sandstone, fine grained, well sorted, glauconitic becomes coarse grained towards bottom
23883							2.24	CORE LOSS
	3.38		2.24	94				SANDSTONE/SHALE INTERLAMINATED Same as above.
23883							0.14	CORE LOSS
23883								SHALE/SANDSTONE INTERLAMINATED Shale, med dark gray N-4, silty, Carby traces glauconitic, Siderite nodules abundant in the middle. Sandstone, fine grained, glauconitic, few broken shells & Carby traces, rare resin grains, grades into glauconitic sand- stone. Lower 0.50 m is highly glauconitic Sandstone with Pyrite grains an.

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								Patches, contains forams, glauconite, med. to coarse grained, calcareous.
241.88	241.88	1.53	1.22	80	2		0.70	CALCAREOUS GLAUCONITIC SANDSTONE Greenish gray sandy, glauconite, med. to coarse grained with calcareous matrix, fossiliferous; forams & fossil shell fragments. rare disseminated pyrite, hard & compact.
	243.41				3		0.52	
							0.31	
243.41	243.41	2.18	2.18	100	4		0.85	SHALE, SANDY Dark gray N-3 to Grayish black-N2 Burrows filled with clear fine sand and glauconite grains; Carby traces and specks; root pyritized, disseminated pyrite grains.
	245.59				5		1.33	
245.59	245.59	3.05	3.05	100	6			CORE LOSS SHALE, SANDY Same as above. SANDSTONE / MUDDY / SHALE Med. gray N-5 to Dark gray N-3, fine to med. grained glauconitic, muddy & shaly; at places fine inter. lamination with Carby shale.
	247.64				7		3.05	
247.64	247.64	3.05	3.05	100	8			SANDSTONE / MUDDY / SHALE Same as above.
	249.69				9		3.05	
249.69	249.69	3.05	3.05	100	10			SANDSTONE / MUDDY / SHALE Same as above.

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
25.69	25.69							
25.69	3.05	3.05	100		2		0.70	SANDSTONE/MUDDY/SHALEY Same as above.
	3.05	3.05	100		3		2.35	SHALE/SANDY/SILTY Dark gray N3. Shale with carbony traces & flakes. burrows filled with clear quartz sand, medium grained, glauconitic, fine lamination of fine sand with fine glauconite grains, disseminated pyrite grains; sand, equi granular, well sorted, abundant siderite nodules at places.
	25.74				4			
25.74					5			SANDSTONE/MUDDY/SHALEY Same as above.
	3.05	3.05	100		6			
	25.79				7			
25.79					8			SANDSTONE/MUDDY/SHALEY Same as above.
	2.81	2.81	90		9		2.60	
	2.81				10			
26.65					11			
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DRILL-HOLE NO 25-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
260.65							1.0	SANDSTONE/MUDDY/SHALEY Same as above.
	3.05	3.05	100				1.0	SHALE Dark gray N ₃ to Grayish. black - N ₂ Shale, sandy; Carby Traces & flaccles, burrows filled with sand, sand contains glauconite grains Sand mostly fine grained, disseminated Pyrite grains.
	263.20						1.05	SANDSTONE/MUDDY Mostly Quartz grain, fine to med. grained, glauconitic, pyritic & Carby.
263.20							2.20	SANDSTONE/MUDDY/SHALEY Same as above.
	3.05	2.20	72				0.85	CORE LOSS
266.75							0.47	CORE LOSS
269.20							2.49	SANDSTONE/SHALE INTERLAMINATED Sandstone med. light gray N-6, fine to med. grained, moderately to well sorted, Quartz grain subrounded to rounded, glauconitic, non-calcareous, matrix clity & shaley. Shale, med. dark gray N-4, Carby Traces, & specks, disseminated Pyrite grain & patches, burrows. filled with Quartz sands & glauconite fine grained, med compact, shale is subordinate. Shale lamination thin .5mm to 2 cm thick and sandstone 3 to 5 cm thick.
269.20	3.04	3.04	100					SANDSTONE/SHALE INTERLAMINATED Same as above.

DRILL-HOLE NO 2S-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
	272.84				1			SANDSTONE Dark gray N-3, Mostly Quartz grains are Coarse grained, rare coarse grains of glauconite fossiliferous, rare pyrite, matrix silty, Calcareous, hard & Compact.
					2		0.55	
272.84					3		0.70	SANDSTONE Same as above.
	3.05	3.05	100		4			SANDSTONE Greenish Gray, 5 G 6, fine grained, highly glauconitic, Quartz grain equigranular, well sorted, rare Pyrite patches & grains, rare Carby material and rarin, Calcareous, med. hard and Compact, Cross and flaser laminations at places rare fossil shell fragments. Sandstone grades into shale.
	3.05				5		2.35	
	275.29				6			SILTSTONE/SANDSTONE Dark gray N-3, Disseminated Pyrite grains, few siderite nodules, rare fossil shell fragments and Carby material, few rarin grains, sandstone very fine grained.
					7		0.60	
	3.0	3.0	100		8			SANDSTONE Greenish gray 5 G 6, to Med. gray N-5, fine grained, Quartz grain mostly equigranular, moderately to well sorted, Carby Traces & specks, disseminated Pyrite grains, rare rarin, fossiliferous in the middle, bioturbated at few places, abundant siderite nodules, glauconitic, burrows filled with Quartz and glauconite; matrix silty, changes into med to Coarse grained, fossiliferous Sandstone.
	278.29				9			
	3.05	3.05	100		10			SANDSTONE Same as above.

37

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								SANDSTONE Same as above.
291.08	291.51	291.51	100		1			SHALE/SANDSTONE INTERLAMINATED. Shale, Olive black SY 2, Carby traces, leaf Pyritized, few stems Pyritized. Sandstone, med to Coarse grained, sub-angular to sub-rounded Quartz grains, rare pyrite and glauconite grains.
	293.59				2		2.10	
					3		0.41	
293.59	3.05	3.05	100		4			SHALE/SILTY/SANDY Olive black SY 2, Med. dark gray N-4. Shale with Carby traces & specks, wood Pyritized, burrows filled with sand & glauconite grains, few siderite nodules, roots Pyritized, rare fossil shell fragments, med hard.
	296.64				5		3.05	
					6			
296.64	3.05	2.67	82		7		0.85	SILTSTONE Med. gray N-4, Contains fossil shell fragments, famel, gastropods etc. Disseminated Carby traces & specks and Pyrite grains & patches, glauconitic, few siderite nodules, grades into sandstone/shale.
	299.69				8		1.82	
					9		0.38	SANDSTONE/SHALE FLAZER LAMINATION. Light grey N-7 to Brownish black SY R 2, Sandstone, fine to med. grained, mostly Quartz grains are subrounded to rounded, moderately to well sorted, glauconitic, fossil shell fragments, soft friable. Shale, sandy, silty, Carby, rare disseminated Pyrite burrow filled quartz and glauconite sand.
299.69	300.28	0.32	54		10		0.27	
							0.32	CORE LOSS probably due to loose sand.
								CORE LOSS
					1			SANDSTONE/MUDDY Med. dark gray N-4, Med. to Coarse grained, Quartz grains angular to sub-rounded, poorly sorted, few fossil shell fragments and glauconite grains, loose, soft friable.

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
30.28								CORE LOSS Probably due to loose sand.
							1.02	SANDSTONE Same as above.
	3.04	2.02	66				2.0	SHALE/SANDSTONE/SILT Med. gray N-5, Dark gray N ₃ & Light bluish gray SB ₇ . Sandstone, fine to med. grained, Quartz grains are sub-rounded to rounded, moderately sorted, glauconitic, Shale, dark gray, carb. traces, disseminated pyrite and marcasite, few fossil shell fragments, silty, glauconitic, few burrows filled with sand & glauconite grains, roots Pyritized, shale grades from siltstone to sandstone.
	3.32	3.0					0.22	SANDSTONE Light bluish gray SB ₇ , fine to med. grained, Quartz grains are sub-angular to subrounded, moderately sorted, glauconitic, few weathered glauconite grains, Pyrite grains, med. hard.
3.32								CORE LOSS Probably due to loose sandstone
	3.05	Nil	100				3.05	
	3.37							
3.37								CORE LOSS: Probably due to loose sandstone.
	3.05	Nil	100				3.05	
	3.42							
3.42								

DRILL-HOLE NO 25-1

[illegible]

DRILL-HOLE NO 25-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE NO.	CORE %					
								SANDSTONE Light gray N-7, Med. grained, well sorted, mostly Quartz grains are subrounded to rounded. glauconitic, lower about 0.14 m and upper 0.05 m is Carbonaceous.
							0.48	
328.61	1.02	328.61	100		2			CORE LOSS
329.63					3		0.78	CORE LOSS
					4			SANDSTONE/SHALE CARBONACEOUS Same as above, sandstone grades into claystone lower 0.35 m is clay stone.
					5		2.27	
325.69					6		0.57	CLAYSTONE/SILTY/SANDY Light bluish gray SB7, Carby traces, roots. Pyritized, silty, sandy, grades into siltstone.
					7		0.55	SILTSTONE Med. light gray N-6, Carby traces & flakes, Pyrite grains, marcasite, roots, pyritized, grades into sandstone.
					8		1.93	SANDSTONE Med. light gray N-6, fine to med. grained, grains are subangular to subrounded, few are well rounded, moderately to well sorted, glauconite grain abundant. Carby material, flaser lamination of siltstone/shale interrupted at places, rare pyrite grains, few burrows filled with quartz, clear sand, and glauconite grains. few roots pyritized.
328.73	2.03	328.73	100		9		0.57	
					10		0.62	SANDSTONE Same as above.
								CORE LOSS
							0.84	SHALE/CARBY/SILTY Med. gray N-5 grayish black N-2. Dark gray N-3 upper 5 cm is claystone, burrows filled with coarse grained sand. Shale contains Carby material disseminated pyrite grains & marcasite, roots pyritized.

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
330.76	3.04	2.69	88		1		1.69	SHALE / SANDY SILTY Dark gray N-3, shale, sandy, silty, Carby Traces and specks, Pyrite grain & roots, Pyritized at places, interbedded & flaser laminated with sandstone grades into sandstone.
333.80					2		1.0	SANDSTONE Light gray N-7, med grained, Quartz grains rounded to sub-rounded, moderate to well sorted, glauconitic grain, Carby material, Pyrite grains, marcasite patches, flaser lamination of Carby shale in the lower 0.28 m.
333.80					3		0.35	CORE LOSS
333.80					4			CORE LOSS
333.80	3.05	1.84	60		5		1.21	SHALE SANDSTONE, FLASER LAMINATION. Dark gray N-3, shale, sandy, silty, Carby material abundant, Pyrite material, Pyrite, marcasite, few small siderite nodules & sandstone in flaser lamination.
336.85					6		0.60	
336.85					7		1.24	SHALE, CARBY, SILTY Dark gray N-3 to olive black 5Y 7/1. Upper 24 cm in claystone. Shale sandy, silty, with Carby material abundant in the upper half, Pyrite grains, marcasite patches, roots pyritized lower 0.30 m. is sandy.
336.85	3.05	2.80	92		8		2.80	SHALE / SANDSTONE, FLASER LAMINATED Same as above
339.90					9			
339.90					10		0.25	CORE LOSS
339.90					11			

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
					1			
	31.05	0.90	29		2		2.15	CORE LOSS
	342.95						0.90	SANDSTONE. Dark gray N-3. Sandstone shaly, med to coarse grained, moderately sorted, quartz grains are sub-angular to rounded, soft, carb. material abundant, lower 0.20m is more shaly.
342.95					3		0.25	
	31.05	0.60	19		4		0.35	SANDSTONE - very light gray N-8. Quartz coarse grained, well sorted, sub-angular to sub-rounded, calcareous matrix, few glauconite grains, rare pyrite grains, hard and compact.
346.0					5		2.45	SANDSTONE. Med. light gray N-6. Fine to med. grained, glauconite abundant, few pyrite grains, quartz grains are sub-angular to sub-rounded, poorly sorted, silty matrix.
346.0	1.21	0.65	53		6		0.65	CORE LOSS
	347.21				7		0.56	SANDSTONE. Same as above.
347.21								CORE LOSS.
	1.83	1.83	100		8		0.55	SHALE Dark gray N-3 Shale silty, disseminated pyrite & patches of maroon to roots by bitized, carb. material abundant
	349.04				9		1.28	SANDSTONE Med. light gray N-6 Fine grained, eugranular, quartz grains sub-rounded to rounded, well sorted, carbonaceous material at places, not decomposed carb. material, leaf fossil at 349.89m, abundant glauconite fine grained, rare siderite nodules, flaser laminations at places, med compact.
349.04					10			
					11			

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
	352.05	2.77	91		1			SANDSTONE med light gray N-6. Fine to med: grained, moderately sorted. rest is same as above. Thin laminations of carbony material at few places.
	352.09				2		0.28	CORE LOSS
	352.09						0.59	CORE LOSS
	352.09				3		0.62	SANDSTONE Light gray N-7, coarse quartz grains, sub-angular to sub rounded, moderately to well sorted, carbony traces and specks, unaltered woody material soft grades into fine grained sandstone and shale inter laminated, few siderite nodules.
	352.09	3.05	2.46	81	4		1.14	SANDSTONE/SHALE INTER LAMINATED Med: light gray N-6, finely inter laminated, carbony traces and specks, rest pyritized, burrows filled with clean coarse grained quartz sand
	355.14				5		0.70	SHALE- Dark gray N-3, carbony material, pyrite & marcasite at places, shale silty, few siderite nodules. burrows filled with clean sand.
	355.14						0.14	CORE LOSS
	355.14				6		1.54	SHALE/SANDSTONE INTER LAMINATED. Shale in the lower half with abundant carbony and coaly material, rest is same as above, not calcareous.
	355.14	3.05	2.21	95	7		1.32	SILTSTONE Med: light gray N-6 carbony and coaly material abundant, plant fossils at places, disseminated pyrite grains and marcasite patches, siltstone non-calcareous.
	355.19				8		0.65	SHALE Dark gray N-3, Carbonaceous, carbony layers, specks & flakes, wood fossils, pyrite & micrite grains & patches, silty.
	355.19				9		2.22	SANDSTONE Light gray N-7, fine grained, mostly quartz grains, equigranular, moderately to well sorted, rare glauconite grains and carbony material, few black grains, soft & friable.
	361.24	3.25	2.27	94	10			
					11		0.18	CORE LOSS

DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
370.38	373.43	3.05	100		1			SHALE/SANDSTONE INTERLAMINATED
					2			Same as above.
					3			
373.43	373.43						0.39	CORE LOSS
					4		0.45	SANDSTONE Med. dark gray N-4, Med. to coarse grained, sub-angular to sub-rounded, moderately to poorly sorted, few Carby laminations, rare Pyrite & marcasite, grades into Shale & Sandstone lamination.
					5			
					6		2.21	SHALE Med. dark gray N-4, silty, sandy, Carby laminations at places, siderite nodules at places, fine sand lamination and at places flaser laminations, disseminated Pyrite grains & marcasite patches. Burrows filled with sand, root Pyritized, grades into Sandstone.
376.48	376.48							
					7			SANDSTONE/MUDDY/SILTY Dark gray N-3, fine grained, equigranular Quartz grain, moderately to well sorted, Carby & Coaly material, wood Pyritized, Pyrite & marcasite disseminated, rare glauconite fine grains, burrows filled with fine to med. sand.
					8			
					9			
377.52	379.52	3.05	100					
					10		1.76	SHALE/SANDSTONE INTERLAMINATED AND FLASER LAMINATED Same as above.
					11			

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DRILL-HOLE NO LS-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE%					
	391.72							
391.72								
	3.04	0.90	29				2.14	CORE LOSS
	394.76						0.90	SANDSTONE Light gray, N-7 to very light gray N-8, Mostly Quartz grains. Med. to Coarse grained, moderately to well sorted, sub-rounded to rounded, matrix silty, Non-Calcareous.
394.76								
	3.05	1.45	47				1.45	SANDSTONE Same as above.
	397.81							
							1.60	CORE LOSS
397.81								
	3.05	0.34	100				2.71	CORE LOSS
400.85								
							0.34	SANDSTONE / CARBONACEOUS Dark gray, N-3 fine grained, equigranular, Quartz grains are sub-rounded to rounded, moderately to well sorted. Fine laminations of Coal and Carbonaceous material. Wood pyritised, disseminated Pyrite grains and marcasite patches.

DRILL-HOLE NO 25-1

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
400.88	1.78	1.78	100		1		0.40	SANDSTONE Same as above.
	402.64				2		0.66	CLAYSTONE / SILTY / SANDY Med gray N-5, Carby material abundant, root pyritized, Pyrite & Marcasite, upper 0.12 m is carbonaceous shale. Claystone grades into sandstone
					3		0.72	SANDSTONE Light gray N-7; fine grained, quartz grains are equigranular, well sorted, rare Carby material, wood pyritized, rare roots pyritized, glauconite grains disseminated, Sandstone hard & compact, Matrix silty.
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TOTAL DEPTH = 402.64 M.

CUMULATIVE CORE % 82.27

" CORE LOSS % 17.72

COAL SAMPLE DATA

SAMPLE NO. LS-1-1 NO. OF BAGS 1
COLLECTOR ZAMEER MOHD KHAN COAL FIELD LAKHARA SOUTH
ALTAFU. KHAN
LATITUDE _____ LONGITUDE _____
PROVINCE SINDH DISTRICT DADU
DRILL HOLE LS 1 DATE SAMPLED 03-03-92
FORMATION BARA AGE PALEOCENE
COAL SEAM _____ ESTIMATED RANK LIGNITE
TOTAL SEAM THICKNESS _____ in THICKNESS SAMPLED _____ in
0.80 m 0.80 m
DEPTH TO TOP OF COAL _____ ft SURFACE ELEVATION _____ ft @MSL
201.91 m _____ m
ROOF ROCK SANDSTONE FLOOR ROCK SANDSTONE
SAMPLE TYPE DRILL CORE
(channel, channel/upper bench, grab, drillcore, etc.)
COMMENTS:

COAL SAMPLE DATA

SAMPLE NO. LS-1-2 NO. OF BAGS 1
COLLECTOR ALTAFALI KHAN COAL FIELD LAKHRA SOUTH
ZAMEER M. KHAN
LATITUDE _____ LONGITUDE _____
PROVINCE SIND DISTRICT DADU
DRILL HOLE LS-1 DATE SAMPLED _____
FORMATION BARA AGE PALEOCENE
COAL SEAM _____ ESTIMATED RANK LIGNITE
TOTAL SEAM THICKNESS _____ in THICKNESS SAMPLED _____ in
1.05 m 1.05 m
DEPTH TO TOP OF COAL _____ ft SURFACE ELEVATION _____ ft @MSL
224.11 m _____ m
ROOF ROCK SHALE FLOOR ROCK SHALE
SAMPLE TYPE DRILL CORE
(channel, channel/upper bench, grab, drillcore, etc.)
COMMENTS:

1 of 55

DRILLING RECORD
COAL REAP

Drill hole LS-2

Topo Sheet 40C/3
Grid ref 861810 mN 2165211 mE
Surface elev. (m) 55.2 (surveyed)
Drill rig LONG YEAR 44

Drilling started Date 1-3-92 Time _____
Drilling completed Date 17-3-92

Drill Bit Surface to 6.10 m TRICON ROLLER BIT.
6.10 to 322.49 m HQ DIAMOND BIT.
_____ to _____ m _____
_____ to _____ m _____
_____ to _____ m _____
_____ to _____ m _____

Fluids used BENTONITE.

Casing set Surface to 6.10 m HW casing
_____ to _____ m _____
_____ to _____ m _____

Lith logged by GHULAM SARHAR LASHARI.
ABDUL RAHIM MEMON.
ALTAH HUSSAIN CHANDIO.

Geophysical logs:

Geophysical logs:										
XAP Probe	{	N-Gamma	From	00	m	to	225.40	m	through	open hole
		Caliper		00	m		228.50	m		
		GGNR		00	m		228.90	m		
		GGFR		00	m		228.80	m		
JLP Probe	{	Natural Gamma		00	m		230.30	m		
		Neutron		00	m		232.70	m		
JLP Probe	{	Natural Gamma		00			362.80	m		
		Neutron		00			365.00	m		
XAP Probe	{	Natural Gamma		00			361.40	m		
		GGFR		00			364.80	m		
		GGNR		00			364.90	m		

Through Drill pipe

Through Drill pipe

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COAL REAP

Drill Hole L.S. 2

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
1-3-92		3.05	Drilling started on 1-3-92, non casing
			started from 0m to 6.10m,
		6.10	Casing started from 6.10m.
2-3-92	1300		Reamed the H.W. casing up to 6.10m.
			Drilling started with tricon bit 4 7/8
	1400		Prepared mud with four bags of
			ben-tonite.
	1700		Set the H.W. casing with diamond bit
			No. 213, lowered the bit up to 6.10m,
	1900	8.28	Run 2.18, core loss 0.74
	2000		Generator became out of order then
			Prepared.
	2100	9.27	Run 0.99, core loss 0.72m
	2200	9.88	Run 0.61m, core loss 0.44m
3-3-92	0800		checked oil and fuel, selling mud,
	0900	11.28	Run 1.40m, core loss 0.11m
	1050	14.33	core loss 0.65m
	1150	17.38	core loss nil
	1400	20.42	core loss 0.29m
	1600		There was no mud, drilling stopped,
			Preparation, cleared the channel and
			Pits

COAL REAP

Drill Hole L.S.2

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
3-3-92	1700	20.85	Run 0.43m, core loss 0.17m
	1900	20.85	There was water loss 70%, drilling stopped
			Prepared the mud, discussed with
			Site in charge, water pressure is not
			available at site gage, Valve broken
			duct. Sudden raise of mud pressure
			replaced it.
	2300	23.19	Run 2.18, core loss 0.20m
			Prepared the mud and mixed the
			chemicals,
		26.23	
			drilling stopped, mud pump became one
			of codes.
4-3-92		28.93	Run 2.70, core loss 0.15m
		30.45	
	0650	31.98	Core loss nil
	0710	31.98	Pulled out inner tube 60% water loss
	0820		Prepared six bags of bentonite,
			two mugs of C. Pan, two kilos of S.M.
			and 4 mugs of P.H.P., jetted the mud.
	1050	34.00	Run 2.22, core loss 0.27

COAL REAP

Drill Hole L.S.2

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
4-2-92	1142	34.00	During drilling gate valve busted, so
			repaired and fitted, pulled out inner
			tube, lowered and let down.
	1240	35.68	Run 1.68, Core 1.68,
	1445		Rigging wire became out of order so
			repaired.
	1700	38.12	
	1900		core blocked, pressure suddenly rose,
			gate valve broken so repaired it,
			Prepared mud with three bags again
			pulled out the inner tube, washed
			the hole.
	2250	41.17	Core loss 0.35
	2420	44.22	Core loss 0.11
5-2-92	0215	47.27	
	0400	50.32	
		51.92	Core loss 0.35
	0700	53.97	
	0810	57.02	Core loss 0.12
	0900	60.27	
	1010	63.12	Core loss 0.45

COAL REAP

Drill Hole 19-2

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
5-3-92		67.46	Run 1.29, Core loss 0.39
	1630		Bevel gear became out of order so
			pulled out - IT and again lowered
			and latched the tube during latching
			motor started again, drilling stopped
			called the mechanic from camp
	1730	68.98	Run 1.52m, Core loss 0.58m
	1800		Sudden rotation stopped, drilling stopped
			main bearing out.
6-3-92			Market was closed due to Friday.
7-3-92	2300		Arrange bearings from Karachi; assemble
	0100		the survival head and fixed, mud jetted
	0240		lowered down the string but at 54.8
			hole was caved, washed the hole by
			rotation and chipping.
8-3-92	0630	72.03	Core loss 0.37m
	0800		checked oil and fuel and replace gate valve
	0845	72.94	
	1030	75.99	Core loss 0.45m
	1230	78.36	
	1315	79.65	

COAL REAP

Drill Hole LS-2

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
8-3-92	1400	82.70	
	1500	84.45	Core loss 0.23
	1630	87.50	
	1700	90.55	
	1730	93.60	Core loss 0.08
	1800	96.65	work stopped due to Rosa after
	2030	99.70	Core loss 0.48
	2115	102.59	
	2200	105.48	
	2245		Pulled and lowered down I/T, prepared
			one log benderite and mixed 2 kits. MC
			and jelled the mud.
	2350	107.62	
9-3-92	0200	108.83	
	0330	111.88	
	0435	113.93	Core loss 0.64
	0700	117.32	
	1330		Redrilled from 112.78 to 117.32, cleaned
			the pits, drilling stopped due to shortage
			of water, prepared the mud.
	1500	117.98	Run 66,

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COAL REAP

Drill Hole LS-2

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
9-3-92	1500	117.98	Mud pump was out of order.
	1530	121.03	
	1630	124.08	Core loss 0.30m
	1800	126.22	Core loss 1.39, drilling stopped due to
			Rosa after
	2200	128.80	Core loss 0.10m
10-3-92	0130		Mud pump out, changed the seat ball
			and plunger, pulled, lowered and
			latched the I/T and mud jetted.
	0250	130.17	Core loss 0.49m
	0355	133.22	Core loss 0.85m
	0730	136.27	
	0900	137.00	Core loss 0.34
	1130	139.32	Core loss 0.07
	1515		Mud pump out, opened the rods, checked
			the plug, prepared mud and raised down
	1630	142.36	
	1730	145.41	
	1820	148.46	Core loss 0.35m
	1930	151.51	Core loss 0.10m
	2040	154.56	

COAL REAP

Drill Hole LS-2

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
<u>10-3-92</u>	<u>2330</u>	<u>157.60</u>	
<u>11-3-92</u>	<u>0215</u>	<u>162.18</u>	
	<u>0300</u>	<u>163.70</u>	<u>Core loss 0.10m</u>
	<u>0400</u>	<u>166.75</u>	<u>Core loss 0.2m</u>
	<u>0510</u>	<u>169.80</u>	
	<u>0600</u>	<u>172.84</u>	
	<u>0800</u>	<u>175.89</u>	
	<u>0945</u>	<u>178.94</u>	
	<u>1120</u>	<u>181.99</u>	<u>Core loss 0.35m</u>
	<u>1300</u>	<u>184.73</u>	
	<u>1400</u>	<u>186.41</u>	
	<u>1515</u>	<u>188.09</u>	<u>Core loss 0.44m</u>
	<u>1630</u>	<u>191.13</u>	<u>Core loss 0.24m</u>
	<u>1700</u>	<u>194.18</u>	<u>Core loss 0.16m</u>
	<u>1730</u>	<u>197.23</u>	
	<u>1800</u>	<u>200.28</u>	
	<u>2050</u>	<u>203.33</u>	<u>Core loss 0.50m</u>
	<u>2200</u>	<u>205.36</u>	
	<u>2330</u>	<u>206.37</u>	
<u>12-3-92</u>	<u>2445</u>	<u>209.42</u>	
	<u>0210</u>	<u>212.47</u>	<u>Core loss 2.30m</u>

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COAL REAP

Drill Hole LS-2

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
<u>12-3-92</u>	<u>2335</u>	<u>215.52</u>	<u>Core loss 1.61m</u>
	<u>0455</u>	<u>218.56</u>	<u>Core loss 0.02m</u>
	<u>2730</u>	<u>221.13</u>	
	<u>1000</u>	<u>224.18</u>	
	<u>1200</u>	<u>227.23</u>	
	<u>1430</u>	<u>230.15</u>	
	<u>1530</u>	<u>233.20</u>	
	<u>1610</u>	<u>236.24</u>	<u>Core loss 0.17m</u>
	<u>1700</u>	<u>239.29</u>	<u>Core loss 2.37m</u>
	<u>2015</u>	<u>242.34</u>	<u>Core loss 0.18m</u>
	<u>2100</u>	<u>245.39</u>	
	<u>2200</u>	<u>247.98</u>	
	<u>2300</u>	<u>249.04</u>	<u>Core loss 0.69m</u>
	<u>2345</u>	<u>252.09</u>	
	<u>0220</u>	<u>255.14</u>	
	<u>2345</u>	<u>258.19</u>	
	<u>0700</u>		<u>pull out all rods with core barrel</u>
			<u>because friday was holiday</u>
<u>14-3-92</u>			<u>cleaned the all pits, prepared the mud w/</u>
			<u>chemicals, lowered the rods up to 213.</u>
			<u>washed the hole from 213.26 to 258.10</u>

COAL REAP

Drill Hole LS-2

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
<u>14-3-92</u>	-----	-----	<u>by rotation and chipping</u>
-----	<u>1540</u>	<u>260.60</u>	<u>Core loss 0.15m</u>
-----	<u>1600</u>	<u>263.65</u>	-----
-----	-----	<u>266.70</u>	<u>Core loss 0.31m</u>
-----	-----	<u>269.37</u>	-----
-----	-----	<u>272.41</u>	-----
-----	-----	<u>275.46</u>	-----
-----	-----	<u>278.51</u>	<u>Core loss 0.11m</u>
-----	-----	<u>281.56</u>	<u>Core loss 0.3m</u>
-----	-----	<u>284.61</u>	<u>Core loss 0.4m</u>
-----	-----	<u>287.65</u>	<u>Core loss 0.5m</u>
-----	-----	<u>290.19</u>	<u>Core loss 1.04m</u>
-----	<u>2245</u>	<u>291.72</u>	<u>Core loss 0.17m</u>
<u>15-3-92</u>	<u>0025</u>	<u>294.77</u>	<u>Core loss 1.46m</u>
-----	<u>0248</u>	<u>295.53</u>	-----
-----	<u>0355</u>	<u>298.58</u>	<u>Core loss 0.63m</u>
-----	<u>0300</u>	<u>300.20</u>	<u>Core loss 0.24m</u>
-----	<u>0410</u>	<u>303.91</u>	-----
-----	<u>0425</u>	<u>306.73</u>	<u>Core loss 0.25</u>
-----	<u>0730</u>	<u>309.17</u>	-----
-----	<u>0800</u>	<u>309.75</u>	-----

COAL REAP

Drill Hole LS-2

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
15-3-92	0930	312.80	
	1000	315.85	Core loss 1.20m
	1320	318.90	Core loss 1.85m
	1400	331.66	
	1515	323.72	
	1615	326.77	Core loss 2.15
	1715	329.82	Core loss 0.92
	1800	330.73	Core loss 0.28
	2200		Drilling suspended due to failure of survival head and then rigged it
	2230		Fixed Survival head and couple the rods with water. Survival Mud circulated
	2250		Lowered down I/I and latched it
	2345	332.86	Core loss 1.53m
16-3-92	0035	334.39	Core loss 0.77m
	0145	337.44	Core loss 0.08m
	0315	340.48	Core loss 0.04m
	0410	343.53	Core loss 0.08m
	0510	346.58	Core loss 0.72m
	0525	349.63	Core loss 1.12m
	0730	352.61	Core loss 2.70m

~~Drill Hole~~ Drill Hole LS-2

DATE	TIME	DEPTH	REMARKS
16-3-92	0830	355.72	Core loss 2.15m
	0930	358.77	Core lost 2.92m
	1030	360.60	core lost 0.74m
	1300	363.65	Core loss 1.95m
	1400	366.55	Core loss 1.92m
	1430	367.92	Core loss 0.40m
	1600	370.96	Core loss 0.24m
			Drillbit stopped due to failure of survival lead.
	1700	372.40	
			Again survival lead became out of order.
17-3-92			Drilling ceased on 17-3-92

DRILL-HOLE NO L.S. 2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								LIMESTONE:- Limestone with clay, Limestone, white N ₉ to very light grey N ₈ , crystalline, medium hard, Fossils.
								LIMESTONE:- White N ₉ , hard, crystalline, some clayey and fossils.
								LIMESTONE:- White N ₉ , hard, crystalline and fossils.
								LIMESTONE:- Same as above unit
								LIMESTONE:- White N ₉ , hard, massive, shell fragments, Fossils crystalline
								LIMESTONE:- Very light grey to light grey N ₇ , crystalline, massive, very hard full of fossils.
								LIMESTONE:- White N ₉ , hard, massive, crystalline, Fossils
								Core loss at bottom
								Core loss at top
								LIMESTONE:- White N ₉ , compact to compact, coarse grained, crystalline, sandy, Fossils, Fossils, sandy texture.
								LIMESTONE:- Same as above unit
								Core loss at bottom
								LIMESTONE:- White N ₉ , coarse to medium compact, crystalline, Fossils

DRILL-HOLE NO LS-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE CORE %	CORE %					
							0.55	Core loss predominant for limestone
							0.11	LIMESTONE:- Same as above unit
					11		0.74	LIMESTONE:- Same as above unit
11.28		11.28					0.28	Core loss at loose lime stone
					12		0.65	LIMESTONE:- Same as above unit
					13		2.12	SANDY LIMESTONE:- Cream to white, compact, hard, sandy, loose crinoid stems, bryozoans, Forams.
14.33		14.33			14			MARL:- Moderate yellowish brown to YR 5/4 to Dark yellowish orange to YR 6/6, calcareous, Gypsiferous, silty, clayey, flaky, gypsum intercalated, soft, fissile
					15		2.55	CLAYSTONE:- Moderate yellowish orange to YR 4/6, calcareous, silty gypsum intercalated, semi compact, fossiliferous, clayey material, Forams, shell fragments, bryozoans.
					16			LIMESTONE:- Pale yellowish orange to YR 8/6 to very pale orange to YR 8/6 Semi compact to compact, clayey, silty, highly fossiliferous, Gypsum bands, shell fragments, Forams.
17.38		17.38			17		0.55	CLAYSTONE:- Moderate yellowish orange to YR 6/6, soft to semi compact gypsum intercalated, shell fragments, clayey, flaky
					18		1.38	LIMESTONE:- Pale yellowish orange to YR 8/6, semi compact, clayey, Forams
					19		0.20	Core loss probably at clay stone
					20		0.45	CLAYSTONE:- Same as above unit

DRILL-HOLE NO LS-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
							0.15	
20.42	20.42						0.30	LIMESTONE:- very light gray N8, Compact, hard, crystalline, Fossiliferous, Siderite bands, Coarse granitic grains, Forams.
	20.85						0.17	
							0.26	Core loss at top
					21		0.74	LIMESTONE:- Same as above unit
							0.15	LIMESTONE:- White N9 to very light gray N8, Compact to very hard, Highly fossiliferous, Calcite crystals, Forams, Siderite
					22		1.09	Semi Compact near bottom.
23.03	23.03						0.20	CLAYSTONE:- Moderate yellowish brown 10YR 5/4 to Moderate
23.19	23.19						0.16	brown 5YR 3/4, Soft, Friable, Gypsum layering at places and intermixed, Calcareous.
							0.70	LIMESTONE:- Same as above unit.
					24		0.07	Core loss at bottom
							1.23	LIMESTONE:- Cream to white N9, loose to Semi Compact, Siderite, nodules, Forams.
					25		0.10	LIMESTONE:- Greenish orange 10YR 7/4, Semi Compact to Compact, Cherty
							0.15	Highly Fossiliferous, Sideritic, Gypsum bands, micaceous,
							0.15	Carby material.
	26.23				26		0.60	SHALE:- Moderate yellowish brown 10YR 5/4, Soft, Cherty material
26.23	26.23						0.10	Shell fragments, Calcareous
							0.15	LIMESTONE:- Greenish orange 10YR 7/4, Compact to hard, Highly
							0.15	fossiliferous, Gypsum intermixed, Calcareous
					27		2.55	SHALE:- Grayish brown 5YR 3/4 to dark yellowish orange 10YR 6/4, Soft to Semi Compact, Fossiliferous, Calcareous, Cherty layers, Gypsum at top.
							0.15	LIMESTONE:- Very pale orange 10YR 9/4 to dark yellowish orange 10YR 6/4, Semi Compact to Compact, Fossiliferous, Cherty - Carby material.
					28		0.06	SHALE:- Grayish brown 5YR 3/4, Semi Compact, Cherty flakes, Gypsum at bottom, Calcareous.
	28.93						0.15	Core loss
28.93	28.93				29		0.15	LIMESTONE:- White N9 to very light gray N9, Compact to hard, Sideritic nodules, Crystalline, Carby material, Calcite crystals, Gypsum intermixed.
							0.15	LIMESTONE:- White N9 to very light gray N9 and pinkish gray 5YR 4/4, Semi Compact, hard, nodular, Calcite crystals and veins in hollow patches, Sideritic nodules, Cherty flakes, crystalline, Forams in hard and crystalline portion, Shell fragments, Gypsum flakes and layers.
					30			Core loss at bottom probably
								LIMESTONE:- Very light gray N9, light gray N7, Compact & hard, Highly forams, (Cherty flakes), Pyrite, Silty, Calcite veins and crystals

DRILL-HOLE NO 2S-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE NO.	% CORED					
							1.48	MARLY LIMESTONE:- Medium dark gray N ₆ , Semi compact, Fossiliferous, Forams, siderite, clayey, Shell frag ments.
					31		0.32	SILTY LIMESTONE:- light gray N ₇ to light bluish gray SB 7/11, semi-compact to compact, Sideritic, Pyritic, Forams, Shell fragment, Sandy, Calcite veins
							0.90	SILTY LIMESTONE:- Medium light gray N ₆ to medium gray N ₅ , Silty, Root is same as above unit.
31.98		31.98			32		0.35	LIMESTONE:- very light gray N ₈ to light gray N ₇ , Compact to hard, Glauconite, pyrite, siderite, Crystalline, Silty, Sandy, Calcite lenses
							0.90	CARBON SHALE:- Dark gray N ₃ to Grayish black N ₂ , Soft to semi-compact, Fossiliferous, Pyritic, Small burrows, Shell fragments, Calcareous
					33		0.20 0.15 0.27	MARLY LIMESTONE:- Very light gray N ₈ to light gray N ₇ , Semi-compact to compact, Calcareous, Pyritic, Silty, Fossils.
34.00		34.00			34		0.50	CORE LOSS
							1.68	SILTSTONE:- Light gray N ₇ to medium gray N ₆ , Compact, Hard, Calcite crystals, Calcareous, Pyritic, Fossiliferous, Slit con. Side.
35.68		35.68			35			Silty SANDSTONE/SANDSTONE (INTERBEDDED):- Very light gray N ₈ , Compact, Hard, Fossiliferous, burrows, Shell fragments, Glauconite, Pyritic, Crumbly material, Coaly flakes, Fine grained sand interbedded, lightly calcareous
					36		2.44	Silty SANDSTONE/SANDSTONE (INTERBEDDED):- Same as above unit
					37			SANDSTONE:- Very light gray N ₈ to medium light gray N ₅ ; Semi compact to compact, very fine grained, Fossiliferous, calcareous, Pyritic, coaly coaly flakes.
38.12		38.12			38		0.34	SANDY SHALE:- Dark yellowish brown to YR 3/2 & brownish black SYR 2/1, Semi compact, very fine to fine grained, Sand intermixed, clayey, Siderite, Shale side, burrows, calcareous at places.
					39		1.83	
					40			

DRILL-HOLE NO 48-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								<i>2nd side</i>
							0.53	SILTSTONE: - Medium light gray N ₆ to light bluish gray 5B; Semi Compact, Calcareous, Fossiliferous, Shell fragments, Sandy near bottom.
		41.17			41		0.35	Core loss at bottom probably
41.17							0.66	SILTSTONE: - Same as above unit but less and Coaly flakes near bottom.
					42		0.78	CARBYSHALE: - Dusky yellowish brown 10YR 2/2 to brownish black 5YR 2/1, Semi Compact, Rare Calcareous, Sandy, Glauconite at top, Coaly Coaly flakes, Shale side.
							0.25	SANDSTONE (CLAYSTONE INTERMIXED): - Brownish black 5YR 2/1, Semi Compact, Coaly Coaly flakes.
					43		0.22	
							0.60	SILTY SANDSTONE: - Greenish black 5GY 2/2, Semi Compact, Very fine grained, Siliceous, clayey, Coaly Coaly flakes.
		44.22			44		0.43	CLAYSTONE: - Same as above unit
44.22							0.11	SILTY SANDSTONE: - Same as above unit
								Core loss probably at bottom
					45		3.05	SANDY SILTSTONE: - Dark gray N ₃ to olive gray 5Y 4/1, Semi Compact to Compact, Coaly Coaly flakes, very fine grain sand, muscovite, siderite, Pyrite, Fossil hash of 0.30m near bottom.
					46			CARBYSHALE: - Grayish black N ₂ , Semi Compact, Coaly flakes, Pyrite nodules, Silty Coaly flakes.
		47.27			47			SILTSTONE: - Dark gray N ₃ , Semi Compact to Compact, Pyrite, Coaly Coaly flakes, Fossil burrows.
47.27							0.34	CARBYSHALE: - Same as above unit but less.
					48		0.87	
					49		1.84	
					50			

DRILL-HOLE NO LS-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
50.32	50.32							0.07 CARBY SHALE: - Same as above unit
					51		1.18	CLAYSTONE: - light bluish gray 5B7, Compact, Coaly, wavy flakes, Pyritic, Silty, Sandy streaks, sideritic.
								Core loss at bottom
							0.35	CLAYSTONE: - Same as above unit
51.92	51.92				52		0.23	CARBY SHALE: - Medium gray N5 to medium dark gray N4, SemiCompact, Coaly, wavy flakes, Sideritic, Pyritic.
							0.68	CLAYSTONE: - Same as above unit
							0.26	LIMESTONE: - light bluish gray 5B7, to light gray N7, Compact, Fossiliferous, Sandy, Silty, Coaly flakes at places.
					53		0.88	LIMESTONE: - Same as above unit
53.97	53.97				54			Core Loss
					55		2.93	LIMESTONE: - Same as above unit
					56			
57.02	57.02				57		0.12	
57.02					58		3.05	
					59			
					60			
					61			

DRILL-HOLE NO LS-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
60.07								LIMESTONE:- Same as above unit
					61		2.60	core loss at bottom
					62			LIMESTONE:- Same as above unit
					63		0.45	LIMESTONE:- Same as above unit
63.12		63.12			64			core loss at bottom
					65		3.05	LIMESTONE:- Same as above unit
					66			core loss at bottom
66.17		66.17			67		0.90	LIMESTONE:- Same as above unit
					68		0.39	core loss at bottom
67.46		67.46			69		0.94	LIMESTONE:- Medium gray N5 to Greenish black 5 G121, Semiconcompact to Compact, Sandy, clayey near bottom, Fossils, shell fragments, crinoid material.
					70		0.52	
68.75		68.75						

DRILL-HOLE NO/S-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
					71			Limestone
					71		0.87	Core loss at bottom
		72.03			72			LIMESTONE:- Medium gray N5 to greenish black 5Gx2, Semiconpact to Compact, Sandy, clayey near bottom, Fossils, shell fragments, coraly material.
					72		0.91	LIMESTONE:- Same as above unit
	72.94				73			
					74		2.60	Core loss at bottom
					75			LIMESTONE:- Same as above unit
					75		0.45	LIMESTONE:- Same as above unit but Pyrite
	75.99	75.99			76			Limestone
					77		2.37	
					78			
	78.36	78.36			79		1.29	
					80			
	79.65							
	79.01							

DRILL-HOLE NO 25-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
					81		3.05	LIMESTONE:- Medium gray N5 to greenish black 5GY 2/1, Semi Compact to Compact, Sandy, clayey near bottom, Fossiliferous, shell fragments, carbony material.
					82			LIMESTONE:- Light gray N7 to greenish black N2, Semi Compact to Compact, Fossiliferous, Sandy, Silty, shell fragments, carbony material, coaly flakes, Sandy streaks near bottom.
82.70	82.70				83		1.27	SILTSTONE:- Grayish black N2, Semi Compact, Siderite, Pyrite, clayey, coaly, carbony flakes, Fossiliferous, calcareous at top.
					84		0.25	Core loss at bottom probably
84.45	84.45				85		0.23	CLAYSTONE:- Grayish black N2, Semi Compact, Silty at places, Slickensided, Fossiliferous, Siderite, shell fragments, carbony layers.
					86		1.50	SILTSTONE:- Olive gray 5Y 3/2, Semi Compact, Fossiliferous, calcareous, Sandy, Coarse grained sand at places, shell fragments, carbony and coaly flakes, clayey at places.
					87		1.55	SANDSTONE:- Olive gray 5Y 3/2, Semi Compact, very fine grained to fine grained, clayey at places, Fossiliferous, shell fragments, Pyrite filled the shell at places, Siderite, carbony material.
87.50	87.50				88		3.05	
					89			
					90			
					91			

DRILL-HOLE NO 28-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								SAND stone
90.55		90.55			91			SANDSTONE:- Same as above unit
					92		3.05	SANDSTONE:- Medium dark gray N ₄ to greenish black 5GY 2/1, rest is same as above unit
					93			SILTSTONE:- Medium dark gray N ₄ to greenish black 5GY 2/1, Semiconpact, clayey, Siderite, Pyrite, corby traces, Rare shell fragments
93.60		93.60			94		1.70	CLAYSTONE:- Grayish black N ₂ , Semiconpact, silty at places, slickenside, Fossils, siderite, shell fragments, corby layers.
					95			
					96		1.35	
96.65		96.65			97			Core loss at bottom probably claystone,
					98		2.65	
					99			
					100		0.25	
99.70								

DRILL-HOLE NO LS-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
					101		1.50	CLAYSTONE:- Grayish black N ₂ , Semi compact, silty, at places, Shale on side, Fossils, Siderite, shell fragments, Coaly layers.
					102		0.55	FOSSIL MASH:- Medium gray N ₅ , Fossiliferous,
							0.84	Colours, Pyrite at places, Matrix, Glauconite, Shell fragments
102.59		102.59			103		0.85	CLAYSTONE:- Same as above unit
					104			CLAYSTONE:- Same as above unit
					105		2.40	LIMESTONE:- Dark gray N ₃ to light gray N ₇ , Semi-compact to Compact, Fossiliferous, Pyrite at places, Glauconite, Silty near top and bottom, crystalline.
105.48		105.48			106		0.65	LIMESTONE:- Same as above unit but not so hard, Sideritic and silty.
					107		0.92	SANDSTONE:- Dark greenish gray 5Gx4p, Soft, Semi compact, very fine to fine grained, Pyrite scattered, Sideritic, Coaly and Coaly flakes, Moderately sorted.
107.62		107.62			108		1.21	SILTY CLAYSTONE:- Dark greenish gray 5Gx4p, Soft to Semi compact, Sandy near top, silty, pyritic, coaly matrix.
108.73		108.73			109		1.55	CLAYSTONE/SANDSTONE (INTERLAYERED, INTER-MIXED):- olive black 5Y3p to medium gray N ₅ , Soft, Semi compact, Burrows, Very fine grained sand, Siderite, coaly and pyrite layers near top, Congl. streaks.
								CLAYSTONE/SANDSTONE (INTERLAYERED, INTER-MIXED):- Same as above unit

DRILL-HOLE NO L8-9

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
							1.55	<i>Medium gray N5, Semi Compact, Sandy</i> <i>SANDY SILTSTONE:-</i>
							0.40	<i>Sideritic, Rare fossils, Burrows, clay parting,</i> <i>corby material.</i>
							1.10	<i>SILT SANDSTONE:-</i> <i>Medium gray N5, Compact, Hard,</i>
111.88		111.88			112		0.18	<i>very fine, silty, clayey, Rare Fossils, Pyrite at places</i>
							0.64	<i>Calcareous near top, Silty band .05m.</i>
					113			<i>SILTY SANDSTONE:-</i> <i>Same as above unit</i>
								<i>Core loss</i>
							2.23	<i>SANDY SILTSTONE:-</i> <i>Medium dark gray N4, Compact,</i> <i>Fractured, sandy flakes, siderite, corby and coaly</i> <i>material at places, Pyrite.</i>
					114			
								<i>SILTY CLAYSTONE:-</i> <i>Medium dark gray N4, Compact, silty,</i>
114.93		114.93			115			<i>Fissile, siderite, sandy streaks, corby flakes at places</i>
					116		2.39	<i>CLAYSTONE:-</i> <i>Medium dark gray N4, Compact, Fiss</i> <i>Sideritic, corby material, slickenside, Pyrite and</i> <i>Fossils at places.</i>
					117			<i>CLAYSTONE:-</i> <i>Medium dark gray N4, greenish black</i> <i>5G41, Semi Compact to Compact, Glauconite, Siderite,</i> <i>Slickenside, Coaly corby traces, more fossils</i> <i>near bottom grades into fossil hash.</i>
117.32		117.32					0.66	
117.98		117.98			118			
							1.82	<i>FOSSIL HASH:-</i> <i>Dark greenish gray 5G41, Semi Compact,</i> <i>clayey and silty matrix, Forams, Glauconite,</i> <i>Siderite, Calcareous.</i>
					119			
					120			

DRILL-HOLE NO 25-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								LIMESTONE:- Dark greenish gray 5G 4 1/2 to light gray N7. Compact, Hard, Silty, Clayey in upper half, Fossiliferous, Glauconitic, Siderite
121.03		121.03			121		0.73	
							0.42	LIMESTONE:- Same as above unit
							0.18	
					122		2.15	FOSSIL HASH:- Dark greenish gray 5G 4 1/2, Semi Compact Clayey and silty matrix, Forams, Glauconite, Siderite Calcareous.
					123			SANDSTONE:- Brownish black 5G Y 2 1/2 to light gray N7, loose, Semi Compact, Fine grained, Coaly partings in upper half and fine to coarse grained in lower half, Carby material, Glauconitic
124.08		124.08			124		0.3	
							1.35	Core loss at bottom SANDSTONE:- Same as above unit
					125			Core loss at bottom
					126		1.39	Core loss at top
126.82		126.82			127		0.10	CLAYSTONE:- Dark gray N3 to olive black 5Y 2 1/2, Compact Fissile, Siderite, Pyrite, Sandy layers, Carby and Coaly traces, Fossils.
							1.88	CLAYSTONE:- Same as above unit
					128			Core loss
128.70		128.70			129		0.18	CLAYSTONE:- Same as above unit.
							0.60	
					130		0.70	

DRILL-HOLE NO 65-5

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
130.17	130.17						0.30	SILTY CLAYSTONE: - Medium light gray N ₆ , Semi Compact to Compact, silty, sandy, pyritic, siderite, glauconitic, coaly carbony traces, calcareous.
					131		0.74	
							0.30	CLAYSTONE: - Dark gray N ₃ to olive black 5Y2/1, Compact, Fissile, siderite, pyrite, sandy layers, coaly and carbony traces, fossils.
					132		0.54	
							0.12	
							0.20	
							0.85	SANDSTONE: - Dark gray N ₃ , Loose to semi compact, silty, clayey, very fine to fine grained, poorly sorted, pyrite, coaly carbony flakes, glauconite at places
133.22	133.22				133			CARBON SHALE: - Grayish black N ₂ , Semi Compact, coal partings, pyrite, sandy patches and layers
					134		1.73	SILTSTONE: - Dark gray N ₃ , Semi Compact, sandy, clayey, pyrite, coaly carbony flakes.
					135		0.35	SANDSTONE: - Same as above unit
								Core loss at bottom
					136		0.97	SANDSTONE: - Medium gray N ₅ , Compact, very fine grained, silty, clay flakes, fossils, forams, shell fragments towards bottom, siderite, silty near bottom, pyrite, glauconite
136.27							0.34	
							0.34	SANDY SILTSTONE: - Medium gray N ₅ , Semi Compact to Compact, sideritic nodules scattered, burrows, very thin coaly carbony traces, rare shell fragments, pyrite at places
137.00					137		2.25	CLAYSTONE: - olive black 5Y2/1 to dark gray N ₃ , Semi hard to Compact, silty at top, sandy layers at places, siderite throughout the unit, coaly carbony traces, fissile, shell fragments, forams towards bottom, A hard band of s. brittle at 0.10 m near bottom, slickenside at one place
					138			
					139			
139.32					140		1.11	CLAYSTONE: - Same as above unit
								Core loss at bottom
								Core loss at top
								CLAYSTONE: - Same as above unit but glauconitic
								CLAYSTONE: - Same as above unit but sticky, shell fragments towards bottom, silty.

DRILL-HOLE NO 25-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								SILTSTONE/FOSSILIFEROUS: - Greenish gray 5 G 6/1 to medium light gray N ₆ , Semi compact to Compact, Pyritic, glauconitic, Calcareous.
					141		0.50	
							0.40	LIMESTONE: - Light gray N ₇ , Hard, Compact, Fossiliferous, Glauconite, Pyrite, Calcite
							0.25	
					142		0.75	SILTSTONE: - Greenish gray, clayey, Pyrite scattered glauconite, Forams, Shell fragments, Slightly muddy.
142.36		142.36					0.58	LIMESTONE: - Same as above unit but crystals fine
					143		0.30	LIMESTONE: - Light gray N ₇ , Hard, Compact, Fossiliferous, Glauconite, Pyrite, Calcite
							0.48	SILTSTONE: - Greenish gray clayey, Pyrite scattered, glauconite, Forams, Shell fragments, Slightly muddy.
					144		0.95	CLAYSTONE: - Medium dark gray N ₄ to medium gray N ₅ semi hard to compact, Pyrite, glauconite, Shell fragments, sticky, fractured at top.
					145		0.74	SILTSTONE: - Full of glauconite coarse grains, calcareous Shell fragments, Forams
145.41		145.41					0.35	CLAYSTONE: - Dark gray N ₃ , Semi hard, Coaly coaly traces at top, Wood fragments pyritized, burrows, Fine grained sandy lamination through out the unit, more sandy towards bottom.
					146		1.08	
					147		1.02	CORE LOSS AT 145
							0.60	SANDY CLAYSTONE: - Dark gray N ₃ , Olive black 5Y 2/1, Semi hard, Compact, Fine grained sand inter laminated with clay stone, Pyrite abundant, Coaly coaly traces, slickenside at one place, vertical burrows filled with pyrite, Glauconite intermixed in sandy lamination.
148.46		148.46			148			
					149			SANDSTONE: - Dark gray N ₄ 5 G 4/1 to medium gray N ₅ to semi compact, Fine grained intermixed with glauconite clayey partings.
					150			CLAYSTONE/SANDSTONE (INTERLAMINATED): - Dark gray N ₃ , medium hard, Compact, Fine grained sand inter laminated with clay stone, Glauconite Coaly coaly traces, Rare Pyrite

DRILL-HOLE NO. S-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
					151		3.05	CLAYSTONE:- Medium Dark gray N ₄ , Semi hard to compact, sideritic layers in the upper half, Fractured in the middle, Shell fragments throughout the unit, Slickenside, Rooted.
151.51					152		0.52	SANDSTONE:- Medium gray N ₅ to medium dark gray N ₄ , loose, soft, very fine to fine grained, Glauconite, Pyrite, Coaly conchoidal flakes, Poorly sorted, Shell fragments, siltstone band of 0.04 m at top
					153		1.74	SHALE/SANDSTONE (INTERLIMINATED):- Grayish black N ₂ to medium gray N ₅ , Semi compact, Coaly partings, Coaly material, Coaly shale grades into coal (0.03) towards bottom, Resin, Shell fragments, Pyrite, Very fine sand intermixed with glauconite
154.56					154		0.36	COAL:- Black N ₁ to Brownish black 5Y R 2/1, very light, Resin, Pyrite
					155		0.16	CARBONY SHALE:- Black N ₁ to Brownish black 5Y R 2/1, Semi compact, Fissile, Coal partings throughout the unit, Pyritic, Resins, Sandy, Sand increases towards bottom
					156		0.27	SANDSTONE:- Dark gray N ₃ , Compact, very fine sand grain, Glauconite, Pyritic, Coaly conchoidal flakes, Clay partings near top, Pyrite disseminated.
157.60					157		0.73	SANDSTONE:- Dark gray N ₃ , Compact, very fine sand grain, Glauconite, Pyritic, Coaly conchoidal flakes, Clay partings near top, Pyrite disseminated.
					158		0.40	SANDSTONE:- Dark gray N ₃ , Compact, very fine sand grain, Glauconite, Pyritic, Coaly conchoidal flakes, Clay partings near top, Pyrite disseminated.
					159		0.38	SANDSTONE:- Dark gray N ₃ , Compact, very fine sand grain, Glauconite, Pyritic, Coaly conchoidal flakes, Clay partings near top, Pyrite disseminated.
					160		1.13	SANDSTONE:- Dark gray N ₃ , Compact, very fine sand grain, Glauconite, Pyritic, Coaly conchoidal flakes, Clay partings near top, Pyrite disseminated.
					161		0.40	SANDSTONE:- Dark gray N ₃ , Compact, very fine sand grain, Glauconite, Pyritic, Coaly conchoidal flakes, Clay partings near top, Pyrite disseminated.
					162		0.36	SANDSTONE:- Dark gray N ₃ , Compact, very fine sand grain, Glauconite, Pyritic, Coaly conchoidal flakes, Clay partings near top, Pyrite disseminated.
					163		0.32	SANDSTONE:- Dark gray N ₃ , Compact, very fine sand grain, Glauconite, Pyritic, Coaly conchoidal flakes, Clay partings near top, Pyrite disseminated.
					164		0.32	SANDSTONE:- Dark gray N ₃ , Compact, very fine sand grain, Glauconite, Pyritic, Coaly conchoidal flakes, Clay partings near top, Pyrite disseminated.
					165		0.32	SANDSTONE:- Dark gray N ₃ , Compact, very fine sand grain, Glauconite, Pyritic, Coaly conchoidal flakes, Clay partings near top, Pyrite disseminated.
					166		0.32	SANDSTONE:- Dark gray N ₃ , Compact, very fine sand grain, Glauconite, Pyritic, Coaly conchoidal flakes, Clay partings near top, Pyrite disseminated.
					167		0.32	SANDSTONE:- Dark gray N ₃ , Compact, very fine sand grain, Glauconite, Pyritic, Coaly conchoidal flakes, Clay partings near top, Pyrite disseminated.
					168		0.32	SANDSTONE:- Dark gray N ₃ , Compact, very fine sand grain, Glauconite, Pyritic, Coaly conchoidal flakes, Clay partings near top, Pyrite disseminated.
					169		0.32	SANDSTONE:- Dark gray N ₃ , Compact, very fine sand grain, Glauconite, Pyritic, Coaly conchoidal flakes, Clay partings near top, Pyrite disseminated.
					170		0.32	SANDSTONE:- Dark gray N ₃ , Compact, very fine sand grain, Glauconite, Pyritic, Coaly conchoidal flakes, Clay partings near top, Pyrite disseminated.

DRILL-HOLE NO. LS-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE #					
160.35	160.35						0.47	CLAYSTONE: - olive black 5Y 2/1, Compact, Silty, Pyritic, Siderite band on top, Sandy layers, Coaly crinoid traces, Glauconite in sandy part.
					161		0.68	SILTY CLAYSTONE: - olive black 5Y 2/1, Compact, Hard, Fossiliferous, Shell fragments, Pyrite, Coaly crinoid traces, Silty, Small burrows, Calcareous
					162		1.15	SILTSTONE: - light gray N7 to greenish gray 5G 4/1, Hard, Compact, Fossiliferous, Glauconite, Pyrite, Forams, Shell fragments, Calcareous, Sandy near bottom.
162.18	162.18						0.68	SANDY SILTSTONE: - Dark gray N3 to dark greenish gray 5G 4/1, Compact, Hard, Fossiliferous, Sandy, clayey near bottom, Shell fragments, Siderite, Glauconite
					163		0.74	CLAYSTONE: - Dark gray N3 to brownish black 5Y 2/1, Semi-compact to Compact, Silty near top, Pyrite disseminated and lenses, Slickenside at bottom
163.70	163.70						0.10	CORE LOSS at bottom
					164		1.82	CLAYSTONE: - Dark gray N3, Compact, Fractured, Coaly crinoid traces, Pyrite filled the vertical burrows, silty, Siderite slickenside, Glauconite near bottom, Sandy near bottom
					165			SANDSTONE: - Dark greenish gray 5G 4/1 to dark gray, Soft, Semi-compact, Fine grained, Glauconite, Pyrite, Siderite, Coaly crinoid traces, claystone bands near top
					166		1.23	SANDSTONE: - Same as above unit
								SILTSTONE: - Dark gray N3 to olive black 5Y 2/1, Semi-compact to Compact, mud bands intermixed near top, sandy layers, Siderite, Coaly crinoid traces, Pyrite, Slickenside, Glauconite, Coaly partings at bottom
166.75	166.75				167		0.35	COIL: - Black N1, Pyritic, Resins, light weight.
					168			COIL: - Same as above unit
					169		1.92	CLAYSTONE: - Gray to black N2 to dark gray N3, Compact, Siderite, slickenside, dirt, Coal lens of 0.01 m at top, Sandy, burrowing, small forams near bottom, Glauconite in sandy partings.
169.80	169.80				170		0.28	

DRILL-HOLE NO 13-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								clay stone
					171		1.32	SANDSTONE: - Dark greenish gray 5GY 4/1 to dark gray N ₃ , soft, semi compact, fine grained, glauconite, Pyrite, siderite, clay stone bands intermixed near top, coaly, crinoid traces.
					172		0.45	SILTSTONE: - Dark gray N ₃ to olive black 5Y 2/1, semi compact to compact, mud bands intermixed near top, sandy layers, sideritic, coaly crinoid traces, Pyrite, slicken side, glauconite, coaly partings at bottom
172.84	172.84				173		0.98	SANDSTONE: - Dark greenish gray 5GY 4/1 to dark gray N ₃ , soft, semi compact, fine grained, glauconitic, siderite, clay stone bands intermixed near top, coaly crinoid traces, Pyrite
					174		0.19	CLAYSTONE: - Medium dark gray N ₄ , compact, hard, sand interlayered through out the unit, coaly crinoid flakes, glauconite, slicken side, sand increases towards bottom.
					175		1.20	SANDSTONE: - Dark greenish gray 5GY 4/1, soft, semi compact, fine grained, moderately sorted, clay glauconite, Pyrite
					176		0.44	SILTSTONE/SANDSTONE (INTERMIXED): - Dark greenish gray 5GY 4/1, semi compact, Pyrite disseminated, Basal glauconite
					177		0.24	SANDSTONE: - Dark gray N ₃ to grayish black N ₂ , semi compact, soft, coaly material, coaly crinoid flakes intermixed throughout the unit, fine grained, rare coarse grained
					178		1.17	SANDSTONE: - Same as above unit but clay intermixed near bottom.
173.94	173.94				179		1.40	SILT/CLAYSTONE: - Dark gray N ₃ , olive black 5Y 2/1, semi compact, siderite, clay stone and sand intermixed at top, coaly crinoid traces, Pyrite, slicken side, more silty in lower half, fine silty at bottom in silty portion, calcareous.
					180		1.65	SILTSTONE: - Light gray N ₇ to medium gray N ₅ , semi compact to compact, grey near bottom, highly fossiliferous, shell fragments, rare Pyrite, calcareous, friable, coaly material
					181		2.50	

DRILL-HOLE NO 23-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								Siltstone
					181			COAL: Black N ₁ , Pyritic, Resinous, light weight
								CARBYSILTSTONE: Dark gray N ₃ , grayish black N ₂
								Semi Compact to Compact, Coaly partings at middle, Coaly, coaly material throughout the unit, Sand intermixed near top, Pyritic, Resinous
							0.07	
							0.34	Core loss at bottom
181.99	181.99				182		0.44	SANDY SILTSTONE: Dark gray N ₃ , Semi Compact, Sand intermixed, Pyritic, Coaly, coaly flakes, Sideritic near bottom, Pyrite filled the burrows
					183		2.00	SILTY SANDSTONE: Dark gray N ₃ , Semi Compact, Soft, very fine grained moderately sorted, Pyrite filled the burrows, Glauconite
					184			SILTY SANDSTONE: Same as above unit but coaly shale of 0.06 m at middle.
							0.74	
184.73	184.73				185		1.68	SANDSTONE: Medium dark gray N ₄ , loose, soft, clay stone intermixed at places, Fine to medium grained, Coaly, coaly flakes, Glauconite.
					186			Core loss at bottom
								SANDSTONE: Same as above unit.
186.41	186.41				187		1.24	CLAYSTONE: Dark gray N ₃ , Compact, Hard, Sideritic, Sandy at top and bottom, Coaly, coaly, teacoss like on side.
							0.44	
188.09	188.09				188		0.96	
					189		1.20	
					190			

DRILL-HOLE NO 25-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
							0.24	SANDSTONE:- Dark greenish gray 5GY4/1, loose, soft,
							0.40	Fine grained, Pale medium grains, Glauconite, clay
							0.30	at top and. Coaly flakes
191.13		191.13			191			SANDSTONE:- light gray N7, medium light gray N6 hard
							1.23	to compact, calcareous, Fine grained, Coaly
					192			coaly material, Pyrite near bottom in soft s/st.
								Core Loss at bottom
								SANDSTONE:- Medium dark gray N4, soft, loose, semi-
					193		1.82	compact, Fine grained, Glauconite, coaly nodules
								CLAYSTONE:- Medium dark gray N4, compact, hard,
								sandy, silty near top, silty, pyrite filled the
								burrows
		194.18			194			CLAYSTONE:- Same as above unit but Fossils
194.18								and Glauconite near bottom.
								SILTSTONE/LIMESTONE:- Medium light gray N6, Hard
					195		1.60	to compact, Fossiliferous, Forams, Sandy near
								bottom, Glauconite, Calcareous.
								SANDSTONE:- Medium dark gray N4, soft, loose,
					196		1.20	semicompact, Fine grained, Glauconite, Coaly
								coaly traces, Calcareous.
								SANDSTONE:- Same as above unit but calcareous
								coaly partings near bottom.
		197.23			197		0.25	COAL:- Black N1, light, dirty, Resin
197.23							0.38	CARBON SHALE:- Black N1, grayish black N2, Semi
							0.24	compact, Coaly Coaly partings near top, Coaly
								coaly flakes through out the unit, pyritic,
					198		0.10	Sandy near bottom.
							0.33	SANDSTONE:- Grayish black N2, soft, semi-
								compact, Coaly streaks, Coaly coaly flakes,
					199		1.42	Fine grained, Resin, Clay.
								SILTY CLAYSTONE:- Medium dark gray N4, Hard,
								compact, Gray coaly traces and sandy near
					200			top, Pyrite filled the burrows, Fossils,
								Glauconite.

DRILL-HOLE NO. L.S.-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
		200-28					28	SANDY SILTSTONE: Greenish black 5 GY 2/1, Semi Compact to Compact, Fossiliferous, calcareous, Pyrite, Siderite, Coaly Coaly material, Coaly parting at bottom, Resins
200	28						0.7	
					201		0.60	DIRTY COAL: - Black N1, Brownish black 5Y R2/1, Fossiliferous, Resins, Pyritic.
							0.75	
					202		0.93	SANDY SILTSTONE: - Dark gray N3, Semi Compact, Coaly Coaly material, dirty coal bands 0.06 m near top, sideritic bands near bottom, Sandy, Pyritic
		203-33			203		0.50	SANDSTONE: - Dark gray N3, Semi Compact, Fine grain Siderite, Coaly Coaly traces, Pyrite, Coaly streaks
203	33							CLAYSTONE: - Medium light gray N6, dark gray N3, Compact to Red, Coaly Coaly traces, Pyrite, Slickenside, Sandy.
					204		1.87	Core loss at bottom
								CLAYSTONE: - Same as above unit but fossils towards bottom
					205			Core loss at bottom
		205-36					0.76	CLAYSTONE: - Same as above unit
205	36						0.32	SANDSTONE: - Medium dark gray N4, Compact, very fine grained to medium grained as patches, Coaly Coaly material, Pyrite.
							0.24	
					206		0.14	
		206-37					0.21	CLAYSTONE: - Medium gray N5, Compact, Hard, Sandy, Coaly Coaly material.
206	37							SANDSTONE: - Dark greenish gray, 5G 4/1, Compact very fine to medium grained as patches, Pyrite, Coaly Coaly material.
					207		3.05	Core loss at bottom
								SANDSTONE: - Same as above unit but coarse sand grains at bottom.
					208			
					209			SANDSTONE: - Medium gray N5, Medium dark gray N4, loose, soft, medium to coarse grained Coaly Coaly material, Glauconite, clayey, Coal parting, near bottom
					210		1.10	

DRILL-HOLE NO. 5-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								Sandstone
								Core loss at bottom
								Core loss at top
					211		1.95	SANDSTONE:- Same as above unit
					212			COAL:- Black N ₁ , light, Resins, Pyrite
212.47		212.47			213		1.61	SANDY CLAYSTONE:- Grayish black N ₃ , Compact Coaly carby flakes, sandy, Pyrite
					214		0.84	SANDSTONE:- Medium dark gray N ₄ , Semi Comp act to Compact, clayey, Coaly carby flakes, very fine grained, Pyrite
					215		0.60	
215.52		215.52			216		0.25	CLAYSTONE:- Medium dark gray N ₄ , olive black 5% p.p. Compact, Sandy, Sidesite, Coaly carby traces, Pyrite, sandy layers, slicken side
					217		1.65	
					218		1.14	CLAYSTONE, Same as above unit
218.56		218.56			219			
					220			

DRILL-HOLE NO 25-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								clay stone
							2.57	SILTSTONE:- Brownish grey 5Y R 4/1 to olive grey 5Y 4/2 Hard, compact, Siderite, Fossils, Shell fragments, Glaucinite, Slickenside, calcareous, Fossiliferous near bottom.
221.13		221.13					0.89	SANDY LIMESTONE:- Light grey N7, very hard, compact, quartz grains, Fossils, Glaucinite, crystalline clayey at bottom and grades into clay stone
							1.18	SANDY CLAYSTONE:- Dark grey N3, Sandy, Fossiliferous at places, coaly carbony traces, Pyrite, Sand increasing towards bottom.
							0.45	
							0.53	SANDSTONE:- Medium grey N5, soft, semi compact, very fine grained, moderately sorted, calcareous, Fossils, Pyrite scattered, clayey, Siderite, medium grained at places.
224.18		224.18					0.63	
							0.90	SANDSTONE:- Same as above unit
							1.52	SANDY SILTSTONE:- Medium grey N5, semi compact, Siderite, sandy lignite, coaly carbony traces, Pyrite
227.23		227.23					2.25	SILTY CLAYSTONE:- Medium grey N5, compact, Siderite, coaly carbony traces, Pyrite, Glaucinite, Fossils, Shell fragments, Slickenside.
								SILTY CLAYSTONE:- Same as above unit, but more Siderite, calcareous towards bottom
								SILTSTONE:- Dark greenish grey 5G 4/1, semi-compact, Hard, Glaucinite, Siderite, clayey Fossils, Shell fragments, Pyrite, calcareous

DRILL-HOLE NOZ S-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
230	5	232	0				0.42	SILTSTONE:- Same as above unit
							0.12	SANDSTONE:- Dark greenish gray SG 4/1, Semi com
					231		0.40	Coarse grained, Glauconite, Pyrite, Coaly calc
							0.50	traces, Calcareous.
					232		1.51	CARBON SHALE:- Dark gray N3, grayish black N
								Semi compact, Coaly, Coaly flakes, FISS,
								Sandy, Pyrite, Coal streaks.
					233			SANDY SILTSTONE:- Dark gray N3, Semi comp
								Coaly coaly material, Coaly coaly flakes, Py,
								Sandy.
233	20	233	20					SANDSTONE:- Medium Dark gray N4, Semi com,
					234		2.87	very fine grained, Coaly coaly traces at top,
								Pyrite filled the burrows, Siderite.
					235			SANDSTONE:- Same as above unit but clay
								stone inter laminated.
								Core loss at bottom
					236		0.17	CLAYSTONE/SANDSTONE (INTERBEDDED
								AND INTERLAMINATED):- Medium dark
								gray N4, Semi compact, Soft, Coaly calc
								material, Glauconite, Coaly flakes.
236	24	236	24				1.05	SANDSTONE:-
					227			Medium dark gray N4, Medium
								gray N5, Soft, loose, Semi compact, Fine
					238		1.63	grained, Glauconite, clay stone inter
								laminated
								Core loss at bottom
					239		0.27	CLAYSTONE/SANDSTONE (INTERLAMIN
								ATED):- Dark gray N3, Semi compact to
								compact, Coaly coaly material, Pyrite,
								Siderite rare.
239	29	239	29				1.27	

DRILL-HOLE NO/ S-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
					241		1.07	CLAYSTONE: Dark greenish gray 5G4/1, Soft, Semi Compact, Coaly, waxy flakes, Fine grained, Glauconite, Siderite, Rare Fossils
					242		0.53	CLAYSTONE: Grayish black N ₂ , Medium dark gray N ₄ , Compact, Coal partings near top, Pyrite, Siderite Sand interlayered.
							0.18	Core loss at bottom
242.34					243		2.18	CLAYSTONE: Olive gray 5Y4/1, dark gray N ₃ , Compact, Siderite, Sand interlayered, Coaly waxy traces, Pyrite, Rare fossils
					245		0.87	SANDSTONE: Dark greenish gray 5G4/1, Soft, Semi Compact, Coaly waxy flakes, Fine grained, Glauconite, Siderite, Rare Fossils, Calcareous.
					245		0.42	SANDSTONE: Same as above unit.
245.39					246		0.58	SANDSTONE/CLAYSTONE (INTERBEDDED AND INTERLAYERED): - Medium dark gray N ₄ , dark gray N ₃ , Semi Compact, Soft, Coaly waxy material, Glauconite, Coaly flakes.
					247		0.60	CLAYSTONE: Grayish black N ₂ , medium dark gray N ₄ , Compact, Coal partings near top, Pyrite, Siderite, Sand interlayered.
					248		0.69	SANDSTONE: Grayish black N ₂ , Dark gray N ₃ , Semi Compact, Coaly streaks throughout the unit, Coaly waxy flakes, Pyrite, Fine grained sand.
247.98							0.37	Core loss at top
					249		0.34	SANDSTONE: Same as above unit.
249.04							0.40	CLAYSTONE: Medium dark gray N ₄ , Compact, Coaly sand intermixed, Coaly waxy traces, Coarse gr. Glauconite, Sandy layers.
								SANDSTONE: Dark greenish gray 5G4/1, Semi Compact, Claystone interlayered, Glauconite, Pyrite, Coaly waxy flakes, Siderite, Fine grained

DRILL-HOLE NO 23-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
					251		2.20	SANDSTONE:- Same as above unit
					252			SANDSTONE:- Same as above unit
252.09		252.09			253			SANDSTONE:- Same as above unit but calcareous and medium to fine grained
					254			CLAYSTONE/SANDSTONE (INTERBEDDED) Medium dark gray N4, dark gray Semi Compact, Soft, Coaly Coaly material, Glaucon Coaly flakes.
					255		0.34	SANDSTONE:- Dark greenish gray 5B x 4 1/2, medium dark gray N4, Soft, Semi Compact, claystone interbedded, Glauconite, Pyrite, Coaly Coaly flakes, siderite, Fine grained.
255.14		255.14			256		0.50	CLAYSTONE:- olive gray 5Y 4/1, Semi Compact, Fractured, Pyrite, Coaly Coaly flakes, Sand intermixed.
					257		2.21	SANDSTONE:- Dark gray N3, Soft, Semi Compact, Fine grained, Coarse grained at places, claystone intermixed throughout the unit, Coaly Coaly flakes, Fossil
					258		0.23	
258.19		258.19			259		1.65	
					260			

DRILL-HOLE NO LS-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								Same as above
							0.38	SANDSTONE/CLAYSTONE (INTERMIXED): - Medium gray N ₄ , soft, semi compact, fine to coarse grained, Fossiliferous, Glauconite, shell fragments, Pyrite
260.60		260.60					0.15	
					261			Core loss at bottom
					262		3.05	SANDSTONE: - light gray N ₃ , medium dark gray N ₄ , loose, soft, Rare pyrite to very fine grained, calcareous, traces of blacas, Fossils, shell fragments, Glauconite, claystone interbedded in lower portion.
					263			FOSSIL HASH: - light gray N ₇ , very light gray N ₈ , very hard, quartzitic, coarse grained, Full of Fossils, Fossils, shell fragments, medium grained band on top, Glauconitic calcareous material
263.65		263.65			264		0.40	
					265		1.31	SILTSTONE/SANDSTONE (INTERBEDDED): - Medium dark gray N ₄ , light gray N ₇ , sandstone beds very hard, compact, Rare coarse grained, calcareous, Fine grained, Glauconite, shell fragments.
					266		1.03	
							0.31	SILTSTONE: - Dark gray N ₃ , medium dark gray N ₄ , compact, very hard, calcareous at top, Fossil calcareous material, Rare pyrite, Rare pyrite, Calcite veins, shell fragments.
266.70		266.70			267		3.04	
					268			Core loss at bottom
					269			SILTSTONE: - Same as above unit.
269.37		269.37			270		3.04	SANDSTONE: - Greenish black S & G, semi compact, very fine grained, silty near top, Fossil Pyrite throughout the unit, calcareous, Glauconite, etc.

DRILL-HOLE NO 15-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								Sandstone
					271			SANDSTONE:- Same as above unit but coaly and coaly at places.
					272			Core loss at top
272.41		272.41			273			SANDSTONE:- Same as above unit but Coaly partings near bottom.
					274		3.05	
					275			CLAYSTONE AND SANDSTONE (INTERMIXED AND INTERLAYERED):- Grayish
275.46		275.46			276		0.11	black N ₂ , dark gray N ₃ . Semi compact & compact, coal partings at top, coaly coaly flakes, Pyrite, coarse grained as patches, Glauconite, Resins.
					277		1.30	
					278		1.64	CLAYSTONE AND SANDSTONE (INTERMIXED AND INTERLAYERED):- Same as above unit
					279		1.05	SANDSTONE:- light gray N ₂ , Medium gray N ₃ Compact towards top, soft, loose towards bottom, clayey near top, coaly coaly flakes Fine to medium grained, coarse grains at places, Pyrite, Resins, Glauconite
					280			

DRILL-HOLE NO 25-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
					281			Sandstone Core loss at bottom
		281.56			281		0.25	SANDSTONE:- Same as above unit but clay band of 0.06m at top.
281.56					282		0.97	CLAYSTONE/SANDSTONE (INTERMIXED AND INTER- LAYERED): Grayish black N ₂ , Dark gray N ₃ , Semi- compact, Compact, Coal partings at top, Coaly coaly flakes, Pyrite, Coarse grains as patches, Glauconite, Resins
					283		1.30	SANDSTONE:- Medium gray N ₂ , Soft, loose, Fine to medium grained, clayey, Pyrite rare
		284.61			284		0.78	SANDSTONE:- Grayish black 5G21, Dark gray N ₃ , Coarse grains as patches, Semi Compact, Fine to medium grained, claystone interlayered and intermixed, Coaly coaly flakes, Sideritic, Fossils, Pyrite at places
284.61					285			Core Loss at bottom
					286		2.99	SANDSTONE:- Same as above unit.
		287.65			287			Core loss at bottom
287.65					288		1.50	
					289		1.04	
					290

DRILL-HOLE NO LS-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
290.17		290.19			291		1.36	LIMESTONE/SANDSTONE (INTERBEDDED AND INTERMIXED): - Dark gray N ₃ , grayish black N ₂ , light gray N ₁ , semi compact, fine grained, calcareous, medium sized coarse grains as patches, Pyrite, Fossils
291.72		291.72			292		0.17	Core loss at bottom in loose sand
					293		1.44	Core loss at top
					294		1.61	SANDSTONE: - Medium gray N ₅ , loose, semi compact, medium grained, coarse grained as patches, Pyrite near bottom, a hard sand stone band of 0.10m at bottom, crystalline, quartzitic coarse grains, calcareous
294.77		294.77			295		0.48	SANDSTONE: - Light gray N ₇ , very hard, compact, crystalline, quartzitic coarse grains, calcareous, Pyrite, Coaly carbony material, meddus.
295.53		295.53			296		0.28	SILTSTONE: - Dark gray N ₃ , medium dark gray N ₃ , very hard, compact, calcareous at top, Fossils, Coaly carbony material, Rare Resins, Rare Pyrite, Calcite veins, shell fragments
					297		2.36	SILTSTONE: - Same as above unit
					298		0.69	Core loss at bottom
298.58		298.58			299		2.04	SILTSTONE: - Same as above unit
					300			

DRILL-HOLE NO LS-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								Siltstone
								Core loss at bottom
300.16		300.86			301		0.24	SANDSTONE:- Dark gray N3, Dark greenish gray S & Y4, Semi Compact, soft, very fine grained to medium grained, Coarse grains as patches, Fossils, Glauconitic, clay stone intermixed at bottom, Calcareous, siderite.
					302		1.58	
					303		0.20	CARBON SHALE:- Grayish black N2, Semi Compact, Carby Carby partings, Sandy streaks, Pyrite, Siderite.
					304		1.27	SANDY SILTSTONE:- Medium dark gray N4, Compact, Carby Carby traces, Pyrite, Sandy, Resins, Siderite at places.
303.91		303.91			305		1.45	SANDY SILTSTONE:- Same as above unit
					306		0.94	SANDSTONE:- Medium gray N3, Soft, Semi Compact, Carby Carby flakes, Pyrite, Fine to medium grained, clay interlayered at places
					307		0.38	SANDY SILTSTONE:- Medium dark gray N4, Semi Compact to Compact, Sandy, Carby Carby flakes, Pyrite
306.73		306.73			308		2.44	Core loss at bottom
					309			SANDY SILTSTONE:- Same as above unit
					309.17			
309.17		309.17			310		0.58	CLAYSTONE:- Medium dark gray N4, Semi-Compact, Sideritic, Pyrite, Carby layers, Carby Carby flakes.
309.75		309.75			311		1.57	

DRILL-HOLE NO LS-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								CLAYSTONE
					31.1			SILTSTONE: - Medium gray N3, Compact, Sandy, Coarse, Glauconite, Pyrite
					31.2		1.48	SILTSTONE: - Medium gray N3, Compact, Sandy, Coarse, Coarse flakes, Pyrite
					31.3		0.60	CLAYSTONE: - Medium dark gray N4, olive gray 5B7, Compact, Siderite, Sandy layers, Coarse, Coarse material, Pyrite
312.80					31.4		0.83	SANDSTONE: - Medium gray N5, Soft, loose, medium grained, Coarse, Coarse flakes, Pyrite
					31.5		0.42	Coarse grains at places.
					31.6		1.20	Core loss at bottom
					31.7		1.85	Core loss at top
315.85					31.8		0.58	SANDSTONE: - Medium dark gray N4, light gray N7, loose, soft, but one band of sand stone 0.17 m at bottom very hard, Compact, Coarse grained, Coarse, Coarse particles near top
					31.9		0.62	UNDERCLAY: - Light bluish gray 5B7, Compact, hard, Silty, Pyrite, Coarse grained, Sand near top, Glauconite
318.90					32.0		1.06	UNDERCLAY: - Same as above unit

DRILL-HOLE NO LS-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
							0.37	CARB. SHALE:- Dark grey N ₃ , Compact, Coaly, Coarse flakes, Coaly, bituminous, Pyrite, Silty.
							1.33	CARB. SHALE:- Same as above unit
321.66		321.66			322		1.00	CLAYSTONE:- Medium dark grey N ₄ , olive grey 5Y 4/1, Compact, Sideritic, Sandy layers, Coaly, Coarse material, Pyrite
					323		1.02	SILTSTONE:- Medium dark grey N ₄ , olive grey 5Y 4/1, Compact, Sideritic, Coaly and Coaly material, Sand intermixed through out the unit
323.72		323.72			324		0.15	SILTSTONE:- Same as above unit
323.72					324		0.75	SANDSTONE:- Medium dark grey N ₄ , Dark grey N ₃ , Soft, loose, Coaly, Coarse flakes through out the unit, Pyrite, Coaly streaks, medium to coarse grained.
					325		2.15	Core loss at bottom Core loss at top probably in loose sand
					326			SANDSTONE:- Same as above unit
326.77		326.77			327		0.92	SILTSTONE:- Medium dark grey N ₄ , Medium grey N ₅ , Sandy near top, Siderite, coaly, Coarse flakes, Pyrite, Sand intermixed.
					328		0.10	CARB. SILTSTONE:- Grey to black N ₂ , Dark grey N ₃ , Compact, Coaly, Coaly material through out the unit
					328		0.52	Sandy patches, pyrite, Shale in sand, Coaly, Coaly flakes
					329		0.47	SANDY SILTSTONE:- Medium dark grey N ₄ , Compact, Coaly (at streaks) through out the unit, Sandy, Pyrite, Coaly, Coaly flakes, Sand, Coarse material towards bottom.
329.83					330		0.91	SANDSTONE:- Medium dark grey N ₄ , Soft to sandy, Compact, medium grained, Coaly, Coaly flakes through out the unit
								SANDSTONE:- Same as above unit

DRILL-HOLE NO LS-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								Sandstone
		330.73						SANDSTONE:- Same as above unit Core loss at bottom
330.73					331		0.60	SANDSTONE:- Same as above unit
					332		1.53	Core loss at bottom
		332.86			333		0.76	SANDSTONE:- Dark greenish gray 5GY4p, light gray N-1, Semi compact, very fine grained, Cross bedding in lower half, coaly, waxy layers in upper half, Glauconitic, From top 0.45 m Sandstone of 0.20 m is calcareous.
		334.39			334		0.77	
334.39					335		2.97	Core loss at bottom
					336		0.28	SANDSTONE:- Same as above unit but siliceous and fine grained near bottom
		337.44			337		0.02	CLAYSTONE:- Medium dark gray N4, Compact, Hard. A coaly, waxy layer at top, coaly waxy traces through out the unit, Pyrite filled the burrows, Sand intermixed near top and bottom.
337.44					338		0.68	
					339		1.76	SANDSTONE:- Medium dark gray N4, Soft to semi- compact, medium grained, coaly waxy flakes through out the unit.
					340		3.43	

DRILL-HOLE NO L3-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
340.48	340.48				341			<i>Sand stone</i> SANDSTONE:- Medium dark gray N4, Soft to Semi compact, medium grained, Coaly, carbony flakes throughout the unit, Sideritic, Fine grained near bottom.
					342		2.97	Core loss at bottom
					343			SANDSTONE:- Same as above unit
343.53	343.53				344		0.52	CLAYSTONE:- Medium dark gray N4, olive gray 5 N4, compact, Hard, Sideritic, Coaly, carbony traces throughout the unit, Coaly flakes, Pyrite, Sandy layers
					345		0.72	
					346		1.09	SANDSTONE:- Medium gray N5, loose, soft, Semi compact, Coaly carbony flakes, Fine grained, Pyrite, clayey at places
					347		0.72	Core loss at bottom
346.58	346.58				348		1.12	SANDSTONE:- Same as above unit
					349		0.62	SANDSTONE/CLAYSTONE (INTERMIXED):- Medium gray N5, Semi compact, Sideritic, Coaly carbony flakes, Pyrite
					350		1.13	SANDSTONE:- Medium gray N5, loose, Semi compact, Coaly carbony flakes, Fine grained, Pyrite, clayey at places
349.63	349.63				351		2.12	Core loss at bottom

DRILL-HOLE NO LS-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
					351		2.35	SANDSTONE:- Same as above but graded bedding
					352		0.70	Core Loss at bottom
352	68	352	68		353		0.89	SANDSTONE:- light gray N7, semi compact to loose, Siderite band, medium to coarse grained, Coaly flakes at places.
					354		2.15	Core loss at bottom
					355			Core Loss at top
355	72	355	72		356			SANDSTONE:- Pale yellowish brown to YR 5/6, Medium light gray N6, medium grained, well sorted, quartzitic grains
					357		2.92	SANDSTONE:- Light gray N7, Medium light gray N6, semi compact, loose, fine to medium grained, Coaly Coaly flakes, Glauconite, Sideritic, Pyrite at places.
358	77	358	77		359		0.13	Core loss at bottom
					360		1.09	
					361		0.74	

DRILL-HOLE NO 25-2

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
		360.40				X		CORE LOSS
360.00					361		1.10	SANDSTONE:- Same as above unit but a hard band of sand stone at bottom
					362	X		Core loss at bottom
					363	X		SANDSTONE:- Same as above unit
		363.65			364		0.98	Core loss at bottom
363.25					365		1.92	SANDSTONE:- Medium light gray N6, very light gray N6, semi compact, Hard, Fine grained, Coaly coaly flakes, siderite at places, Glauconite, lower half is very hard sandstone, cross bedding and calcareous.
		366.50			367		0.97	Core loss at bottom
366.50					368	X	0.40	SANDSTONE:- Medium light gray N5, light gray N7, semi compact, loose, clay stone inter-
367.92					369		2.80	laminated, Fine to coarse grained, Coaly coaly flakes, Glauconite, clay stone inter-
					370			mixed.

DRILL-HOLE NO 25-2.

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								Sand Stone
								Core loss at bottom
370.96		370.96			371		0.24	SANDSTONE:-
					372		1.53	Same as above unit
		372.49						T.D = 372.49M
					3			
					4			
					5			
					6			
					7			
					8			
					9			
					10			
					11			

51 07 55

Drill hole LS-2

Collar elevation _____

104

COAL SAMPLE DATA

SAMPLE NO. LS-2-1-92 NO. OF BAGS 1
 COLLECTOR B.S. Lashari COAL FIELD LAKHRA SOUTH
A. Rahim Memon
 LATITUDE _____ LONGITUDE _____
 PROVINCE SINDH DISTRICT JADH
 DRILL HOLE LS-2 DATE SAMPLED _____
 FORMATION BAPA AGE PALEOCENE
 COAL SEAM _____ ESTIMATED RANK LIGNITE
 TOTAL SEAM THICKNESS _____ in THICKNESS SAMPLED _____ in
0.36 m 0.36 m
 DEPTH TO TOP OF COAL _____ ft SURFACE ELEVATION _____ ft@MSL
153.77 m _____ m
 ROOF ROCK Shale/S.Stone Interlaminat FLOOR ROCK Carby Shale
 SAMPLE TYPE DRILL CORE
 (channel, channel/upper bench, grab, drillcore, etc.)
 COMMENTS:

COAL SAMPLE DATA

SAMPLE NO. LS-2-2-92 NO. OF BAGS 1
 COLLECTOR G.S. LASHARI COAL FIELD LAKHRA SOUTH
A. Rahim Nemon
 LATITUDE _____ LONGITUDE _____
 PROVINCE SINDH DISTRICT DADU
 DRILL HOLE LS-2 DATE SAMPLED _____
 FORMATION BAKA AGE Paleocene
 COAL SEAM _____ ESTIMATED RANK LIGNITE
 TOTAL SEAM THICKNESS _____ in THICKNESS SAMPLED _____ in
0.38 m _____ m
 DEPTH TO TOP OF COAL _____ ft SURFACE ELEVATION _____ ft@MSL
169.52 m _____ m
 ROOF ROCK SILTSTONE FLOOR ROCK Claystone
 SAMPLE TYPE DRILL CORE
 (channel, channel/upper bench, grab, drillcore, etc.)
 COMMENTS:

COAL SAMPLE DATA

SAMPLE NO. LS-2-3-72 NO. OF BAGS 1
 COLLECTOR G.S. LASHARI COAL FIELD LAKHRA SOUTH
A. Rahim Memon
 LATITUDE _____ LONGITUDE _____
 PROVINCE SINDH DISTRICT DADU
 DRILL HOLE LS-2 DATE SAMPLED _____
 FORMATION JHARA AGE Paleocene
 COAL SEAM _____ ESTIMATED RANK LIGNITE
 TOTAL SEAM THICKNESS _____ in THICKNESS SAMPLED _____ in
0.24 m _____ m
 DEPTH TO TOP OF COAL _____ ft SURFACE ELEVATION _____ ft@MSL
197.61 m _____ m
 ROOF ROCK SANDSTONE FLOOR ROCK CARBON. Shale
 SAMPLE TYPE DRILL CORE
 (channel, channel/upper bench, grab, drillcore, etc.)
 COMMENTS:

COAL SAMPLE DATA

SAMPLE NO. LS-2-4-92 NO. OF BAGS 1
 COLLECTOR G. S. LASHARI COAL FIELD LAKHRA SOUTH
A. Rahim Memon
 LATITUDE _____ LONGITUDE _____
 PROVINCE SINDH DISTRICT DADU
 DRILL HOLE LS-2 DATE SAMPLED _____
 FORMATION BARA AGE Paleocene
 COAL SEAM _____ ESTIMATED RANK LIGNITE
 TOTAL SEAM THICKNESS _____ in THICKNESS SAMPLED _____ in
0.60 m _____ m
 DEPTH TO TOP OF COAL _____ ft SURFACE ELEVATION _____ ft@MSL
214.92 m _____ m
 ROOF ROCK SANDSTONE FLOOR ROCK Clayey Sandstone
 SAMPLE TYPE DRILL CORE
 (channel, channel/upper bench, grab, drillcore, etc.)
 COMMENTS:

DRILLING RECORD
COAL REAP

Drill hole LS-3

Topo Sheet 40 C/3
Grid ref 867513 mN 2161903 mE
Surface elev. (m) 57.6 (surveyed)
Drill rig ACKER WA III C

Drilling started Date 14th MARCH 92 Time 09/- HRS
Drilling completed Date 28th MARCH 92 22/15 HRS

Drill Bit Surface to 6.10 m TRICONE 4 3/4
6.10 to 352.37 m HQ DIAMOND BIT
to m
to m
to m
to m

Fluids used RWIR THICK BENTONITE

Casing set Surface to 61.57 m HW
to m
to m

Lith logged by ABDUL RAHIM MEMON
ALTAF H. CHANDIO
SHAFIQUE A. KHAN

Geophysical logs:

JLP	NATURAL GAMMA	From	SURFACE	m	to	347.80	m	through	DRILL PIPE/CASING
	NEUTRON		"	m		350	m		"
XAP	NATURAL GAMMA		"	m		346.40	m		"
	GG FR		"	m		349.80	m		"
	GG NR		"	m		349.90	m		"
JLP	NATURAL GAMMA		"	m		348.80	m		OPEN HOLE / CASING
	NEUTRON		"	m		349	m		"
REMARKS:									
XAP	NATURAL GAMMA		"			344.40	m		"
	GG FR		"			347.80	m		"
	GG NR		"			347.90	m		"
	CALIPER		"			347.40	m		"

COAL REAP

Drill Hole LS-3

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
14 th MARCH 92	03/-		Drilling started with 1 3/4" yellow bit
	07/- 14/-	6.10m	Drilled 6.10m down to HW casing
	14/- 07/-	8.10m	Mechanical fault
15 th MARCH 92	07/- 07/-	8.10m	- NO -
16 th MARCH 92	08/- 08/-	8.10m	- NO -
17 th MARCH 92	01/- 07/50	15.26	Drilled from 6.10m to 15.26
	07/30 - 11/15	15.26	Lowered HW casing to 15.26
	11/15 - 00/30	41.48	Drilled from 15.26 to 41.48m
18 th MARCH 92	01/15 - 03/-	44.53	Drilled from 41.48 to 44.53
	03/- 14/-		Drilled from 44.53 to 49.17
		44.53	Lowered HW casing to 44.53
	14/- 03/-	49.17	Drilled from 44.53 to 49.17
			50% water loss
	02/- 07/-	52.15	Drilled from 49.17 to 52.15
19 th MARCH 92	07/- 07/30	56.72	Drilled from 52.15 to 56.72
			53% water loss
	03/- 06/-	61.59	Drilled from 56.72 to 61.59
	06/- 14/-	61.59	Pulled out rods
	14/- 06/-		Pulled out HW casing. Redrilled from 6.10
20 th MARCH 92		61.59	to 61.59
	06/- 11/30	61.59	Pulled out HW casing. Lowered the casing to 61.57

COAL REAP

Drill Hole LS-3

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
20 th MARCH 92	11/30 - 00/-	96.65 m	Drilled from 91.59 to 96.65
21 st MARCH 92	00/- - 06/30	111.28	Drilled from 96.65 to 111.28
	06/30 - 10/45	120.42	Drilled from 111.28 to 120.42 Water loss 25%
	10/45 - 20/45	142.06	Drilled from 120.42 to 142.06
	20/45 - 00/-		Wire line drum broken
22 nd MARCH 92	00/- - 21/45	175.03	Drilled from 142.06 to 574'32" 175.03
	21/45 - 23/-		Washed and Redrilled from 171.71
	23/- - 01/20	178.08	Drilled from 175.03 to 178.08
23 rd MARCH 92	01/20 - 05/-	206.07	Drilled from 178.08 to 206.07
24 th MARCH 92	05/45 - 07/-	212.17	Drilled from 206.07 to 212.17 Water loss 75%
	07/45 - 22/-	241.63	Drilled from 212.17 to 241.63
25 th MARCH 92	22/- - 02/20		Refractors were down Pulled out rods. Loosened
		241.63	the rods till 213.24 Redrilled from 213.24 to 241.63
	02/20 - 23/15	270.08	Drilled from 241.63 to 270.08
26 th MARCH 92	23/15 - 02/15	276.17	Drilled from 270.08 to 276.17 15% loss
	3/- - 05/30	309.70	Drilled from 276.17 to 309.70
27 th MARCH 92	05/30 - 02/20	332.41	Drilled from 309.70 to 332.41
28 th MARCH 92	02/- - 02/15	352.37	Drilled from 332.41 to 352.37
29 th MARCH 92	02/15 - 11/-	352.37	NO CIRCULATION

DRILL-HOLE NO LS-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
		NON-CORING			1		1.52	CLAYS
1.52	1.52				2		1.53	CLAYS
3.05	3.05				3		1.52	CLAYS
4.57	4.57				4		1.53	CLAYS
6.10	6.10				5		1.64	CLAYS, Variegated color, Gypsiferrous at few places. Gypsum bands. Silty, Burrowed at one place? Slightly sandy, Iron oxide coating at some places. Hard concretions throughout the unit.
7.74	7.74				6		1.55	CORE LOSS
10.79	10.79				7		1.50	CLAYS Same as above.
					8			
					9			
					10			
					11			

DRILL-HOLE NO LS-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								10.79
								CORE LOSS 11.09
	10.79						0.30	CLAYS
10.79					11			Variegated color, Gypseferous, few hard bands of sandstone up to 0.05 m thick. Iron oxide staining at few places. Core fissile, slickensided in the middle.
	3.05	2.75	90%		12		1.98	
					13			13.07
								LIMESTONE
							0.72	Grayish orange 10YR 7/4, to pale yellowish orange 10YR 8/6. Semi hard and compact at top, and very hard and compact towards lower portion. Gypsum bands in the upper unit. Lower unit more fossiliferous. Black patches (weathered iron oxide).
	13.84							13.84
15.84					14			LIMESTONE
	1.10	1.40	100%				1.40	Med light gray N6, light bluish gray 5B 7/1 and pale yellowish orange 10YR 8/6, hard and compact. Color changes from gray to yellowish. Fossiliferous, forams, silty, calcitic. Grades into siltstone/fossil hash.
	15.24				15		0.23	SILTSTONE/FOSSIL HASH.
15.24								Med gray N5 to greenish gray, semi hard and compact, full of forams and fossil shell fragments. Abundant glauconite throughout the unit. Grades into shale, slickensided at lower contact.
	1.85	1.75	75%		16		0.77	15.27
								SHALE
					17			Dark gray N3, to grayish black N2. fissile, sideritic bands. Burrowed. Burrows filled with silt, pyrite and med sand and glauconite, very fine coaly earthy traces. Pyrite in patches.
17.09							0.75	16.24
								CLAYSTONE SANDY
					18			Med light gray N6 to Med gray N5, semi hard and compact sandy, silty. Pyrite rare, glauconite rare, few broken shell fragments. Slickensided at base, fractured in the middle. At the base very fine grained sandy laminae.
	3.05	3.05	100%				11.0	
								CORE LOSS (0.10) 17.09 16.99
					19			CLAYSTONE SANDY
								Med light gray, full of shell fragments and forams
								17.28
								CLAYSTONE SANDY
	20.4				20		2.26	Med gray to med light gray, More than 30% sand. Very fine to fine grained, subangular to subrounded, mostly qtz grains. Clayst contains abundant fine rounded glauconite grains, scattered fossil shell fragments, earthy, coaly specks. Few small sideritic nodules. Plant impressions, replaced by very fine grained pyrite at few places. Few slickensides. More clayey near bot. Few pockets of fine clean sand and glauconite.

DRILL-HOLE NO. LS-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
20.14	20.14						20.14	
	3.05	3.02	99%				3.02	
							20.17	
							20.17	
							23.19	
23.19	23.19						0.62	CLAYSTONE Med gray NS, Med light gray NG, lenses of silt near top. Sideritic nodules, more in the upper half. Scattered shell fragments. Concentration of shell fragments at two, three places. Few pyritized roots. Few patches of very fine grained disseminated pyrite. Slickensided in the lower half. Concentration of shell fragments near the bottom. Few, upto one cm size Gastropods and bivalves impressions and coarse rounded scattered glauconite grains.
	3.05	1.75	57%				0.90	CLAYSTONE, Fossiliferous, highly fossiliferous near bottom. Shell fragments, upto one cm bivalve fragments and impressions abundant. Few forams. More glauconite than the above unit. Few sideritic nodules. One, half cm thick gypsum band near the bottom. Gradually becomes silty & then sandy, finally grades into S-st.
							0.23	
	26.24						1.30	SANDSTONE, Hard, compact, becomes friable near bottom, weathered oxidized, Dark yellowish orange 10YR 6/6. Dark reddish brown 10R 3/4. Dominantly med grained, few coarse grains, subangular to subrounded.
							1.57	CORE LOSS
	3.04	1.57	52%				1.47	SANDSTONE, Grayish orange 10YR 7/4. Dark yellowish orange 10YR 6/6. Friable, with few comparatively hard bands. Iron oxide staining. Dominantly med size, subangular to subrounded grains. with few coarse grains. Moderately sorted less than 10% clayey cementing material. Not calcareous.
							1.41	CORE LOSS
	29.28						1.41	SANDSTONE, Dark yellowish orange 10YR 6/6, Grayish orange 10YR 7/4. Same as above, with few comparatively hard, slightly calcareous bands, otherwise friable sandstone.
	3.05	1.41	46%				30.69	

DRILL-HOLE NO. 45-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
					31		1.64	CORE LOSS
					32			CORE LOSS
32.25	32.33						1.85	
					33			SANDSTONE
	3.05	1.20	39%					Frangible with few comparatively hard bands. Red brown, maroon, yellow iron oxide staining same as above. Lower contact with claystone sharp
					34		0.40	CLAYSTONE,
								Med light gray N6, light gray N7. Shaley. Yellow stained iron oxide staining in the upper half. Sideritic nodules in the lower half. One, one cm thick gypsum band in the lower half. Noncalcareous
35.23	35.38				35		0.20	Few pyritized roots in the lower half.
					36		1.33	CLAYSTONE,
	3.05	3.05	100%					Same as above, abundant sideritic nodules. One cm gypsum band in the upper half. Shaley. Not oxidized. Few pyritized roots. Grades into sandy fossiliferous unit below
					37		0.60	FOSSIL MASH
								Full of shell fragments. Matrix probably clayey. Quartz grains at places. Glauconite grains also present. Color Med gray N5, Med light gray N6. Few mm thick coaly lamination in the middle
38.43	38.47				38		1.12	SILTSTONE,
								Med light gray N6, Med gray N5. Compact. Noncalcareous. Few small sideritic nodules. Clayey laminations. Fine sand laminations with fine glauconite. One or two patches of very fine grained pyrite
					39		0.92	SILTSTONE
								Same as above and few scattered shell fragments
	3.05	3.05	100%		40		2.13	CLAYSTONE,
41.48								Med gray N5, Med dark gray N4. Sideritic nodules, abundant in the lower half. Few scattered fossil shell fragments. Claystone silty at places. Coaly specks at few places. Few patches of very fine grained pyrite

DRILL-HOLE NO LS-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								41.48
					41			CLAYSTONE Med gray N5, Blue gray 5Y4/1, Sideritic nodules abundant near top, gradually decrease downward. Few scattered shell fragments. Slickensided. Noncalcareous. Small early specks at few places. Grades into fossil hash below 43.59
41.48					42		2.41	
	3.04	2.94	97%		43		0.43	Fossil Hash Light gray N7, Hard, compact, full of shell fragments. Contains glauconite grains. Probably contains forams and bivalves 44.32
					44		0.10	CLAYSTONE Light gray N7, fossiliferous, Contains unidentifiable shell fragments and forams. Glauconitic. 44.42
44.52							0.10	CORE LOSS 44.52
	1.60	1.60	100%		45		0.37	LIMESTONE Med gray N5, Hard, compact, Illpreserved forams and shell fragments. Few with glauconitic coating. Limestone crystalline. Few mm thick calcite veinlets. 44.89
					46		0.83	LIMESTONE Light gray N7, Full of small pores (solution cavities?). Highly fossiliferous, full of ill preserved forams. Fossil shell fragments and glauconite also present. Abundant impressions of forams and unidentifiable fossils 45.72
46.12					47		0.10	
	3.05	3.05	100%		48		2.00	LIMESTONE Med light gray N6, Hard, compact, crystalline. Contains illpreserved forams and shell fragments and scattered glauconite grains. Grades into claystone near the bottom 46.12
					49		1.05	CLAYSTONE Light gray N7, laminations and lenses of silt. Fossil shell fragments rare. Few early specks. Slickensided. Grades into limestone, lower about 30 cm transition 48.12
49.17					50		0.80	LIMESTONE Light gray N7, Very light gray N8, Hard, compact, highly fossiliferous. Full of ill preserved forams and shell fragments. Glauconite grains scattered throughout. May be termed as fossil hash at some places and calcarenite at few other places. 49.17
	2.97	2.17	73%		51		1.05	LIMESTONE, Same as above, Grades into claystone 49.47
					52			CLAYSTONE, med gray N5, Contains lenses and laminations of clean, fine grained sand and fine grained glauconite. Few sideritic lenses. Few early and early streaks. Upper 10 cm burrowed 50.52

DRILL-HOLE NO LS-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								50.52
					51		0.82	SANDSTONE, Med light gray N6, light gray N7, friable. Contains clay laminations and coaly and carbony streaks. Fine to very fine subangular grains, well sorted. Contains abundant fine glauconite grains. 51.34
							0.80	CORE LOSS
	52.14				52			52.14
52.14								CORE LOSS
	1.53	NIL	NIL		53		1.53	53.67
	53.67							53.67
53.67					54		2.15	CLAYSTONE, with silt and fine sand laminations. Few coals and carbony streaks. Few sideritic lenses in the middle of the unit. Color Med light gray N6, Med gray N5. Few patches of very fine grained disseminated pyrite. Few burrows filled with sand. 55.82
	3.05	3.05	100%		55			55.82
					56		0.90	MUDSTONE, Fine to coarse, dominantly med grained sand in clayey matrix. Mudstone brownish black 5YR 2/1. Lenses of clean sand with glauconite. Few carbony streaks. 56.72
	56.72							56.72
56.72					57		0.60	CLAYSTONE, Med dark gray N4, Claystone with fine sand, silt laminations. Few sand lenses. Sand in laminations and lenses is clean and contains abundant glauconite. 57.32
								57.32
					58		2.45	CORE LOSS
	59.77				59			59.77
59.77								CORE LOSS
	1.82	1.15	63%		60		0.67	60.44

DRILL-HOLE NO LS-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								60.44
							0.45	CLAYSTONE, with sand laminations and pockets of sand, mostly fine grained, well sorted, subangular to subrounded grains. Comparatively clean, with abundant fine glauconite grains. At few places sand is medium grained. Coarse grains rare. Claystone is med light gray N6
61.59	61.59						0.70	CLAYSTONE-SAND INTERLAMINATED. Claystone olive gray 5Y 4/1, to med dark gray N4. Sandstone light bluish gray 5B 7/1. Sand mostly fine grained, well sorted, with abundant glauconite grains. At few places sand med grained. Few carbony and coaly streaks. Wavy bedding at places. Sand laminations or bands up to 7 cms thick. Claystone laminations - bands up to 4 cms thick
	3.05	3.05	100%				0.55	SHALE-SANDSTONE INTERLAMINATED. Sand bands few mm to 5 cms thick, Shale bands few mm to 5 cms thick. Wavy bedding at few places. Sand mostly fine grained. At few places fine to med grained. Well sorted, comparatively clean with abundant glauconite
							0.20	SANDSTONE, FOSSILIFEROUS. Light bluish gray 5B 7/1. Fine to coarse grained, homogeneously coarse, scattered glauconite grains. Abundant fossil shell fragments and forams. Hard in the middle, friable at top and bottom
64.64	64.64						0.80	SANDSTONE, light bluish gray. Fine grained, very well sorted. Abundant glauconite. Few clayey, carbony streaks. Grades into siltstone
64.64							0.60	SILTSTONE, Fossiliferous with forams and scattered shell fragments and probably fine glauconite grains
	3.05	3.05	100%				1.20	FORAM HASH, Full of forams, shell fragments. Few 1 cm size. Gastropods, sandy, abundant glauconite grains
							1.85	FORAM HASH, light bluish gray, sandy, silty, full of forams and shell fragments. Abundant glauconite. Few up to one cm size Gastropods
67.69	67.69						1.22	MUDSTONE, Fine to coarse sand in clayey matrix. Near top burrowed, burrows filled with fossil trash and glauconite. Few sideritic nodules. Shell fragment scattered throughout the unit. Coaly-carbony streaks. Grades into sandstone
67.69	1.22	1.22	100%				0.12	SANDSTONE, Dark greenish gray, Muddy, Clayey streaks, bands, few shell fragment near top. Sideritic lenses near the bottom. Fine to very fine grained, well sorted. Lower half glauconitic. More clayey near bottom. Rare carbony streaks. Grain size fining downward
68.91	68.91						0.12	CLAYSTONE, Olive gray 5Y 4/1, Upper 0.02 m sandy. Contains few sideritic lenses, coaly carbony traces. Thin laminations of very fine sand with glauconite grains
	3.05	0.12	4%				2.93	CORE LOSS

CONTINUES

DRILL-HOLE NO LS-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
					71		293	CORE LOSS
	71.96				72			71.96
71.96					73		260	SANDSTONE, Med light gray N6, to Med dark gray N4, Compact Fine grained, few med grained. Abundant glauconite. Shell fragments scattered throughout the unit. Few coarsy-carby streaks near the top. Upper half muddy. Few upto one cm size Gastropods. Grades into friable medium grained sand.
	71.96	3.04	2.60	56%	74			74.56
	75				75		0.44	CORE LOSS
75					75		1.35	CORE LOSS
					76			76.35
		3.05	1.70	56%	77		1.70	SANDSTONE, Greenish gray SGY 6/1, Friable, more near top. Clay percentage increases downward. Fine to med grained. Glauconitic, Subangular grains. Grain size decreases downward. Rare shell fragments. Contains few coarse grains as well.
	78.05				78			78.05
78.05					79		1.25	SANDSTONE, Slightly silty and clayey, Med light gray N6, Greenish gray SGY 6/1. Fine to very fine grained lenses filled with coarse quartz grains. Rare shell fragments. Glauconitic, Calcareous
		3.05	3.05	100%	80		1.20	MUDSTONE, Fossiliferous. Shell fragments scattered throughout the unit. Coarsy-carby streaks rare. Glauconitic. Fine to med, few coarse sand grains in clayey matrix
	81.10				81			81.10

DRILL-HOLE NO 65-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								81.10
81.10					81		1.15	SILTSTONE, Med light gray N6, compact, contains shell fragments Scattered fine grains of pyrite. Contains few forams Becomes clayey in the lower half. One large burrow filled with with med grained sand and scattered pyrite grains. Grades into limestone
	3.05	1.55	51%		82		0.18	LIMESTONE, light bluish gray SB 7/1, hard, compact, fossiliferous crystalline, Contains forams and shell fragments Clayey near the top.
					83		1.50	CORE LOSS
	84.15				84		0.22	SANDSTONE, Loose, friable, Greenish gray SG 7 6/1, Med grained few coarse grains. Comparatively clean, Coaly-carby traces near bottom
84.15							0.40	CORE LOSS
	3.05	2.85	87%		85		2.65	SHALE-SANDSTONE INTERLAMINATED Sand light gray N7, shale med dark gray N4, With few sideritic laminations. Coaly-carby streaks Sand at few places glauconitic. Slightly calcareous Shell fragments at few places. Pyritized plant material at few places.
	87.20				86			
87.20					87		1.82	SANDSTONE light gray to med light gray. Fine grained. Silty. Clayey. Few scattered shell fragments and carby streaks. At places med grained. One 8 cm thick band of hard, calcareous sandstone with forams and shell fragments and coarse quartz grains as well
	3.05	2.25	74%		88			
					89		0.43	SILTSTONE light bluish gray SB 7/1, Fossiliferous. Contains shell fragments. Glauconitic. Few forams.
	90.25				90		0.80	CORE LOSS
								90.25

DRILL-HOLE NO 45-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
90.25								90.25
	3.04	3.04	100%		91		1.75	SANDSTONE, Olive gray, 5Y4/1, Med light gray. Clayey. Silty. Very fine grained. Contains shell fragments and forams Disseminated fine grained pyrite rare. Glaucconitic. Clayey in the upper half. Grades into sandy limestone 92.00
					92		0.57	SANDY LIMESTONE Sandy, hard, glauconitic, contains shell fragments, Crystalline at places. Light bluish gray 5B 7/1, More sandy near top. 92.57
	93.29				93		0.72	SANDSTONE, Muddy contains shell fragments. Silty near the bottom Glaucconitic. Contains few forams 93.29
93.29					94		3.05	SILTSTONE Med light gray N6. Contains one pyritized root Glaucconitic rare, Scattered shell fragments 96.34
	3.05	3.05	100%		95			CORE LOSS (0.15) 96.49
					96		0.16	SILTSTONE light bluish gray 5B 7/1, Contains shell fragments and rare glauconite 96.65
96.34					97		1.15	SILTSTONE Scattered fossil shell fragments and forams. Slightly sandy, few coarse grain as well. Calcareous, grades into limestone 97.80
96.65					98		0.90	LIMESTONE, light bluish gray 5B 7/1, Fossiliferous. Silty near the top. Crystalline in the lower half. Glaucconitic Hard, Compact, Contains forams. Sandy near the bottom. Med to coarse sand grains. 98.70
	2.74	2.74	100%		99		0.65	MUDSTONE Burrowed. Burrows filled with sand, coarse grained near the top, fine grained near bottom. Shell fragments and coaly clay streaks 99.23
99.39					100		1.00	CLAYSTONE Burrowed, Burrows filled sand 99.55
	3.05	2.86	94%		101			SANDSTONE, Muddy, Fine to med grained. Few coarse grains. Olive gray 5Y4/1, Few siderite nodules, Silty th. med hard Glaucconitic at places. Clayey towards bottom. 101.55

DRILL-HOLE NO LS-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								100.55
					101		0.60	CLAYSTONE, With sand and siderite laminations, coaly carby streaks. Burrows filled with sand. Sand fine to coarse, glauconitic. Fine disseminated pyrite at two or three places. Color olive gray
							0.67	SANDSTONE, Same as above sandstone, Muddy
					102		0.43	SILTSTONE Med gray NS, Shell fragments rare. Glauconitic, Sandy
102.44	102.44						0.19	CORE LOSS
	3.04	3.04	100%		103		3.04	SANDSTONE, Med gray NS, Silty, clayey. Few bands with concentration of shell fragments. Clayey laminations. Few, upto 2 cms thick clay bands. Scattered glauconite grains. Most grains fine, few coarse grains. More clayey near bottom
	105.48				105			105.48
105.48	105.48				106		1.30	CORE LOSS
	3.05	1.75	57%		107		1.75	SANDSTONE, Light gray N7, to med gray NS, compact. A 12 cms thick clay band at the top of the unit. Very fine grained sand. Silty throughout. Rare shell fragments scattered throughout the unit. Glauconite at places. Coaly carby specks at few places. Few coarse grains. Scattered throughout.
	108.53				108			108.53
108.53	2.75	2.75	100%		109		2.75	SANDSTONE, Greenish gray SG 6/11, med light gray NS. Compact. Fine to coarse grained. Few patches of fine grained disseminated pyrite. Scattered few shell fragments. Brownish fine grained. Glauconitic. Silty. Friable at places. Siderite lens near top
	111.28				110			111.28

DRILL-HOLE NO LS-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
					111			111.28
111.28							4.28	SANDSTONE, Calcareous, light bluish gray 5B7/1, Greenish gray 5G46/1, Glauconitic with shell fragments. Dominantly med grained. Few coarse grains. Upper about 12 cms hard
	3.04	1.50	49%		112		1.22	SANDSTONE, Fine to med grained, few coarse grains. Few scattered shell fragments. Sideritic lenses in the lower half. Glauconite at places. Burrowed, Burrows filled with fine sand and glauconite grains. Coaly carby streaks rare. Pyritized roots and carby material at few places. Few clayey bands. One 5 cm thick, hard, calcareous medium grained band near bottom. Glauconite increases near bottom
					113			112.78
					114		1.54	CORE LOSS
114.32								114.32
	3.05	3.05	100%		115		1.90	SANDSTONE, Greenish gray 5G46/1, light gray N7, fine to med grained glauconitic. Friable, grains subangular. Lower 25 cms med to coarse grained
					116		1.15	SANDSTONE, Med dark gray N4, Muddy, Clayey bands and laminations. Carby coaly streaks also common Fine to med, dominantly, fine grained
					117		0.27	CORE LOSS
117.37								117.54
	3.05	2.78	91%		118		2.78	SANDSTONE, Muddy. Fine to coarse grained. Med light gray N6 to med dark gray N4. Coaly carby streaks. Silty. Few coarse grains at places. Shell fragments scattered at few places. Disseminated pyrite at few places. Siderite lenses in the lower part. Glauconite in the middle and near bottom More clayey and silty near bottom
					119			
					120			
120.42								120.42

DRILL-HOLE NO LS-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE%					
120.42	120.42							
	3.05	3.05	100%		121		2.03	SANDSTONE: - greenish gray SG 6%, semi hard to compact, fine grained, few medium grained, glauconitic, upper half up to 0.40m Calcareous and also containing a hard band of Calc. sandstone 0.05m thick, silty throughout the unit. Clayey at top, Angular to subangular grains, Rare broken shell fragments near top, and are scattered throughout the unit, grades into siltstone - 120.42
					122		0.65	
					123		0.37	SILTSTONE: - Greenish gray SG 6%, hard and compact. Calcareous, shell fragments, few coarse grains glauconitic. Slide side at base grades into Limestone. 122.45
123.47	123.47							
	3.05	3.05	100%		124		1.23	LIMESTONE: - Greenish gray SG 6% to light bluish gray SB 7%, very hard and compact, forams, broken shell fragments, calcitized, glauconitic, coarse grain at places, Crystalline. 123.47
					125		1.82	LIMESTONE - Same as above unit, Lot of wood fragments, calcitized, rare Crystalline, Coaly flakes, silty towards lower portion. 124.70
					126			SANDSTONE: - greenish gray SG 6% to medium gray NS, loose to semi compact, fine to v. fine grained, glauconitic also fine grain rare shell fragments towards bottom of the unit, slightly silty towards base. 126.52
126.52	126.52							
	3.04	3.04	100%		127		2.74	SANDSTONE: - Medium light gray N6 to Medium dark gray N4, semi hard to loose, fine to very fine grained sand glauconitic, very fine broken shell fragments at places few Coaly traces, more silty towards bottom grades into 129.26
					128			
					129		0.30	SANDY LIME STONE / CALC SANDSTONE? SANDY, silty, shell fragments, small wood fragments, calcitized, glauconitic at places, Light-bluish gray SB 7%, hard and compact. 129.56
129.56	129.56							
	3.05	2.6 = 86%			130		0.70	SANDSTONE Silty. Medium light-gray N6, semi hard to loose, fine grained, silty throughout the unit, rare fine broken shell fragments, rare coarse OT3 grains. 130.26

DRILL-HOLE NO LS-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								130.26
					131		0.15	CALCAREOUS SANDSTONE-SANDY LIMESTONE light bluish gray SB7/11, compact. Crystalline at places Heavy. Few traces of plant fragments, pyritized 130.41
					132		1.78	MUDSTONE, contains fine grained sand with few med and coarse grains at places. Few broken shell fragments Pyrite at places. More clayey in the lower half 132.19
							0.42	CORE LOSS 132.51
13261	13261						0.24	CORE LOSS 132.85
	2.54	2.30	91%		133		2.30	SANDSTONE, Muddy, fine to coarse grained near top. Med dark gray N4. Coaly carby streaks. Few scattered shell fragments Few sideritic nodules. Lower half fine to med grained Pyritized carby material at few places 135.15
					134			
					125		0.20	SANDSTONE, With clay streaks. Fine to coarse grained. Coaly flakes Mostly fine grained Pyritized carby material Sideritic lenses rare. Not calcareous. 135.35
13515							0.20	SHALE, Med dark gray N4. Few forams and shell fragments Coaly, carby streaks. Silty, sandy laminations. Sand fine to coarse grained. Pyritized plant impressions Pockets of coarse sand. 135.55
	3.05	3.05	100%		136		0.85	SANDSTONE Fine to coarse grained. Dominantly coarse grained Muddy. Coaly, carby streaks. Noncalcareous. Olive gray 5Y 4/1 136.40
					137		0.65	CLAYSTONE-SANDSTONE INTERLAMINATED Sand, fine to med grained dominantly fine grained. Pyritized plant fragments. Few glauconitic grains. Med dark gray 137.05
13820					138		1.15	SANDSTONE, light gray N7, Med light gray. Fine to coarse grained Coaly, carby streaks common. Pyritized plant impressions. Comparatively friable. 138.20
		0.60	74%		139		0.60	SANDSTONE, light gray N7, Clayey laminations and bands. Burrowed burrows filled with sand, fine to coarse. Coaly carby streaks, in the lower half. Wavy laminations Patches of disseminated pyrite rare. Not calcareous CORE LOSS 0.21 m 139.01
13901					140		1.05	SANDSTONE Fine grained, few med and coarse grains. Burrowed burrows filled with fine sand. Few carby streaks Few coaly streaks. Pyritized plant material 140.06

DRILL-HOLE NO L5-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
					141		1.30	SANDSTONE. Silty. Fine grained, one 10 cm thick band of hard sandstone with calcareous matrix near top. Shell fragments rare. 140.06
	142.06				142		0.70	CLAYSTONE:- Medium dark gray N4, slickensided near top. Burrowed. Burrows filled with fine sand and few pyrite grains. Bioturbated near the bottom, few wavy and coaly streaks. Lower portion about 20 cm intercalated with fine sand and few sideritic lenses. 141.36
142.06					143		1.50	SHALE. INTERLAMINATED SAND. Fine grained sand. Lamination near top, and fine to coarse lamination in the lower half, few coaly coaly streaks. Coaly material at few places pyritized. Burrows filled with fine to medium, dominantly med and few coarse grains. 142.45
	3.05	1.65	54%		144		0.15	SANDSTONE:- Medium to coarse, few coaly coaly streaks. 143.56
					144		1.40	CORE LOSS Probably in sand stone 143.71
	145.11				145			CORE LOSS Probably in Sandstone 145.11
145.11					146		1.35	SANDSTONE:- Medium to Coarse grained, poorly sorted, comparatively friable, light bluish gray and light gray, coaly coaly streaks, few in upper and more near lower part. 146.46
	3.05	1.70	56%		147		0.67	SILTSTONE:- Burrows filled with coarse sand, pyritized plant impressions, few coaly streaks, one sideritic lense, at places fine sandy lamination, Medium dark gray N4, hard and compact. 147.13
	148.16				148		1.03	SILTSTONE Medium dark gray N4, Contains fine sand pockets. Coaly streaks few, few sideritic lenses, fossil shell fragments scattered in the middle part. One 4 cms thick sideritic band in the middle part, few coarse sand grains at places. 148.16
148.16					149		1.60	CLAYSTONE:- Medium dark gray N4, Contains fine to medium sand lamination, few coaly coaly streaks, grades into sandstone below. 149.76
	3.05	2.50	82%		150		0.40	CLAYSTONE:- Medium dark gray N4, Contains fine to medium sand lamination, few coaly coaly streaks, grades into sandstone below. 150.16

DRILL-HOLE NO 25-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								150.16
							0.50	SANDSTONE:- Friable, fine to medium grained, light gray N7.
	151.11				151		0.55	CORE LOSS, Probably in S.s. stone
151.21								151.21
								CORE LOSS Probably in S.s. stone
					152		2.24	153.45
	3.04	0.80	26%		153			SANDSTONE:- Fine to coarse, dominantly medium grained Clay bands and lamination, Coaly Coaly streaks Common.
					154		0.80	
154.25	154.25						0.07	154.25
	0.77	0.70	91%				0.18	CORE LOSS Probably in S.s. stone
	155.02				155		0.52	SANDSTONE:- Abundant Coaly lamination, few clayey Laminations, fine to medium grained.
155.02								155.02
	2.28	2.28	100%		156		1.33	SILTSTONE:- Lenses of fine sand, Rooted, Compact, Light-olive gray.
					157		0.45	SILTSTONE:- Massive, Compact, small sideritic nodules common. Larger nodules near the bottom, burrows filled with fine to very fine sand at few places glauconitic as well. Few Coaly streaks, Calcareous near bottom with few shell fragments.
157.30	157.30						0.60	157.30
	3.05	2.64	87%		158		1.34	SHALE, With fine sand and glauconite Lamination. Few Coaly Coaly streaks, Burrows filled with fine sand near the top, shell fragments rare, sideritic bands and nodules abundant near bottom, fissile, Calcareous slightly.
					159			157.30
							0.70	SHALE:- Same as above. with fine sand lamination
					160		0.41	SILTSTONE:- Massive, Compact, sideritic lenses, fine grained sand throughout the unit. Coaly flakes at places, more sandy towards bottom, grades into 1st light- olive gray, fine grained sand in burrows
160.35								160.35
								SANDSTONE:- Light gray N7, loose to compact, fine grained silty and clayey, Coaly Coaly traces, a hard band of sand stone, medium to coarse grained. Coarse grains dominant, Clayey lamination at base.
								CORE LOSS

DRILL-HOLE NO L-5-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
160.35	160.35							160.35
160.35	161.99	2.64	1.00 38%					CORE LOSS Probably in SANDSTONE 161.99
161.99	162.99	3.05	3.05 100%					SANDSTONE: Light gray N7, fine to medium grained glauconitic, comparatively friable, few Coaly Carby streaks near top, moderately sorted, subangular to subrounded dominantly Q ₃ grains. 162.25
162.99	163.04	3.05	3.05 100%					CLAYSTONE: Dark gray N3, compact, pyritized plant-impresion common, Coaly Carby streaks near top, rooted, roots pyritized, Not Calcareous. 162.99
163.04	166.04	3.05	3.05 100%					CLAYSTONE: Medium dark gray N4, sideritic nodules near top, Rooted, roots pyritized compact, Coaly Carby streaks. 163.50
166.04	169.09	3.05	3.05 100%					SANDSTONE - CLAYSTONE INTERBEDDED SAND Light gray N7, medium dark gray N4, muddy, fine-grained, Clayey, Contains few roots, few Coaly Carby streaks, Claystone burrowed - Burrows filled with sand, contains Coaly Carby flakes and pyritized plant material. 166.04
169.09	170.09	3.05	3.05 100%					SANDSTONE: Clayey, fine to medium grained, light gray N7 Brownish Black SYR 2%, gradually becomes less clayey downward, friable and coarse to med in the lower half, pyritized plant impresion, Coaly Carby streaks, Burrowed near bottom, Burrows filled with fine to coarse sand. 169.09
170.09	170.09							CORE LOSS. Probably in Sand stone - 170.09

DRILL-HOLE NO L 53

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
	3.05	2.05	67%		171		2.05	SILTSTONE: Sandy pyritized plant-material, sideritic nodule rare 170.07 172.14
172.14	172.14				172			SANDSTONE:- Clayey, light gray N7, olive black SY 2/1, Carby streaks, muddy; grades into silt-stone. 173
	2.89	2.89	100%		173		1.65	SILTSTONE:- Contains Coaly Carby streaks, pyritized plant- fragments, Medium light-gray N6, Sandy, AT PLACES glauconitic. 175.0
175.03	175.03				174		1.24	SHALE:- Interlaminated with sand, shale olive gray SY 4/1, Contains sideritic nodules in the upper half, contains coaly Carby streaks, few replaced by very fine grained pyrite. Sand lamination. Contains fine grained sand often with fine glauconite grains, Finely coarse clean sand occurs in what look like lenses and pockets, fine sand lamination Contains scattered fine, earthy orange grains, probably oxidized glauconitic grains. 176.68
	3.05	3.05	100%		175		1.65	SILTSTONE:- Light gray N7 to medium light-gray N6 Compact, contains few Coaly Carby streaks 176.23
					176		0.15	
					177		0.19	
					178		1.11	CLAYSTONE:- Medium dark gray N4, contains fine sand lamination and coarse grained at places, coaly Carby streaks, slightly silty, fine to medium grained clean and sugary sand filled in pockets or lenses. 178.97
178.08	178.08	0.56	100%		178		0.56	SILTSTONE:- Dark gray N3, massive Coaly Carby streaks Clayey streaks, sandy towards lower part of the unit fine to coarse grained sand, pyrite fine disseminated replacing plant-material, burrowed at few places. Burrowed filled with fine to coarse subrounded clean AT3 sand. 179.08
178.64	178.64				179		0.10	
	3.05	1.56	51%		180		1.46	SILTSTONE CLAYEY:- Light gray N7, contains coaly carby streaks, burrowed, burrows filled with fine sand and fine glauconitic grains, Compact. 179.24
					181			SILTSTONE:- CLAYEY same as above, grades into muddy SANDSTONE:- Muddy light-gray N7, friable and less muddy in the lower half, Coaly Carby and clayey streaks and lamination throughout the unit, fine grained, well sorted with rare med and coarse grains in the upper part. Medium to coarse grained, dominantly medium grained in the lower part. Coarsened sequence.

DRILL-HOLE NO L S 3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE%					
								180.25
					181		1.49	CORE LOSS - Probably in sand stone
								181.69
					182		0.40	CORE LOSS - Probably in sand stone
181.69	181.69							182.09
	3.04	264	87%		183		2.64	SANDSTONE - Coaly, Carby streaks, few replaced by fine-grained pyrite; Medium dark gray N4 to olive gray SY4, fine to medium grained, few coarse grains, contains clayey bands and streaks, clayey bands contains burrows filled with fine to med clean sand, pyritized plant impressions at places muddy.
					184			184.73
	3.05	3.05	100%		185		1.67	SANDSTONE - Fine grained, clayey, coaly, Carby streaks throughout the unit, olive black SY2, Medium gray N5, few medium to coarse grains, silty, few sideritic nodules, Not calcareous, grades into next unit - 186.40
184.73					186			SHALE - SAND INTERLAMINATED More sand in the upper half and more shale in the lower half, Coaly Carby streaks throughout the unit, sideritic nodules up to 3 cm thick, sand very fine to fine glauconitic, pyritized plant impressions in lower half.
	3.05	3.05	100%		187		1.08	SHALE - Medium dark gray N4, Abundant sideritic nodules, bands near the top, fine sand laminations pyritized plant impressions near top, Burrowed - Burrows filled with fine sand and fine glauconite
					188		0.30	SHALE - Medium dark gray N4, fine sandy laminations with few glauconitic grains, sideritic bands thin throughout the unit. Coaly Carby fragments, few replaced by fine pyrite, few burrows filled with fine to medium sand and glauconite grains, few pyritized plant impressions.
187.73	3.05	3.05	100%		189		0.70	SHALE - With sand laminations, more sandy than the above unit, sideritic nodules, abundant near top, medium gray N5, sand in lamination very fine to fine, Coaly Carby streaks, Rare shell fragments, Not Calcareous.
					190		0.37	SHALE - Medium dark gray N4, fine rooted, slicken sided near bottom, pyritized plant material.
								190.10

DRILL-HOLE NO L53

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
	190.83						0.73	SILTSTONE:- Medium gray Compact, fractured at places, few Sideritic nodules about 3 cm in size, heavier, Non Calcareous Pyritized Shale - Impression, rooted - 190.83
190.83	2.44	2.44	100%		191		1.52	SILTSTONE:- SAME AS ABOVE 192.35
					192		0.92	SILTSTONE:- Compact, Contains few sideritic nodules and Coaly, Carby streaks, Medium dark gray, fine Sand lenses throughout the unit, shell fragments rare. 193.27
	193.27				193		0.52	CLAYSTONE:- Sandy Silty, Pyritized plant impression. Fragments of Carby Coaly material, Sand fine to coarse few sideritic nodules near the bottom. 193.79
193.27	3.05	3.05	100%		194		2.53	CLAYSTONE - SANDSTONE INTERBEDDED Claystone olive gray 5/4, Sideritic nodule up to 5 cm thick. Few fine sand laminae, burrows filled with very fine to fine sand and glauconite, Coaly Carby fragments - Sandstone with clay lamination throughout. Few sideritic nodules. Few coaly Carby streaks, Sand very fine to fine grained, glauconitic, lenses and pockets of very fine to fine and coarse and clean sand. 196.32
	196.32				195		0.61	CLAYSTONE:- Sandy Silty streaks throughout, distributed very fine grained pyrite replacing plant material fragments of Coaly Carby material, at places sand contains fine - glauconite. 196.93
196.32	2.51	2.51	100%		196		2.51	SHALE - SAND INTERLAMINATED - shale medium dark gray, sand medium gray, Rooted, roots replaced by very fine grained pyrite, few sideritic lenses, sand laminae often contains glauconite sand fine grained. Concentration of fragments of Carby and coaly material at few places. Non Calcareous, 199.44
	199.44				197		2.00	SHALE - SAND INTERLAMINATED
					200			

CONTINUES

DRILL-HOLE NO LS-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
	3.05	3.05	100%		201		2.40	SHALE-SAND INTERLAMINATED Same as above, and few up to 5cm thick sideritic bands. 201.44
	202.49				202		1.05	SANDSTONE:- Dark greenish gray, Contains few sideritic nodules. Abundant Coaly Carby material at places, medium to coarse grained near top, fine to medium grained in the middle and fine grained near bottom, fining downward sequence. Abundant glauconitic grains, may be termed as gran sandstone, few clayey bands near bottom. 202.49
202.49					203		0.88	CORE LOSS 202.50
	3.05	2.95	97%		204		0.67	SANDSTONE:- Highly glauconitic, may be termed as green sst, fine grained, few sideritic bands, Coaly, Carby streaks rare, few clayey bands. 203.4-
	205.54				205		0.20 0.27	SHALE-SAND INTERLAMINATED Medium gray fine sand laminae, between clay bands glauconitic, shell fragments rare, few pyritized plant-impresion, few sideritic bands some with med: to coarse sand around. 204.14
205.54		0.53	100%		206		0.53	CARB/CLAYSTONE:- Brownish black, pyritized plant-impresion, abundant Coaly streaks, fine to medium and few coarse grains in lenses, Burrows filled with sand. 205.54
206.07					207		0.70	COAL:- 206.61
	3.05	1.50	49%		208		0.80	CLAYSTONE/ UNDERCLAY Rooted, few roots pyritized, Compact, Top 4cm Coaly and Carby Light- Bluish gray SB 7/1 206.94
	209.12				209		1.55	CLAYSTONE:- Light bluish gray SB 7/1, rooted, few roots pyritized silty, grades into siltstone below. 206.97
209.12					210		3.00	SILTSTONE:- Light bluish gray SB 7/1, rooted, root-pyritized few coaly fragments, replacement fine pyrite, glauconitic, scattered Coaly Carby fragments, medium light gray NG in the lower half, grades into fine grained sandstone. 206.77
							0.00	SANDSTONE:- Medium light gray NG, clayey, few clay bands - fine grained sand, Rooted few sideritic nodules, Non-Calcareous few scattered Coaly Carby fragments in the lower 5cm grades into coarse grained friable sandstone. 207.12
								CORE LOSS Probably in Sandstone - 207.16
								SANDSTONE:- Friable Med to Coarse, dominantly Med grained, Coaly Carby fragments, light olive gray 207.16
								CORE LOSS

CONTINUES

DRILL-HOLE NO L S-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
	3.04	2.04	13%		21.1		3.00	CORE LOG Probably in sand 212.16
					21.2			CORE LOG Probably in sand 213.51
212.16	3.05	1.70	56%		21.3		1.35	SILTSTONE:- SANDY, About 30 cm near bottom Clayey, glauconitic, Coaly Carby fragments, Sideritic nodules, abundant in the Lower 40 cm, upper about 30 cm Burrowed burrows filled with Coarse sand, Sideritic nodules abundant between 30 and 70 cm as well. Clayey towards lower end, Scattered Sideritic lenses Broken shell fragments. 215.21
					21.4		1.70	CLAYSTONE SHALY:- Sideritic nodule scattered throughout, few Coaly Carby fragments, Rare fossil shell fragments, Medium dark gray M, Non Calcareous Lower 10 cm Slightly Calcareous, Pockets of medium to Coarse sand. 216.31
215.21	3.05	3.05	100%		21.5		0.80	SILTSTONE:- Fossiliferous and highly glauconitic. Contains shell fragments and abundant forams, Hard compact greenish gray S G 5%, Sideritic nodules in the lower half. 216.81
					21.6		0.80	
					21.7		1.02	SILTSTONE:- Clayey, Medium gray NS, Contains pockets of glauconite and shell fragments and forams in the upper 40 cm, few Sideritic nodules, Fragments of Coaly Carby Material, pyritized, fine to medium sand lamination Burrowed, burrows filled with fine sand and shell fragment in the lower part. 217.85
218.26	3.05	2.25	74%		21.8		0.43	
					21.9		2.25	SANDSTONE - very fine grained, light gray, Clayey streaks and laminations, few glauconitic grains, few scattered shell fragments, comparatively friable, Burrowed, burrows filled with fine sand, Rooted contains Coaly Carby streaks and lamination. 218.26
					22.0			SANDSTONE - greenish gray S G 5%, friable with few hard bands, fine grained and fine to medium grained at places Moderately sorted, subangular to subrounded grains, glauconitic throughout the unit. Coaly Coaly lamination in few more near top, few hard bands probably Sideritic Non Calcareous.

CONTINUED

DRILL-HOLE NO 15-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								220.51
								CORE LOSS Probably in sand
					221		0.80	221.31
								CORE LOSS Probably in sand
221.31	221.31				222		0.85	222.16
	221.31							SANDSTONE:- Friable, Medium grained, few fine grains moderately sorted, subangular to subrounded, glauconitic less than the above unit, contains Coaly Carby streaks few non Calcareous hard bands.
	221.31				223		2.20	224.36
	221.31							SANDSTONE:- Fine to medium grained, few coarse grains Friable with Non Calcareous hard bands, Medium gray Ns.
	221.31				224			224.48
224.36	224.36						0.12	CORE LOSS Probably in sand.
	224.36				225		1.15	225.63
	224.36							CORE LOSS - Probably in sand.
	224.36							SANDSTONE:- Abundant Coaly Carby streaks laminations Medium gray Ns, fine grained, few Clayey streaks.
225.63	225.63				226		0.20	226.13
	225.63						0.30	CLAYSTONE:- Rooted, few roots replaced by very fine grained Pyrite, Burrowed, Burrows filled with fine sand, Pyritized Plant-impression and fragments, Sandy streaks, grades into Silstone.
	225.63						0.30	
	225.63				227		0.68	SANDSTONE:- Fine to medium grained, few coarse grain dominantly med. grained few sideritic nodules, few coaly Carby streaks, lower part muddy with fine to coarse sand grains and Coaly Carby streaks.
227.41	227.41							226.72
	227.41				228			SILTSTONE:- Compact, Burrowed few pyritized roots few scattered coarse grains and Coaly Carby fragments few pyritized grades into Claystone.
	227.41						2.64	227.41
	227.41				229			CLAYSTONE - Medium gray Ns, fractured, Rooted, roots replaced by very fine pyrite, few sand lenses with fine to med and few coarse grains, Rare Coaly Carby streaks, few sideritic bands, Coaly Carby fragments at few places.
230.05	230.05				230			230.25

DRILL-HOLE NO L S-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
230.05	3.05	3.05	100%		231		3.05	CLAYSTONE:- Same as above unit, sandy lamination and bands in the lower half
					232			
					233			
233.10	3.04	NIL	NIL		234		3.04	CORE LOSS Probably in sand
					235			
236.14	2.34	2.34	47%		236		2.34	CORE LOSS Probably in sand.
					237			
					238			
238.53	3.05	2.05	67%		239		2.05	SANDSTONE:- Medium to coarse grained, friable olive gray about 3 cm thick non calcareous band at the bottom.
					240			
								SANDSTONE:- Fine grained, well sorted subangular to subrounded grains, few clayey bands, few coaly carb. streaks and lamination, few bituminous bands, one at bottom of about 4 cms.
								CONTINUES

DRILL-HOLE NO L S-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								240.53
					241		1.00	CORE LOSS Probably in Sand
241.63	241.63							241.63
					242			CORE LOSS Probably in Sand
	2.51						2.00	242.53
		0.51	20%		243			SANDSTONE:- Medium to Coarse grained, fr. abt. few clayey bands, few sideritic nodules in the lower portion, glauconitic grains at few places. 243.14
					244		0.51	CLAYSTONE:- Medium dark gray N5, to grayish black Contains coarse Q13 grains in streaks, coaly coaly, pyritized wood fragments, bottom about 8 cm full of coaly streaks and lamination and pyritized plant material, Resin globule at one place. 244.50
244.14	1.55	1.55	100%				0.66	
					245		0.20	CLAYSTONE - UNDERCLAY
							0.69	Highly rootled, few roots pyritized, scattered plant fragments. 245
245.69					246			CLAYSTONE - Medium gray N5, Contains few sideritic bands, plant fragments scattered throughout the unit, few pyritized coaly coaly traces. 245.67
	3.05	3.05	100%				1.85	SANDSTONE:- Interbedded with Claystone and siltstone Contains few sideritic nodules and bands, Med. light-gray N6 to medium gray N5, Sand fine to very fine Coaly coaly fragments scattered at few places, glauconitic grains scattered throughout, Coaly coaly streaks common, Moderately sorted Non Calcareous. 247.54
					248		1.20	SILTSTONE:- Medium gray N5, Compact- few sideritic bands and lenses, few bands with coaly coaly laminations and fine to coarse sand siltstone hard compact, Non Calcareous lower portion sandy. 248.74
248.74					249		0.30	SILTSTONE:- with few coaly coaly and few fine sand laminations. 249.04
	3.05	2.73	89%				1.33	CLAYSTONE - Light bluish gray S3, Slickensided Highly sorted, scattered coaly coaly fragments, few sideritic nodules. 250.37
					250			

DRILL-HOLE NO L 53

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
					251		0.40	250-37 SILTSTONE - Light gray N ₇ to Olive gray S _Y 4 ₁ . Compact, rooted at places. Coaly conchy fragments at few places, few pyritized. Few sideritic bands. 251.27
251.79	251.79				252		0.20 0.32	SANDSTONE - Coarse grained, few med. grained, light gray. Non calcareous to slightly calcareous at places. Rare plant fragments. 251.67
	3.05	NIL	NIL		253		3.15	CORE Loss Probably in sstone 251.79 CORE loss Probably in sstone 254.84
254.84	254.84				255		0.75	SANDSTONE - Friable, Medium to Coarse grained. Light gray N ₇ . Moderately sorted, Scattered glauconitic grains at few places. One hard non calcareous band about 3cm thick near bottom. 255.57
	3.05	2.30	75%		256		2.30	CORE Loss Probably in sand 257.89
257.89	257.89				258		1.10	SANDSTONE - Fine to medium grained, rare coarse grained. Glauconitic throughout, greenish gray S _Y 6 ₁ and light gray friable. 257.89
	1.15	1.75	64%		259		1.15	
					260			

CONTINUED

DRILL-HOLE NO Ls 3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								260.14
							0.40	CLAYSTONE - Medium gray Ng, Few sideritic lenses, Few pockets of coarse sand, Rooted, Coaly Carby flakes.
260.94	261.94				261		0.40	SANDSTONE - Fine to medium, glauconitic, About 20cm thick band of medium to coarse sandstone
	3.04	1.40	46%		262		1.40	SANDSTONE - Fine to medium grained, Moderately sorted, Subangular to subrounded, friable, Abundant-Coaly Carby laminations and streaks in the middle about 30cm glauconitic throughout.
					263		1.64	CORE LOSS Probably in sand
263.98	263.98				264			263.98
	3.05	1.35	44%		265		1.35	SANDSTONE - Light gray Ng, friable fine to med. grained glauconitic, Abundant-Coaly Carby laminations in the lower half.
					266		1.76	CORE LOSS - Probably in SAND
267.03	267.03				267			267.03
	5.05	NIL	NIL		268		3.05	
					269			
270.08	270.08				270			270.08

DRILL-HOLE NO 253

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
270.08	270.08							270.08
								CORE LOSS Probably in Sand
	3.05	0.80	26%		271		2.25	272.33
					272			SANDSTONE :- Olive gray 5Y 4/1, Friable, Fine to medium grained, glauconitic, Lower part Clayey, Moderately sorted, sub angular grains, sideritic nodule at bottom
					273		0.80	273.13
273.13	273.13							SANDSTONE :- Fine to medium grained, glauconitic, olive gray 5Y 4/1, light-gray, friable, Moderately sorted, sub angular grains.
	3.05	2.35	77%		274		2.35	275.48
					275			CORE LOSS Probably in sand
					276		0.70	276.18
276.18	276.18							CORE LOSS Probably in Sand
	3.04	NIL	NIL		277		3.04	279.22
					278			SANDSTONE
					279			
279.22	279.22							
	2.28				280		1.60	

CONTINUED

DRILL-HOLE NO L S 3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
		2.23	100%		281		1.80	SANDSTONE: - Same as above described Sstone, one 5cm thick hard Calcareous band of Sstone of med grain and few coarse grains and one 12cm thick Calcareous band of Coarse grained Sandstone near bottom. 281.22
281.50	281.50				282		0.48	CLAYSTONE: - Light bluish gray, Rooted, few Rods pyritized, slickensided, few scattered Coaly Carby fragments, few scattered Coarse sand grains. 281.52
	3.05	3.05	100%		283		0.95	CLAYSTONE - UNDERCLAY, Light bluish gray, Rooted, few flattened Coaly Carby fragments, some replaced by fine grained pyrite. 282.52
					284		1.15	SILTSTONE: - Medium gray N5, few scattered Coaly Carby fragments, few sideritic lenses, Resin, Fine sand lamination near bottom, Grades into Sandstone. 283.50
284.55					285		0.95	SANDSTONE: - Calcareous, fine grained, well sorted, very light gray N8, Hard Compact, One sideritic band, Comparatively Clean Sand. 284.55
284.55	3.05	3.05	100%		286		3.05	SANDSTONE - CLAYSTONE INTERBEDDED Sandstone med light gray N6, Abundant Coaly Carby streaks and lamination, glauconitic throughout; fine to med dominantly, fine grained, Moderately sorted, Claystone Med gray N5, Coaly Carby traces, few Claystone grades into sst and sst grades into Claystone. 287.50
287.60					287			SANDSTONE - CLAYSTONE INTERBEDDED Claystone Same as above Sandstone Same as above and in the lower part muddy, with clayey streaks.
	3.05	3.05	100%		288		3.05	
					289			
					290			

CONTINUES

DRILL-HOLE NO LS-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
290.65	290.65						3.05	
					291			290.55
	3.04	3.04	100%		292		3.04	
					293			293.59
								CLAYSTONE - SANDSTONE INTERBEDDED SAME AS ABOVE Described unit
293.69	293.69				294			
	3.05	3.05	100%		295		3.05	
					296			CLAYSTONE - SANDSTONE INTERBEDDED Claystone olive gray 5Y 4/1, Coaly carbonyl traces, small sideritic lenses, slickensided near the bottom, Sandstone Coaly carbonyl streaks less than above unit, fine to med. grained, glauconitic. Moderately sorted, Medium to Coarse grained near bottom.
296.74	296.74				297			296.74
	3.05	3.05	100%		298		3.05	
					299			
299.79	299.79				300			299.79
								CLAYSTONE CONTINUED

DRILL-HOLE NO LS-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
	30.05	2.20	72%		30.1		2.20	SANDSTONE Light gray to olive gray, fine to medium grained few coarse grains, poorly sorted, Dominantly fine grained friable, medium grained near bottom, slightly calcareous 301.99
	301.84				30.2		0.85	CORE LOSS - in Sand 302.84
301.84					30.3		0.90	SANDSTONE: - olive gray, fine to medium grained, Medium to coarse grains near bottom, coarsening downward sequence, subrounded to subangular, moderately sorted, hard calcareous band of locms near top, About 4 cm dirty clayey sandy coal band near bottom, coarse Qtz grains above and below coal. 303.74
	30.05	0.95	31%		30.4		0.05	SANDSTONE: - Hard Calcareous with medium to very coarse Qtz grains, Contains lithic fragments and coarse pyrite, Quite unique looks like fault breccia, Medium gray Ms. 303.79
	305.89				30.5		2.10	CORE LOSS in Sand 305.89
305.89					30.6			CORE LOSS in Sand 308.94
	30.05	NIL	NIL		30.7		3.05	HIGHLY CARBY SHALE Rare pyrite, Few plant impressions 308.99
	308.74				30.8			SANDSTONE: Medium to coarse grained, Moderately sorted, subangular to subrounded, light gray & friable. 309.12
308.74	0.16	0.16	100%		30.9		0.13 0.13	CARBY SHALE Contains few Resins globules, Abundant Coaly streaks and Carby Coaly fragments, few replaced by very fine grained pyrite. 309.25
	309.25				31.0		0.45	SANDSTONE - Light gray, fine to medium grained Moderately sorted, subangular to subrounded, Coaly Carby streaks near top. 309.70
								309.70

DRILL-HOLE NO LS-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
							0.55	SANDSTONE:- Light olive gray, fine to medium grained, rare coarse grains, subrounded grains, moderately sorted, glauconitic, rare coaly Carby fragments.
							0.69	CORE LOSS
	3.04	185	61%		311		0.50	SHALE:- Dark gray to med. dark gray N ₄ , Burrowed, Burrows filled with med. to coarse sand and pyrite scattered, Coaly Carby fragments few, with very fine grained pyrite, Few thin lamination of plant fragments, fissile.
					312		0.50	
							0.80	CORE LOSS in sand probably
312.74	312.74				313		1.09	SILTSTONE:- Light Bluish gray SB 7/8, Compact, abundant rounded, medium to coarse, dirty white, non-calcareous grains throughout the unit, Rooted few look pyritized.
	3.29	229	100%		314		1.20	SILTSTONE - Light Bluish gray SB 7/8, Same as above, Rounded grains start decreasing from top and become rare near bottom, Rooted, slickensided near bottom.
315.03	315.03				315		0.20	CLAYSTONE:- Medium gray NS to greenish gray SG 6/10, slickensided at places, Rounded white grains rare, few patches of very fine grained pyrite.
					316		2.85	CLAYSTONE:- Contains coaly Carby streaks, Contains one sideritic nodule, Med dark gray N ₄ .
	3.05	305	100%		317			SILTSTONE:- Light gray N ₇ , Soils the fingers, slightly sandy patches of yellow colored iron oxide, Roots rare, few pyritized coaly Carby fragments rare, Rounded coarse, dirty white grains at few places. This unit appears different than any other unit up in the columns.
318.08	318.08				318		1.25	SANDSTONE: Silty, fine grained, moderately to well sorted, light gray N ₇ , Resembles above silt-stone in appearance.
	3.05	305	100%		319		1.80	CLAYSTONE, SILTY
					320			

CONTINUES

DRILL-HOLE NO LS-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
321.13	321.13				321		1.80	CLAYSTONE - SILTY Greenish gray s.g. 6/1, Abundant brown iron oxide patches at one place, Rounded dirty white Coarse grains scattered at few places, sandy at places. 321.13
321.13	321.13				322		1.42	SILTSTONE:- Greenish gray s.g. 6/1, with Clayey and sandy bands, Coarse rounded grains scattered at few places. 322.15
	2.87	1.52	55%		323		1.35	CORE LOSS probably in sand CLAYSTONE:- Greenish gray s.g. 6/1, slickensided silty near top. 323.50
324.00	324.00				324		0.50	SILTSTONE:- Greenish gray s.g. 6/1, siltstone with clayey bands, slickensided, Compact. 324.60
	2.52	2.62	100%		325		0.80	SILTSTONE:- Med: gray, Rounded, Contains Coaly Carbony fragments, Top 50 cms in Carbony shale. 325.40
326.62	326.62				326		1.22	SANDSTONE Light-gray, well sorted, silty, fine grained, grades into siltstone below. 326.62
326.62	326.62				327		0.65	SILTSTONE:- Sandy, light-gray N7, slickensided at one place, patches of yellow, Brown iron oxide Coarse rounded dirty white grains scattered at few places. 327.27
	3.05	3.05	100%		328		1.80	SILTSTONE:- Medium gray, Clayey, Rounded, yellow brown iron oxide, Coloring at few places, few clayey bands. 328.07
329.67	329.67				329		0.60	CLAYSTONE:- Light-gray slickensided at many places, yellow brown iron oxide patches abundant throughout the unit. 329.67
329.67	329.67				330		1.04	Claystone CONTINUES

DRILL-HOLE NO L-S-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
							1.04	CLAYSTONE Same as above unit.
					331			
					332		1.70	SILTSTONE:- Light bluish gray, Compact, Rounded, Coarse dirty to white, non Calcareous grains Scattered at few places, Slide side at bottom.
332.41	332.41							332.41
					333		1.10	SILTSTONE:- Light bluish gray near top, rest medium gray. Contains clay bands and lamination, few fine sand laminae. Roots rare, Compact, burrowed, burrows filled with fine sand and glauconite, grades into Sandstone.
	332.5		55.6					333.51
					334		0.60	SANDSTONE:- Medium light gray No. 6, Coarse grained in the upper and fine to Coarse grained in the Lower half, moderately sorted, friable, Mostly subrounded grains.
					335		1.35	CORE LOSS Probably in Sand.
335.46	335.46							335.46
	1.83	NIL	100		336		1.83	CORE LOSS in Sand.
					337			337.29
337.29	337.29							337.29
	2.12		0.92 43%		338		0.92	SANDSTONE:- Light gray, Med to Coarse grained, subrounded to subangular grains, moderately sorted, slightly Calcareous.
					339		1.20	CORE LOSS - in Sand
339.41	339.41							339.41
		NIL			340		3.15	CORE LOSS
								CONTINUED

DRILL-HOLE NO L S-3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
	342.95	NIL	0%		34.1		3.05	CORE LOSS in Sand
342.96	342.96				34.2			
	343.73	NIL	0%		34.3		0.77	CORE LOSS in Sand
343.73	343.73				34.4		1.4	SANDSTONE - Friable, fine to medium grained, few coarse grain glauconitic, slightly clayey.
	346.43	1-10	34%		34.5		2.10	CORE LOSS in Sand.
346.43	346.43				34.6			SILTSTONE Light bluish gray 5 BT ₁ , Compact, fractured at places more towards upper portion. Subrounded to rounded medium grained sand scattered throughout the core, more in upper half and less towards lower half.
	348.72	2-27	100%		34.7		2.29	
348.72	348.72				34.8			SILTSTONE Light bluish gray 5 BT ₁ , Compact Same as above.
					34.9		1.60	
					35.0			

CONTINUED

DRILL-HOLE NO LS3

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
	2.77	1.77	1.77		351		1.60	
	351.51				351		1.19	CLAYSTONE Medium dark gray, silty, slickensided at few places.
351.51	352.37	1.12	1.12		352		0.86	CORE LOSS in sand.
352.37								Total depth 352.37

DRILLING RECORD
COAL REAP

Drill hole LS4

Topo Sheet 40C/2

Grid ref 875223 m N 2161393 m E

Surface elev. (m) 81.0 (surveyed)

Drill rig ACKER

Drilling started Date 25-4-92 Time 11-45
Drilling completed Date 31-5-92 0600

Drill Bit	Surface to	<u>236.50</u>	m	<u>Diamond bit HQ</u>
	to		m	
	to		m	
	to		m	
	to		m	
	to		m	
	to		m	

Fluids used Kwik Thick Bentonite

Casing set	Surface to	<u>98.65</u>	m	<u>HW</u>
	to		m	
	to		m	

Lith logged by SHAFIQUE AHMAD KHAN
ALTAF HUSAIN CHANDIO

XAP	Geophysical logs:			
	<u>N. GAMMA</u>	From <u>SURFACE</u> m	to <u>226</u> m	through <u>RODS & CASING</u>
	<u>GGNR</u>	" m	<u>230</u> m	" "
JLP	<u>GGFR</u>	" m	<u>230</u> m	" "
	<u>N. GAMMA</u>	<u>SURFACE</u> m	<u>228</u> m	<u>RODS & CASING</u>
	<u>NEUTRON</u>	" m	<u>230</u> m	" "

REMARKS:

HOLE HAD A TARGET DEPTH OF 400 M FOR THE PURPOSE OF CORRELATING & MEASURING METHANE DESORPTION FROM THE "LOWER COAL ZONE" OF THE LAKHRA FIELD.

RODS AND CASING STUCK, COULD NOT BE FREED BEFORE EID HOLIDAY AND HOLE WAS ABANDONED. HOLE IS LOCATED ON ARMY RESERVE AREA AND NEW CLEARANCES ARE REQUIRED FOR REENTRY

COAL REAP

Drill Hole LS-4

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
25-4-92	11/45 - 13/15	4.01	Drilling started. Drilled upto 4.01m.
25-4-92	14/1 - 21/1	15.24	Drilled from 4.01 to 15.24 m. ^{Pulled} RODS
26 April through 21 May 92	Drilling suspended pending clearance to drill LS-4 from Pakistan Army. Rig shifted to SO-4		
21-5-92			Washed the hole
22-5-92	8/30 - 10/30		Washed the hole. Lowered casing H/W 12.71 m
23-5-92	8/30 - 12/30		Washed the hole. Lowered H/W Casing 15.24 m
	12/30 - 1800	26.19	Drilling started from 15.24 to 26.19
	1800 - 18/30		Pulled out the Core barrel upto casing prepared mud
24-5-92	0800 - 0830		Lowered the CORE barrel
	8.30 - 17/30	44.48	Drilled from 26.19 - 44.48
25-5-92	8.30 - 8.45		Checked the oil + fuel of the rig and started
	8.45 - 0900		Lowered the Core barrel, Core barrel stopped at 38.1m. Cased the hole.
	0900 - 1100		Re-drilled from 38.1m upto 44.48m.
	1100 - 1700	50.57	Drilled from 44.48m to 50.57m.

COAL REAP

Drill Hole LS4

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
27-5-92	0600-0730		Checked the oil, mud testing and other maintenance
1st shift			
	0730-1400	68.15	Drilling started from 50.57m to 68.15m in the 1st shift.
27-5-92	1400-2200	96.29	2nd shift - Drilled from 68.15 to 96.29m
27-5-92	2200-0000		Prepared mud - lowered the inner tube
3rd shift	0000-0200	102.39	Drilling started from 96.29 to 102.39
	0200/0600		Due to illness of DE operation could not continue. Kept the rods in rotation with mud circulation.
28-5-92	0600-0630		Checked oil etc. Mud set
	0630-1400	120.68	Drilling started from 102.39 to 120.68
2nd shift	1400-2130	135.46	Drilled from 120.68 - 135.46
	2130-2200		Retrieved out - and landed the inner tube
3rd shift			Third shift - Suspended due to illness of drilling engineer.
29-5-92	0600-1330	158.72	Drilled from 135.46 to 158.72m
2nd shift	1400-2200	166.40	Drilled from 158.72 - 166.40 -
			Prepared 4 bags Bentonite
3rd shift	2200-0540	178.59	Pull out the inner tube. Continue run. Drilled from 166.40 to 178.59m.

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
30-5-92	0600-1400	199.92	Drilled from 178.59 to 199.92
1st shift			
2nd shift	1400-2200	211.02	Drilled from 199.92 to 211.02 Prepared 5 bags bentonite
3rd shift	2200-0600	236.50	Drilling continued from 211.02 to 236.50
31-5-92	1st shift 0600-1400		During pulling out the inner tube Rods were stuck, tried hard to make rods free, but failed - Hydraulic line was also leaking during attempts to free the rods.
2nd shift	1400-2200		Prepared (12) bags bentonite Cut the HQ Rods, pulled out - 11' - HW Casing joined 100' - HW casing.
3rd shift	2200-0600		No work
1-6-92	1st shift 0600-0920		HW Casing No 83733 Pulled out the HW casing, replaced oversight and lowered up to 15.24
	0920-1400		Reamed HW Casing from 15.24 to 27.43
2nd shift	1400-2200		Reamed down HW Casing from 27.43 to 45.72

COAL REAP

Drill Hole L5-4

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
1-6-92	3rd Shift	2200-0600	236.50
			Reamed the H W casing from 45.72 to 60.96
			Coupled H W Casing up to 30.48 m.
2-6-92	1st Shift	0600-1400	
			Reamed the H W Casing from 60.96 — 79.25
	11nd Shift	1400-2200	
			Reamed the H W Casing from 79.25 to 98.65m, Prepared 4 bag of Bentonite.
	111 rd shift	2200-0600	
			Continued Reaming H W Casing
			H W Casing stucked during Coupling at 6.1m. Full Water Return.
			Made some attempts to free the H W casing but failed.
3-6-92		236.50	
			Crew on duty - changed mobil oil
			Hole ABANDONED
5-6-92		236.50	
			E-log thru rods & casing

DRILL-HOLE NO LS-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
						Y Y	1.25	ALLUVIUM, Sandy, Clayey, Grayish orange 10YR 7/4, slightly silty, forams and lithic fragments, few coarse quartz grains 1.25
	3.05	2.15	70.49			Y Y	0.60	ALLUVIUM, Sand, clayey, silty, subrounded to rounded fine to coarse grained sand, containing forams lithic fragments, poorly sorted, friable, loose 1.85
						Y Y	0.15	CLAYSTONE, Moderate yellowish brown 10YR 5/4, Semihard to loose, weathered, Gypsiferous: Calcareous 2.02
3.05	3.05				3		0.70	CORE LOSS 0.70 2.70
							0.15	LIMESTONE, Grayish orange 10YR 7/4, Hard, compact, dense, Gypsum veins at top. Contains poorly preserved forams, silty, slightly weathered 3.05
	3.05	2.85	93.44		4		2.50	LIMESTONE, Grayish orange 10YR 7/4, Dark yellowish orange 10YR 6/6, Hard, compact, silty, slightly weathered, calcified forams, few ostracods, weathered patches and bands 5.55
					5		0.20	CORE LOSS 0.20 5.75
							0.25	CALCAREOUS CLAYSTONE, Variegated, dark yellowish orange 10YR 6/6, weathered, glauconitic grain, some hard, some compact 5.90
6.10	6.10				6		0.20	LIMESTONE, Grayish orange 10YR 7/4, hard, Marly at places, weathered, few forams 6.10
							2.00	LIMESTONE, Grayish orange 10YR 7/4, Dark yellowish orange 10YR 6/6, light bluish gray 5B 7/1, hard, compact, Not weathered where it is light bluish gray. Contains glauconite grains and poorly preserved forams. Dense, heavy, very hard and compact. Forams, mostly calcified. Marly at places. Secondary gypsum and calcite. Forams, mostly poorly preserved, few well preserved 8.10
					8		0.64	CORE LOSS 8.74
							0.40	SANDSTONE, Dominantly fine grained, few coarse grain brown, yellow, maroon, red coloured. Weathered. Few gypsum bands, few clayey bands 9.14
9.14	9.14				9			CORE LOSS, 3.05
								CONTINUES

DRILL-HOLE NO LS-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
							3.05	CORE LOSS, 9.14 — 12.19,
								12.19
		3.05	N/L		1			LIMESTONE. Dark yellowish orange, same as above; Marly, Contains fairly preserved forams. Weathered
							0.20	12.39
	12.19				2			CORE LOSS
							2.65	15.04
		3.05	0.40		3			SANDSTONE, Same as above, Weathered, Brown, yellow, maroon red coloured. Few clay bands, Few gypsum bands
					4			15.24
	15.24				5		0.20	MUDSTONE. Olive black 5Y 2/1, Fine to very coarse grained, quartz in clayey matrix. Contains scattered glauconite grains, forams, fossil impressions at places. Clay bands with carby traces, and pyritized carby material. Sideritic bands near top. Coaly and carby material at places. Sideritic lenses, shell fragment, Bivalves, Sand grains poorly sorted Probably burrowed. Noncalcareous, more clay bands towards bottom of the unit.
							1.30	16.54
	15.24				6			CORE LOSS.
							0.50	17.0
	17.04				7			CLAYSTONE. Olive black, 5Y 2/1, Semihard and compact, Very fine thin sand laminations. Few patches of very fine grained disseminated pyrite. Fine grained glauconite. One sideritic band near bottom. Grades into sandstone
							0.44	17.4
		3.05	1.15		8			SANDSTONE. Grayish black N ₂ . Loose, carby laminations. Fine to coarse grained, glauconitic, medially clayey, Dominantly fine grained
					9		0.11	18.5
	20.07				10			CORE LOSS
							1.90	20.0
					11			
					12			

DRILL-HOLE NO 25-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
20.09							0.30	CORE LOSS
	3.05	2.75	90.16		1		27.5	SANDSTONE. Med dark gray N4, Fine grained sand with clayey matrix, well sorted, glauconitic. Clayey bands in the upper portion of the unit. Rare carby streaks. Dense and friable at places. Non calcareous. Comparatively compact and more clayey in the lower half. Sideritic lenses in the lower half. Rare shell fragments.
					2			23.14
23.14					3			SANDSTONE. Olive gray 5Y4/1, Fine grained, well sorted with clayey matrix. Glauconitic grains throughout the unit. Few scattered shell fragments. Carbonaceous rare, at places with fine disseminated pyrite. Few sideritic lenses. Not loose or friable, somewhat compact. Slightly calcareous.
	3.05	3.05	100		4		3.05	
					5			26.15
					6		0.31	SANDSTONE. Fine grained, well sorted with clayey matrix. Contains abundant glauconite grains same as above.
26.15					7		1.54	LIMESTONE, CALCARENITE. Hard Compact, light gray N7, Med light gray N6. Contains abundant fine to coarse grain glauconite. Contains poorly preserved band calcitized forams and shell fragments. Lower well preserved forams as well. Contains clayey bands. Lower contact sharp.
	3.05	3.05	100		8			22.04
					9		1.20	CLAYSTONE. Dark gray N3. Shickensided not top contact. Burrows filled with few coarse quartz grains glauconite, shell fragments and forams. Rare patches of very fine grained pyrite. Abundant shell fragments near the bottom. Disseminated pyrite more near bottom.
27.24					10			SILTSTONE Med dark gray N4, Glauconitic, Very fine grained glauconite distributed throughout the unit. Fossils shell fragments abundant near top and bottom.
					11			CONTINUES

DRILL-HOLE NO LS-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
	3.04	3.04	100				3.04	otherwise rare, Carby traces rare, few with very fine grained disseminated pyrite, Clayey, Shaley bands, some hard and compact. Rare sideritic nodules. Calcareous. 32.28
32.28	32.28							SILTSTONE Med dark gray N4, Glauconitic. Shell fragments, abundant near top and bottom. Few Gastropods and bivalve impressions. Forams rare, Carby traces at few places. Carby fragments pyritized at places. Few sideritic nodules in the middle. 32.3
	1.02	1.02	100				1.02	SILTSTONE, Med dark gray N4, Same as above. 33.7
33.30	33.30						0.35	SANDSTONE, Muddy near top, Gradually becomes clean near bottom. Med to coarse grained. Moderately sorted. Scattered shell fragments throughout the unit. Friable near bottom, Glauconitic, less near bottom. 34.65
	2.03	2.03	100				0.70	CALCAREOUS SANDSTONE, light gray N7, hard, compact, Med to coarse, subrounded quartz grains in calcareous cementing material. Glauconitic grains distributed throughout. Small patches of pyrite grains. Forams rare. 35.3
35.33	35.33						0.85	CALCAREOUS SANDSTONE, Same as above, hard, compact, with one 15 cm thick comparatively friable band in the middle. 36.4
	3.05	1.10	36.07				1.10	CALCAREOUS SANDSTONE, Same as above, hard, compact, with one 15 cm thick comparatively friable band in the middle. 36.4
	3.05						1.95	CORE LOSS 1.95 38.3
							0.45	CORE LOSS 0.45 38.2
38.38	38.38						0.32	SANDSTONE, Dark gray N2, Med dark gray N4, Muddy. Loose, friable. Med to coarse grained. Poorly sorted. Contains fossil shell fragments, Glauconitic and pyrite rare. Calcareous. 39.1
	3.05	2.60	85.25				0.20	SANDSTONE, Calcareous. Fossiliferous. Full of comparatively large shell fragments. Hard, compact. Contains carby coaly debris, few pyritized. Scattered glauconite grains. Shell fragments mostly calcitized. Fine to coarse grained. 39.2
41.43							2.08	SANDSTONE-CLAYSTONE INTERLAMINATED Med gray N5, Fine grained, mostly subrounded grains, well sorted, Glauconitic. Galy, carby streaks and laminations. Few sideritic nodules. Noncalcareous. Comparatively compact. 41.1

DRILL-HOLE NO 15-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
41.43	3.05	3.05	100				3.05	<p>SHALE</p> <p>With very fine sand laminations, streaks</p> <p>Abundant small sideritic nodules.</p> <p>Glaucinite and carby debris in sand laminations. Med light gray N6, Med dark gray N4. Flaser bedding?</p>
44.48	3.04	3.04	100				3.04	<p>SHALE</p> <p>Med dark gray N4. Contains abundant sideritic nodules. Silty. Carby traces Pyrite rare. Scattered very fine shell fragments.</p> <p>More carby debris in the lower half, few pyritic.</p> <p>Compression slickensides at few places.</p> <p>Calcareous where shell fragments more</p>
47.52	3.05	2.95	96.72				2.95	<p>SHALE.</p> <p>Same as above</p>
50.57							0.40	CORE LOSS

DRILL-HOLE NO LS-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
50.57	3.05	3.05	100				0.15	CLAYSTONE, Silty, Med dark gray N4, contains coraly traces, fine shell fragments and glauconite at places. Grades into siltstone 50.5
							1.38	SILTSTONE, Calcareous, Greenish gray 5G 6/1, Contains abundant glauconite, Contains shell fragments and forams. Abundant calcitized forams. Compact, Calcareous matrix. Grades into sandstone 50.7
53.62	3.05	2.75	90.16				1.52	SANDSTONE, Calcareous, with calcareous matrix, hard, compact Med light gray N6. to greenish gray 5G 6/1. Contains abundant glauconite. Gradually becomes silty and then clayey near bottom. Contains coaly, cat flakes near bottom. Contains calcitized forams Dominantly med grained. Moderately sorted 52.16
							2.00	SANDSTONE Muddy, Fine to coarse grained. Dominantly med grained, few coarse grains. Poorly sorted. Subround to subangular grains. Olive gray 5Y 4/1. Shell fragme throughout the unit. Scattered glauconite grains Contains coraly streaks 53.6
56.67	3.05	1.10	36.07				0.75	SILTSTONE, Med gray N5, Burrows filled with med to coarse sand glauconite, and shell fragments. Contains few Gastropod impressions. Shell fragments distributed throughout the unit 55.6
							0.30	CORE LOSS 56.3
59.72	3.04	1.34	44.08				1.10	SILTSTONE, Burrows filled with med to coarse, subrounded quartz grains and few glauconite grains. Sand clean. Contains sandy laminations with fine to coarse sand. Comparatively clean. Fine and med grains subangular. Coarse grains subrounded. Fine glauconite grains. Siltstone contains scattered shell fragments. Clayey at places. Med gray N5 to Med light gray. Glauconitic. One sideritic nodules near top 56.6
							1.95	CORE LOSS 57.7
							1.70	CORE LOSS 59.

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								61-42
					1		1.36	SANDSTONE. Light gray NT. Friable, loose, Fine to med grained Well sorted, Mostly subangular grains. Comparatively clean sand. Glauconitic, Fine grained glauconite throughout the unit. Few scattered shell fragments At bottom 5 cms thick hard calcareous sandstone band with calcareous matrix and coaly and carby streaks, partly pyritized
	62.76				2			62.76
					3		0.40	SANDSTONE Top 5 cms, hard, calcareous with calcareous matrix and coaly and carby streaks, partly pyritized Rest of sandstone is friable, clayey at places, light gray NT. Fine to coarse grained Dominantly fine grained
					4		0.40	63.16
	3.05	0.80	26.23		5		2.25	SANDSTONE Hard, compact, calcareous, Glauconitic. Fine to coarse, dominantly med grained. Comparatively clean sandstone. Calcified shell fragments lower about 10 cms friable
								63.56
	65.81				65			CORE LOSS
					66			65.8
	3.05	2.20	72.13		67		2.20	SANDSTONE. - Comparatively friable, muddy Fine to Coarse grained, dominantly fine grained, few coarse grains, fossiliferous, abundant shell fragm here more clayey, glauconitic few carby streaks lower half contains no shell fragments and is well sorted.
					68			68.01
								CORE LOSS
	68.86						0.85	68.86
					69		1.80	SANDSTONE. Fine to medium grained, moderately sorted Dominantly subangular grains, glauconitic, fine grain rounded glauconitic throughout the unit, clay laminae fine med fragments where clayey, carby fragments few pyritized, More clayey near bottom.
					70			70.56
					1			
					2			

DRILL-HOLE NO LS-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
	3.05	1.80	59.02		71		1.25	CORE LOSS
71.91	71.91				72		0.90	CORE LOSS
	3.05	2.15	70.49		73		1.05	SANDSTONE: Friable, fine to medium grained, dominant subangular grains, well sorted. Near bottom fine to coarse grained, SANDSTONE, glauconitic, clayey. Contains clay bands, abundant shell fragments near bottom.
					74		1.10	SANDSTONE: Hard, compact, light bluish gray 53% CALcareous, glauconitic, fossiliferous, contains calcareous shell fragments, Gastropoda impression fine to coarse grained, poorly sorted.
74.96	74.96				75		0.02	CORE LOSS
	3.04	2.78	91.45		76		2.70	INTERBEDDED SANDSTONE CLAYSTONE SANDSTONE fine grained, well sorted, dominantly subangular grains, glauconitic contains shell fragments. Light gray N ₄ , claystone contains shell fragments. Coaly carb fragments, few pyritized, Med dark gr. X-5.
					77		0.36	CORE LOSS
78.00	78.00				78			CORE LOSS
	3.05	1.80	59.02		79		1.25	INTERBEDDED SANDSTONE CLAYSTONE SAME AS above. Thicker clay bands than in the above unit. Lower unit about 20cm contains more shell fragments and coarser grains and few sideritic nodules.
					80		1.80	
81.05								

DRILL-HOLE NO LS-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
81.05	81.05				81			
	3.05	2.95	96.72		82		2.05	SANDSTONE - Fine to Coarse grained, fine grained dominantly in the upper part - In the lower part med: grained dominant; Coarsening downward. Sequence, light-gray N7, scattered shell fragments, Calcareous, glauconitic. 83.10
					83		0.90	SANDSTONE: Hard, Compact, greenish gray 5G6, Calcareous, glauconitic, fine to coarse grained, poorly sorted, Abundant Calcitized shell fragments 84.10
84.10	84.10				84		0.10	CORE LOSS
	3.05	3.05	100		85		2.25	SANDSTONE: Loose, friable, fine to coarse grained, dominantly medium grained, poorly sorted, mostly subangular grains, clayey. Abundant Coaly streaks in the middle, few shell fragments, less glauconitic than the above unit. 86.35
					86		0.25	SANDSTONE: - Hard, Compact, Calcareous glauconitic, v. light-gray N8, Calcareous matrix 86.60
	87.15				87		0.55	MUDSTONE - Dark gray N3, Contains fine to very coarse Qtz grains, few glauconitic grains, few scattered shell fragments. 87.15
87.15					88		2.47	SANDSTONE: Muddy, dominantly fine grained, At place medium grained, coarse grains few, few glauconitic grains, Coaly and Carbony fragments at places, few pyritized scattered shell fragments. 89.6
	3.05	3.05	100		89			
					90		0.58	SILTSTONE: Burrows filled with Sand, Contains Clayey Sands, Sand Clean with glauconite, SILTSTONE Contains scattered shell fragments. 90.2
90.20								
					1			
					2			

DRILL-HOLE NO 15-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
90.20	90.20							90.20
	3.04	2.20	72.37		91		0.84	CORE LOG
					92		2.20	SANDSTONE:- Muddy, fine to coarse grained, poorly sorted; few glauconitic grains, shell fragments distributed throughout, one 20cm thick calcareous hard band, full of shell fragments near bottom, clayey near top.
93.24					93			93.24
	3.05	3.05	100		94			SANDSTONE:- Muddy, olive gray 5Y 4/1, fine to coarse grained, dominantly fine grained, glauconitic scattered shell fragments, few coaly carbony fragments, pyritized. Few sideritic nodules in the middle.
					95		3.05	
96.29					96			SANDSTONE:- Muddy, olive gray 5Y 4/1, fine to coarse grained, poorly sorted, glauconitic, concentration of shell fragments near top, burrows filled with fine to very coarse clean Qz and glauconite. Sideritic nodules in the lower portion, few coaly streaks some pyritized.
	3.05	3.05	100		97		1.76	
					98			SANDSTONE:- Silty, fine to coarse grained, dominant silty and fine grained material, few scattered sideritic lenses, glauconitic, burrows filled with fine to coarse clean Qz, sand and glauconite. Shell fragments rare, carbony streaks rare.
					99		1.29	
99.54					100			SANDSTONE
								99.54
								CONTINUES

DRILL-HOLE NO L5-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
	3.05	2.46	80.66		101		2.46	SANDSTONE:- Silty. Same as above and muddy at places. 101.80
					102		0.59	CORE LOSS 102.39
102.39	102.39				103		1.30	SANDSTONE:- Muddy, Medium gray N5, Olive gray 5Y 4/1, fine to coarse grained, dominantly fine grained, poorly sorted, comparatively less glauconitic. 103.69
	3.05	3.05	100		104		0.60	CLAYSTONE:- With thin lamination of fine grained clean sand and glauconitic. Lenses and pockets of fine to coarse clean quartz sand, claystone contains sideritic nodules, medium dark gray, Carby trace near top. 104.20
					105		1.15	SANDSTONE Muddy same as above muddy sandstone unit 105.40
105.44	105.44				106			SANDSTONE:- Dark gray N3 in the upper half, Medium light gray in the lower half, upper half is muddy and clayey. Lower half is more glauconitic, SANDSTONE is fine to coarse grained, dominantly fine grained, coarse grains rare. Few coaly. Carby streaks in the upper half. Non-calcareous. 106.05
	3.04	2.61	85.86		107		2.61	CORE LOSS Probably in Sand 108.40
					108		0.43	CORE LOSS in Sand 108.83
108.48	108.48				109		0.82	SANDSTONE:- Friable, loose, light gray N7, Med. grain well sorted, mostly subrounded grains, Clean sand glauconitic 109.30
	3.05	2.23	73.11		110		0.10	SANDSTONE CONTINUES

DRILL-HOLE NO LS-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
					111		2.13	SANDSTONE:- Muddy, very fine to fine grained, glauconitic. Contains few Calcareous hard bands, few shaley lamination. Few scattered shell fragments, more in Calcareous bands. Coaly fragments few, pyrite rare, silty towards bottom.
111.53	111.53				112		2.92	SANDSTONE:- Fine to coarse, dominantly fine grained. Coarse grains rare, few scattered shell fragments, muddy at places, concentration of shell fragments at few places. Rare coaly, coaly traces, pyrite rare.
	3.05	3.05	100		113			
					114		0.20	SANDSTONE:- CALCAREOUS, fossiliferous. Contains small gastropods and abundant shell fragments, glauconitic hard, compact, shell fragments calcitized, sideritic nodules and coaly coaly fragments near bottom.
114.58	114.58				115		0.43	SANDSTONE:- Muddy fine to medium grained, contains coaly coaly fragments, fine shell fragments near top, sideritic nodule near bottom.
	3.05	3.05	100		116		3.05	SANDSTONE:- Muddy fine to coarse grained, fine grained dominant, medium dark gray N6 to blue gray. Few scattered shell fragments, concentration of shell fragments near bottom, clayey streaks, few coaly coaly streaks, some pyritized.
					117			
117.63	117.63				118		0.40	SANDSTONE MUDDY SAME AS ABOVE
	1.24	1.24	100		119		0.84	CLAYSTONE:- Medium light-gray N6, contains sideritic nodule and scattered shell fragments, pockets of fine to coarse clean sand, patches of fine pyrite crystals.
118.87	118.87				120		0.58	CLAYSTONE:- SILTY, medium light-gray N6, scattered shell fragments, burrows filled with fine to coarse clean sand and glauconite, compact, fine grained pyrite rare.
	1.81	1.81	100		121		1.23	SANDSTONE - CLAYSTONE INTERLAMINATED. Very fine sand and glauconite interlaminated with silty clay, silty clay contains very fine grained disseminated pyrite, flower bedding prominent, throughout the unit.
					122			

DRILL-HOLE NO 15-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
120.68	120.68							
	3.04	3.04	100		12.1		3.04	SAND STONE - CLAYSTONE INTERLAMINATED Very fine sand and glauconite, streaks and laminae in silty clay. Flaser bedding more prominent in the upper half and less prominent in the lower. Lower half contains sideritic lenses, nodules. Coaly and carbony streaks.
					12.2			
					12.3			SANDSTONE - CLAYSTONE INTERLAMINATED Very fine sand and glauconite interlaminated with silty clay. Well laminated at places, flaser bedded otherwise. Abundant sideritic nodules. Coaly, carbony streaks and fragments. Compact.
123.72	123.72				12.4			
	3.05	3.05	100		12.5		3.15	CLAYSTONE, Med dark gray N4, Contains abundant sideritic nodules near top. Burrows, pocket filled with fine clean sand and glauconite. Coaly, carbony fragments, few pyritized. No sideritic nodules in the lower half.
					12.6			
					12.7		1.00	CLAYSTONE Med dark gray N4. Contains silty and fine sand, glauconitic streaks and coaly and carbony, partly pyritized streaks, more towards bottom and less near top. Contains pyritized plant material.
126.77	126.77				12.8		1.05	
	2.59	2.59	80		12.9		0.91	SANDSTONE, Med gray N5, fine grained, well sorted. Coarse grains rare. Glauconitic. Few coaly carbony streaks, some with fine grained pyrite.
					13.0		0.55	SANDSTONE, Muddy, fine to coarse grained, poorly sorted. Coarse grains rounded to subangular. Few coaly and carbony streaks. Pockets and lenses of fine glauconitic clean sand.
129.36	129.36				13.1		0.25	
	3.05	3.05	100		13.2		1.55	SANDSTONE, fine to coarse grained, poorly sorted. Glauconitic. Contains abundant shell fragments. Few gastropod. Pockets of clean, fine to coarse quartz sand, glauconitic.
					13.3			SANDSTONE - CLAYSTONE, INTERLAMINATED. Fine sand and fine glauconite interlaminated with clay. Contains sideritic nodules. Few shell fragments. Sand percentage increases downward. Bands of concentration of shell fragments.
					13.4			
					13.5			
					13.6			
					13.7			
					13.8			
					13.9			
					14.0			
					14.1			
					14.2			
					14.3			
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					33.5			
					33.6			
					33.7			
					33.8			
					33.9			
					34.0			
					34.1			
					34.2			
					34.3			
					34.4			
					34.5			
					34.6			
					34.7			
					34.8			
					34.9			
					35.0			
					35.1			
					35.2			
					35.3			
					35.4			
					35.5			
					35.6			
					35.7			
					35.8			
					35.9			
					36.0			
					36.1			
					36.2			
					36.3			

DRILL-HOLE NO LS-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								131.16
							0.40	SANDSTONE, Hard, compact, calcareous, fossiliferous. Contains abundant calcified shell fragments few Gastropods, few bivalves, Glauconitic, Coaly, carby fragments, partly pyritized near top. Very light gray NS. 131.56
							0.70	SANDSTONE, Greenish gray, fine to coarse grained, poorly sorted, Glauconitic. Abundant shell fragments. Few Gastropod impressions. Friable, loose. Few coaly, carby streaks. Slightly clayey near bottom. 132.26
132.41	132.41						0.15	SANDSTONE, Hard, compact, calcareous, Glauconitic. Coaly, carby fragments, few pyritized near top. Same as above calcareous, hard sandstone. 132.41
							0.75	SANDSTONE, Fine to coarse grained, poorly sorted. Medium grained dominant in the upper portion. Fine grained dominant in the lower portion. Few coarse grains. Glauconitic. Abundant shell fragments. Rare coaly carby streaks. One sideritic band near bottom. 133.16
							1.10	SANDSTONE, Same as above hard calcareous sandstone and with two comparatively friable bands. 134.26
							1.20	SANDSTONE, Fine grained, Mostly well sorted, Med and coarse grains at few places. Glauconitic. Abundant shell fragments. Few sideritic nodule. Coaly, carby streaks rare. Loose near bottom. Med to coarse near bottom. 135.46
135.46	135.46	0.69	0.30					CORE LOSS 0.39 135.85
136.15	136.15						0.29	SANDSTONE, Fine to coarse grained, poorly sorted, Glauconitic. Contains shell fragments. One 3 cms thick, hard, calcareous sandstone band at bottom. 135.85
							0.50	SILTSTONE, with clayey, carby laminations and fine sand & glauconitic laminations. Pockets of fine clean sand. Few coaly carby fragments. 135.9
							1.60	SILTSTONE, Med dark gray NS. Contains streaks of fine sand and glauconite. Coaly carby fragments, rarely pyritized. Few fine to med sand laminations. 136.6
138.94	138.94						0.11	SHALE, Med dark gray NS. Carby debris, often pyritized. Pockets or burrows filled with fine to coarse clean sand. Sideritic nodules throughout the unit. Stick-sided in the middle. 138.25
							3.05	SILTSTONE, Med gray NS, clayey and carby streaks. Burrows filled with fine sand. Compact. Glauconitic. 138.96
142.01	142.01	3.05	3.05					SILTSTONE, Med gray NS. Contains carby and clayey streaks. Burrows and pockets of fine clean sand and fine glauconite. Few sideritic nodules. Few coaly streaks. Apper flaser bedding. Slightly sandy and muddy near bottom. 142.0

DRILL-HOLE NO LS-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								142.01
								CLAYSTONE-SANDSTONE INTERLAMINATED Sand fine to med grained, clean with rare glauconite grains. Burrows filled with fine clean sand.
14201					2		0.25	14226
	3.05	3.05	100				0.65	SANDSTONE, Loose, friable, Coaly, carby material abundant Sandstone muddy, fine to coarse grained Dominantly medium grained. Poorly sorted. One 0.08 m thick, hard, calcareous band containing plant fragments, partly pyritized.
					4		2.15	142.91
								SANDSTONE, CLAYSTONE INTERLAMINATED Sand fine to coarse, dominantly fine grained, with fine grained glauconite.
14506					5			145.06
	3.05	3.05	100				3.05	SANDSTONE, Fine grained, well sorted, mostly subangular grains. Abundant coaly carby streaks. Clayey. Few glauconitic grains. Few sideritic nodules. Light gray N7, Non calcareous.
					8			148.11
14811							2.20	SANDSTONE, Light gray to dark gray N3. Fine grained becomes med grained downward Well sorted. Contains coaly carby streaks and laminations. Few clay bands. Non calcareous.
	3.05	2.20	72.3					150.3
							0.85	CORE LOSS
								151.16

DRILL-HOLE NO 15-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								151.16
151.16					1		2.11	SANDSTONE, Very fine grained, well sorted, with clay laminations and streaks. Carby fragments, few pyritized. Sandstone glauconitic, few sideritic nodules.
	3.04	3.04	100		2			153.27
					3		0.25	CLAYSTONE, Olive gray 5Y 4/1, with fine to coarse grained glauconite sand laminations. Sideritic bands. Non calcareous.
					4		0.68	SANDSTONE, Fine to coarse grained near top. Fine grained well sorted in the lower half. Glauconitic calcareous. Fossil shell fragments in the upper half.
154.20					5		0.20	154.20
					6			154.40
	3.05	2.85	93.44		7		1.90	CORE LOSS 0.20 SANDSTONE, Fine grained, well sorted, glauconitic, Greenish gray 5G 6/1. Few scattered shell fragments. Few clay streaks and bands Coaly, carby streaks rare. About 40 cm thick, hard, calcareous band with few clay streaks at top.
					8			156.30
157.25					9		0.95	CLAYSTONE, Olive gray 5Y 4/1, Very fine sand streaks and laminations with fine glauconite. Burrows filled with fine to medium grained glauconitic sand. Coaly, carby debris, few pyritized. Slickensided at few places. Few sideritic nodules.
	3.05	3.05	100		10		3.05	157.25
					11			CLAYSTONE, With fine glauconitic sand laminations Same as above.
	160.30				12			160.30

DRILL-HOLE NO 15-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
16030	3.05	3.05	100				0.30	CLAYSTONE. Same as above. 160.30-160.60
							0.05	FAULT BRECCIA Probably fault breccia, Contains fine to coarse quartz sand. Coaly and carby fragments. Sideritic fragments. Clayey material and lithic fragments. 160.65
							1.05	CLAYSTONE, With fine glauconitic sand laminations. Few coaly streaks, at places pyritized. More sandy near top. One sideritic band near bottom. 161.70
16335	3.05	3.05	100				1.65	SANDSTONE, Fine grained, Silty, Clayey, with clayey streaks and bands. Coaly carby streaks rare. Few sideritic nodules. Glauconitic. 163.35
							1.35	CLAYSTONE, With fine glauconitic sand laminations. Few coaly, carby streaks. Few sideritic nodules. Carby debris. Few shell fragments, at one place. One 10 cms thick sideritic band at bottom. 164.70
16640	3.04	3.04	100				1.70	SANDSTONE, Fine grained, well sorted, highly glauconitic. Few coaly, carby streaks. Few clayey streaks. Few sideritic nodules. Now calcareous. 166.40
							1.95	SANDSTONE Greenish gray, highly glauconitic. Fine grained, well sorted. Sideritic bands and nodules. Few coaly carby streaks. 168.35
16944							1.97	SHALE, Brownish gray 5YR 4/1, Abundant sideritic bands and nodules. Fine glauconitic sand laminations, Carby fragments few pyritized. 169.44
								SHALE CONTINUES

DRILL-HOLE NO LS-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
	3.05	3.05	100				3.05	SHALE, Contains abundant sideritic bands. Fine sand laminations. Sand glauconitic. Few shell fragments. Scattered carby debris, few pyritized. Sand in laminations. medium grained at places 172.49
172.49	172.49						0.25	FAULT BRECCIA, Probably fault breccia, Contains fine to coarse sand grains. Coaly, carby fragments, lithic fragments, glauconitic grains and clayey material. Contains abundant shell fragments. 172.74
	3.05	2.35	77.05				0.22	SILTSTONE - CLAYSTONE. INTERLAMINATED. Contains few carby streaks and rare shell fragments. 172.92
	3.05	2.35	77.05				0.40	COAL, Sampled No LS-4-1 Color black. Very fine grained pyrite streaks abundant. Streaks are very thin, not visible by naked eye. Resin globules along the bedding plane. Few clayey streaks up to 2 mm thick. Not banded. Moderately developed cleats. Light, ash percentage probably less 173.36
175.54	175.54						0.10	DIRTY COAL, CLAYEY material, gradually increases towards bottom - 0.10 173.46
	3.05	1.91	62.62				0.38	CARBY CLAYSTONE. (0.38) Abundant coaly, carby fragments few pyritized 173.84
	3.05	1.91	62.62				1.51	CLAYSTONE, Olive gray 5Y 4/1. Coaly carby material, at places pyritized. One about 3 cms thick highly coaly, carby band with pyrite and resin near bottom 174.84
	3.05	1.91	62.62				0.70	CORE LOSS 0.70 175.54
178.59	178.59						0.14	CLAYSTONE, Med dark gray N4. Scattered carby debris, at places pyritized. Few carby streaks. Grades into siltstone in the lower half and finally into sandstone at bottom 177.05
	3.05	0.75	24.59				1.14	SANDSTONE, Med to coarse grained, moderately sorted, silty. Contains coaly, carby streaks friable. Med gray N5. 177.45
	3.05	0.75	24.59				1.14	CORE LOSS - 1.14 178.59
	3.05	0.75	24.59				2.30	CORE LOSS 180.29

DRILL-HOLE NO 15-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
18164	18164	3.05	2.10	68.35	1		0.75	SANDSTONE-CLAYSTONE INTERLAMINATED light gray N7, to Med dark gray N4. Sand fine to very fine grained at top and fine to coarse grained at bottom. More sandstone in the upper half and more claystone in the lower. 182.89
18164	18164				2		0.95	CORE LOSS 182.59
	3.05	2.10	68.35		3		1.00	SANDSTONE, Fine grained silty, glauconitic, abundant calcified shell fragments, hard compact, calcareous. At top 7 cms thick sandstone band, med to coarse, dominantly coarse grained Sideritic, followed by 10 cms thick claystone band. 183.59
					4		1.10	CLAYSTONE, Burrows filled with fine sand, glauconite and shell fragments. Coaly, carby, laminations and streaks near bottom 184.69
18469	18469				5		2.00	SILTSTONE Highly burrowed, burrows filled with fine sand Contains sideritic nodules 186.69
18469	18469	3.04	3.04	100	6		0.60	CLAYSTONE, Med gray N5, Contains very fine sand laminations 187.29
					7		0.14	SANDSTONE, Greenish gray SG 6/1, Med grained Moderately sorted. Contains burrows filled with fine to med sand and glauconite Shell fragments rare. Now calcareous 187.73
18773	18773	3.05	3.05	100	8		1.49	SILTSTONE, Med dark gray N4, Sandy at places with rare glauconite. One 5 cms thick sideritic band at the bottom. Very fine grained scattered pyrite at few places Now calcareous 189.22
					9		0.50	SANDSTONE, Fine to coarse grained. Dominantly fine grained, Greenish gray SG 6/1. Carby fragments, few pyrite. Now calcareous 189.72
					10		0.50	CLAYSTONE, Med dark gray N4, Coaly, carby traces Contains fine grained sand laminations 190.22

DRILL-HOLE NO LS-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
								190.42
							0.36	CLAYSTONE, light bluish gray, rooted, abundant carby fragments, few pyritized 190.78
	190.78						0.20	CLAYSTONE, light bluish gray, same as above 190.98
190.78							0.30	COAL Sampled LS-4-2A (For G.S.P) 191.28
							0.10	CLAYSTONE, rooted, slickensided, more carby than above Clayst. 191.38
							0.05	COAL, Black, light, contains resin globules 191.43
							0.25	DIRTY COAL, Resin globules common, slightly heavier than coal 191.68
	3.05	3.05	100				0.43	COAL, Sampled LS-4-2B 192.11
							1.32	CLAYSTONE, light bluish gray, rooted, highly carby and coaly bands 5 to 10 cent thick at top, bottom and the centre 193.43
								COAL, SAMPLED LS-4-3 193.83
							0.40	COAL, SAMPLED LS-4-3 193.98
							0.15	DIRTY COAL 194.08
	193.83						0.10	CLAYSTONE, Rooted, Contains coaly, carby fragments, few pyritized. Olive gray 544/1 194.38
							0.30	
							0.40	SILTSTONE, Rooted, Coaly, carby streaks, few pyritized. Grades into sandstone 194.78
	3.05	3.05	100				2.10	SANDSTONE, light gray N7, fine grained, well sorted, clayey at places. Rooted. Fine to med grained near bottom. Contains coaly carby streaks. 196.88
								SANDSTONE, fine to coarse grained, dominantly fine grained. Light gray. Coaly carby streaks rare. 197.45
	196.88						0.57	
							2.47	SILTSTONE, Light gray, slightly glauconitic, burrowed. Contains few sideritic nodules, few clayey and few very fine sandy bands. 199.92
	3.04	3.04	100					SANDSTONE, Very light gray N8. Silty, Very fine grained, and fine grained bands. Abundant fine coaly and carby laminations. Glauconitic at places. Few sideritic bands up to 2 cent thick. Noncalcareous. 202.97
	199.92							

DRILL-HOLE NO LS-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
	3.05	3.05	100				3.05	SANDSTONE from 199.92 m Described on previous page
202.97	202.97							202.97
	3.05	1.23	40.33				1.23	SANDSTONE, light gray N7. Contains two 5 and 15 cm thick claystone bands. Sandstone is fine grained well sorted and friable. Contains few sideritic nodules near top.
202.97								204.20
							1.82	CORE LOSS
206.02	206.02							206.02
	3.05	0.80	26.23				0.80	SANDSTONE, Yellowish gray 5Y 7/2. Fine grained, loose, friable. Contains few sideritic nodules. Well sorted, subangular grains. Lower half hard, compact, med grained, glauconitic.
206.02								206.82
							2.25	CORE LOSS
209.07	209.07							209.07
								CORE LOSS
209.07								Run CONTINUES

DRILL-HOLE NO 15-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
	3.05	NIL	0.00		1		3.05	CORE LOSS
212.12	212.12				2			212.12
	3.04	1.30	42.76		3		1.74	CORE LOSS
213.86					4		1.30	SANDSTONE Fine to med grained, loose, friable, Few coarse grains. One 20 cm thick, heavy, hard band. Noncalcareous.
215.16	215.16				5			215.16
	3.05	1.55	50.82		6		1.50	CORE LOSS
216.66					7		1.55	SANDSTONE. Fine to medium grained. Moderately sorted. Loose, friable, Contains few sideritic nodules.
218.21	218.21				8			218.21
	3.05	1.85	60.66		9		1.85	SANDSTONE, Very fine grained, well sorted. Clay at top few sideritic bands. Few coaly carby laminations. Noncalcareous, Glauconitic at places. Clay bands and laminations in the lower half.
220.06					10			220.06
					11			
					12			

DRILL-HOLE NO LS-4

CORE RECOVERY				WATER LOSS	DEPTH METRES	GRAPHIC LOG	THICKNESS	LITHOLOGIC DESCRIPTION
FROM	TO	CORE	CORE %					
230.40	3.05	0.20	6.56		1		0.20	SANDSTONE-CLAYSTONE INTERLAMINATED Sandstone light gray NT, fine to coarse grained poorly sorted. Contains few glauconitic grains. Claystone light gray NT. Contains scattered carby debris, few sideritic bands. Core in pieces, not intact.
					2			230.60
					3		2.95	CORE LOSS
232.45	3.05	0.10	3.28		4		0.10	SANDSTONE-CLAYSTONE INTERLAMINATED Sandstone fine to coarse grained, poorly sorted, light gray NT. Glauconitic grains rare. Claystone light gray NT. One sideritic band near bottom. Core in pieces, Not intact. No idea from which part of the run core recovered.
233.45					5			233.55
					6		2.95	CORE LOSS
236.50					7			236.50 T.D.
					8			
					9			
					10			
					11			
					12			

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Collar elevation_____

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COAL SAMPLE DATA

SAMPLE NO. LS-4-1 NO. OF BAGS ONE
COLLECTOR CHANDIO-SUPERIQUE COAL FIELD SOUTH LAHRA
LATITUDE _____ LONGITUDE _____
PROVINCE SINDH DISTRICT DADU
DRILL HOLE LS-4 DATE SAMPLED 30th MAY 92
FORMATION BARA AGE PALEOCENE
COAL SEAM _____ ESTIMATED RANK LIGNITE A
TOTAL SEAM THICKNESS _____ in THICKNESS SAMPLED _____ in
3.50 m 0.40 m
DEPTH TO TOP OF COAL _____ ft SURFACE ELEVATION _____ ft@MSL
172.96 m _____ m
ROOF ROCK SILTSTONE FLOOR ROCK CLAYSTONE
SAMPLE TYPE DRILLCORE
(channel, channel/upper bench, grab, drillcore, etc.)

COMMENTS:

NO. GSP SPLIT

DESORPTION RUN ON THIS SAMPLE

COAL SAMPLE DATA

SAMPLE NO. LS-4-2A NO. OF BAGS One
COLLECTOR CHANDIO-SHAFIQUE COAL FIELD SOUTH LAKHRA
LATITUDE _____ LONGITUDE _____
PROVINCE SINDH DISTRICT DADU
DRILL HOLE LS-4 DATE SAMPLED 30th MAY 92
FORMATION BARA AGE PALAEOCENE
COAL SEAM _____ ESTIMATED RANK LIGNITE 'H'
TOTAL SEAM THICKNESS _____ in THICKNESS SAMPLED _____ in
1.13 m 0.30 m
DEPTH TO TOP OF COAL _____ ft SURFACE ELEVATION _____ ft @MSL
190.98 m _____ m
ROOF ROCK CLAYSTONE FLOOR ROCK SHALE (0.10)
DIRTY COAL
SAMPLE TYPE DRILLCORE
(channel, channel/upper bench, grab, drillcore, etc.)

COMMENTS:

No USGS SPLIT

Desorption Run on this sample

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COAL SAMPLE DATA

SAMPLE NO. LS-4-2B NO. OF BAGS ONE
COLLECTOR CHANDIO SHAFIQUE COAL FIELD SOUTH LAKHNA
LATITUDE _____ LONGITUDE _____
PROVINCE SINDH DISTRICT DADU
DRILL HOLE LS-L DATE SAMPLED 30th MAY 92
FORMATION BANK AGE PALEOCENE
COAL SEAM _____ ESTIMATED RANK LIGNITE 'A'
TOTAL SEAM THICKNESS _____ in THICKNESS SAMPLED _____ in
1.13 m 0.43 m
DEPTH TO TOP OF COAL _____ ft SURFACE ELEVATION _____ ft@MSL
191.68 m _____ m
ROOF ROCK DIRTY COAL (0.70) FLOOR ROCK CLAYSTONE (1.32)
CLAYSTONE
SAMPLE TYPE DRILL CORE
(channel, channel/upper bench, grab, drillcore, etc.)
COMMENTS:

NO GSP SPLIT

Description run on this sample

SAMPLE NO. LS-4-5 NO. OF BAGS ONE
COLLECTOR CHANDIO-SHAFIQUE COAL FIELD SOUTH LAKHRA
LATITUDE _____ LONGITUDE _____
PROVINCE SINDH DISTRICT DADU
DRILL HOLE LS-4 DATE SAMPLED 30th MAY 92
FORMATION BARA AGE PALEOGENE
COAL SEAM _____ ESTIMATED RANK LIGNITE A
TOTAL SEAM THICKNESS _____ in THICKNESS SAMPLED _____ in
0.65 m 0.55 m
DEPTH TO TOP OF COAL _____ ft SURFACE ELEVATION _____ ft@MSL
193.43 m _____ m
ROOF ROCK CLAYSTONE (1.32) FLOOR ROCK SILTSTONE
SAMPLE TYPE DRILL CORE
(channel, channel/upper bench, grab, drillcore, etc.)
COMMENTS:

NO GSP SPLIT