DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Drilling Records and Logs for the Indus East area, Coal Resource Exploration and Assessment Program March 1987 to February 1988 Southern Sind Province, Pakistan

by

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and

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Introduction

The Coal Resource Exploration and Assessment Program (COALREAP), was funded by the United States Agency for International Development (USAID) and the Government of Pakistan (GSP) to explore for coal in Sind Province, Pakistan. This joint effort is being conducted as the Coal Resource Assessment Component of the Energy Planning and Development Project of USAID, under the Participating Agency Service Agreement (PASA) No. 1PK-0478-P-IC-5068-00. Sixteen coal-exploration drill holes were completed between March 1987 to February 1988 in a 616 sq km area, designated as the Indus east coal area, south of the city of Hyderabad, Sind Province, Pakistan (fig. 1). Joint effort between the USGS and GSP enabled the discovery of additional coal deposits in areas that were previously unexplored. The technical aspects of the drilling as described herein serve to supplement the lithologic and geophysical logs contained in reports by Thomas, R.E., Landis, E.R., and Khan, R.A., 1988 and Landis, E.R., et al. 1988. This report contains information concerning the type of rig, drill size, length, and bits used. Day-to-day drilling logs and drilling reports were kept by GSP geologist at the site. Future coal exploration drilling in the area can be more efficient and timely if drilling problems are anticipated in advance by using the technical information in this report. The size, length, and type of casing or drill bit used on the project described herein will help future drillers accurately estimate material amounts and costs.

Geographic Setting

The Indus east area (fig. 1), covers 616 sq. km and is approximately 150 km northeast from Karachi and is an extension of the Sonda coal field, west of the Indus River. The northern limit of exploration was the high limestone cliffs of Ganjo Takkar, (Thomas, R.E. and others, 1988a), whereas in

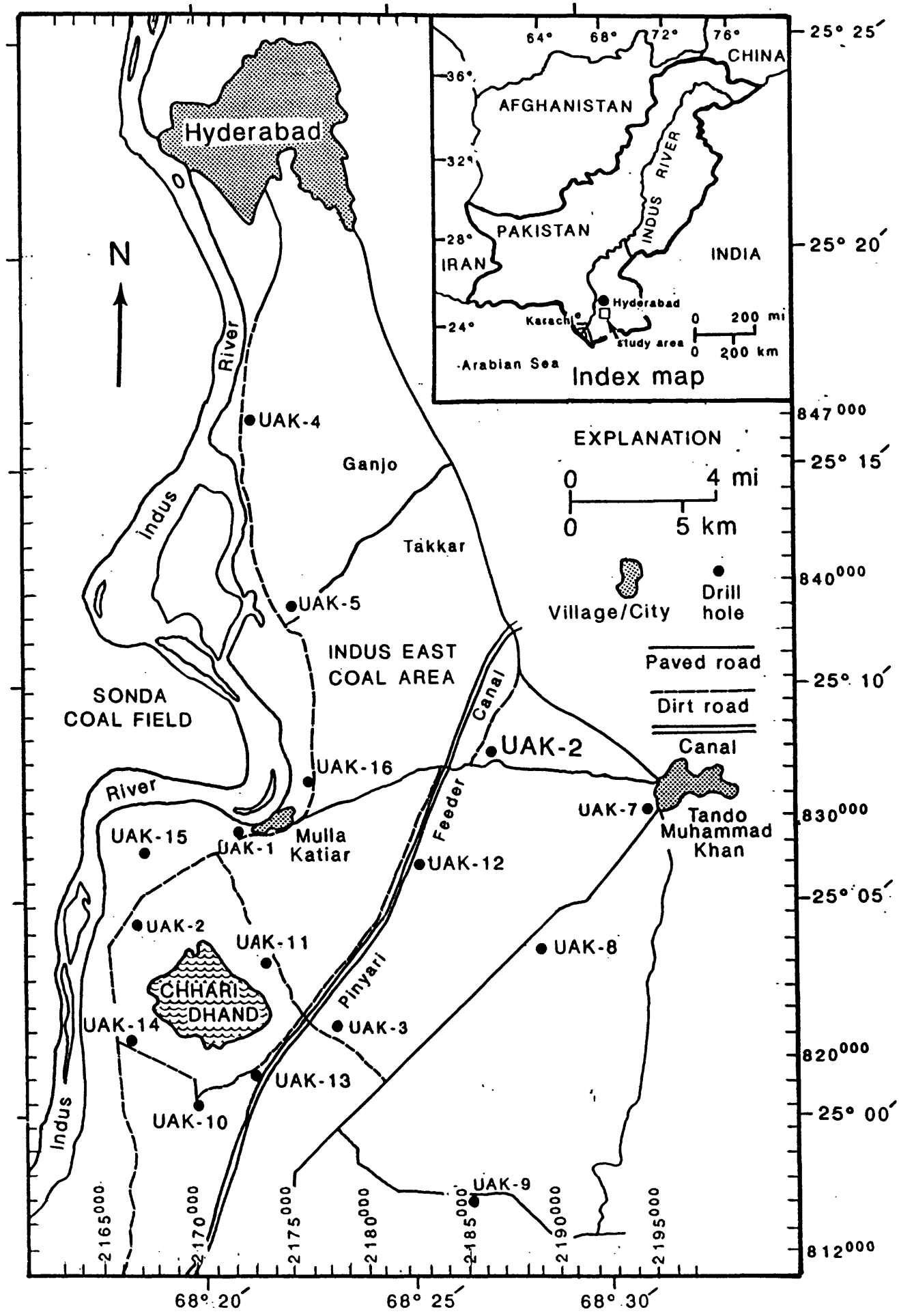

Figure 1.-Index map of the Indus East area and location of Coal Resource Exploration and Assessment Program drill holes, Sind Province, Pakistan.

the south, an arbitrary limit was designated as 4 km south of Charri Dhand. The eastern limit of exploration does not extend beyond the village of Tando Muhammad Khan and the western limit is the Indus River, thus the Indus east area described herein, is defined by existing drilling and arbitrary boundaries.

The Indus east area is relatively flat, except in the north near Ganjo Takkar. Most of the flat, southern area contains numerous shallow lakes and ponds. Extensive canals and intensive sugar-cane farming caused logistical problems for choosing suitable drill sites. Large sand and silt dunes, which probably formed on the river flood plain but which are far from the present location of the Indus River, occupy many of the best drilling locations. The soil is loose and sandy, restricting vehicle travel to roads boardering the canals. Significant logistical difficulties occurred when large, heavy drill and water trucks needed to cross canal bridges. Long and tedious routes had to be chosen to access the drill sites. Few roads and limited availability of water, coupled with intense heat and dust, made visits to the site difficult. Permission to drill on land in proximity of villages and/or crops was difficult or usually impossible to obtain. Drill sites had to be located out-of-sight from the villages and far away from sugar-cane harvesting.

Lithology

One of the objectives of the COALREAP program was to drill into the coal-bearing strata and sample coal beds that where penetrated during drilling. Drilling was confined to depths less than 400 m because of limits imposed by existing drill rigs and current mining practices (Schweinfurth, S.P., 1988).

Most of the area is covered by alluvium consisting of unconsolidated Indus River flood plain sand and silt with minor mud and clay deposits. Thickness of alluvium ranges from 110 m in drill hole UAK-9, in the southern part of the

Indus east area, to 0 m in drill hole UAK-4, in the north. Average thickness of alluvial sand and silt is 41 m per drill hole. Most of the alluvial material was drilled by the rotary method, using a Tricon Roller bit[1].

The alluvial material was flushed out of the drill hole and samples were collected in a sieve. HW (4.5" diameter) casing was set through the alluvium to prevent the unconsolidated sediment from collapsing into the hole. On the basis of stratigraphic information, geologists determined the depth at which coring would be started. Problems with "boiling sand," commonly at depths of 250 m, created a need for additional casing at that depth. Drill rods frequently became stuck in the unconsolidated material, which tended to rise between the rods ad the inside of the casing. Drill holes had to be washed clean of this material before drilling could continue. Recoverability of coal depended upon the type of roof rock and floor rock. Coal with unconsolidated sandstone as roof rock tended to be washed out of the drill hole with the sediment and was seldom completely recovered. Coal between hard, consolidated sandstone, siltstone, or claystone typically would have very good core recovery.

Bedrock consists of limestone, shale, siltstone, sandstone and coal. Generally, casing was not set into bedrock, except in those intervals of unconsolidated sand and silt. Casing was set through alluvium to bedrock in most drill holes. Boiling sand jammed the rods resulting in time lost for pulling casing and rods out of the drill hole. Jammed rods could be freed by constant flusing but this was possible only in very loose material.

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[1] Use of trade names is for identification of types of equipment only and does not imply endorsement by USGS, GSP, or USAID.

Limestone is thick-bedded to massive. Individual beds are separated by beds of siltstone and shale in some places. One-hundred percent core recovery was possible when drilling in this lithology. The on-site geologists determined whether the limestone beds should be cored or noncored.

Shale and siltstone beds are competent and can be cored with reasonable success. Shale, however, tends to become soft when mixed with water and poor core recovery can result.

Upon reaching total depth, the drill hole was extended an additional 5 or 6 m to provide: (1) additional space for the geophysical probe which measured approximately 3.05 m in length, and (2) a hole for loose sediment and caved rock to accumulate. Drilling an additional 5 or 6 m beyond the last coal bed intercepted is highly recommended for future drilling.

Drilling

The drilling was performed by the Indus Valley Construction Company Ltd., of Lahore under contract with USAID. Normally, 2 drill rigs operated and were positioned a few kilometers from each other for logistical and security reasons. Periodic maintenance and repairs to the drill rigs usually required a couple of days every 2 weeks. Down-time should be anticipated in every drilling project. Shortages of rods, casing, bits, and water also caused delays that set the program behind schedule.

Two types of drill rigs were used in the Indus east area. The Longyear-38 and the Longyear-44, both skid-mounted, were barely adequate for the required drilling; a larger drill rig would have provided more power for turning and pulling the rods. The maximum depth each drill rig can drill depends upon the size (i.e., weight) and number of drill rods that must be backed-out of the drill hole and the amount of torque required to turn the rods.

During periods of intense heat, the hydraulic fluid in the drill rig's lines would deteriorate and lose viscosity. In addition, the casing and rods became so hot that gloves had to be worn to protect the drillers from burns.

Collapse of drill holes was a major problem. Various types of drilling "mud" was tested, but, the high viscosity of the tested mixtures reduced efficiency of the mud pump. Drill rods frequently became stuck in collapsed holes and various geophysical logs could not be run for fear of losing the geophysical probe. Saline groundwater, probably due to oversaturation from the Indus River and extensive irrigation, mixed with the drilling fluid and created a chemical imbalance making the drilling fluid less effective. In a program where 100% core recovery of the coal is essential, problems with caving sediment must be minimized. Chemical analysis of drilling fluid mixed with salt walter is recommended before drilling.

Several mud pits, lined with concrete, were used to mix and recirculate the drilling fluid. Though concrete prevented seepage into the ground, evaporation and water loss within the drill hole necessitated frequent replenishment.

Stand-By Time

Stand-by time is time alloted to the driller, at a special financial rate, to allow either washing the drill hole or waiting for the geophysical logging to be completed. Periodic washing of the drill hole is routine; however, under certain circumstances, excess washing may be required and when this is directed by the supervising geologist, a provision must be made to compensate the drilling contractor. Additional stand-by time is also required for the geophysical probe to be lowered through either the casing and/or the drill rods. Allowance for stand-by time should be a part of every drilling program and funds allocated to cover those costs.

Problems encountered

Below is a list of various problems encountered during the duration of the drilling program in the Indus east area:

1. Supplies, such as casing and drill rods, were inadequate
2. Mud pumps frequently malfunctioned
3. Lack of drilling crew for the night shift
4. "Boiling" sand caused rods to stick
5. Heat reduced efficiency of the hydraulic fluid
6. Generators intermittently broke down
7. Lack of adequate water supply
8. Permission to gain access to drill sites
9. Load limits of canal bridges
10. Suitable drilling sites, preferably away from villages
11. Caving of the drill hole
12. Providing a sump or "rat" hole for the geophysical probe
13. Core recovery, especially of coal, was low in some drill holes

Conclusion

This report should be used in conjunction with Thomas, R.E., Landis, E.R., and Khan, R.A., 1988b, and Landis, E.R., et al., 1988. An analysis of the data in these reports, in addition to this report, should eliminate some of the problems during drilling in the Indus east area. Depending upon the depth drilled, a more accurate estimate of both supplies and funds can be proposed. This report should be helpful to future drillers and geologists planning additional exploration in the Indus east area. Contracts between negotiating parties can be properly written with provisions such as stand-by time incorporated into the final cost. Mining companies also require such information if they initiate a developmental drilling program.

Acknowledgements

Special thanks go to the GSP personnel involved in the drilling project. They worked long hours and were very dedicated and conscientious. Additionally, the drillers and the various individuals involved with the operation deserve recognition. Working under intense heat and dust, coupled with the fear of being bitten by an unnoticed viper, create difficult working conditions. Thanks also goes to John R. SanFilipo of the USGS who helped with supplying needed data and the necessary drilling forms.

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Drilling Record

COALREAP

DRILL HOLE UAK- 1

1. Topographic sheet number 40 C/8

2. Grid reference: 8 28 105 (meters) Northing

   21 74 860 (meters) Easting

3. Altitude above mean sea level 13.40 meters

4. Drill rig type Longyear-38

5. Drilling started March 23, 1987

   Drilling completed April 09, 1987

6. Non-coring Surface (m) to 64.00 (m)

   Coring 64.00 (m) to 300.11 (m)

7. Total depth drilled 300.11 (m)

8. Drill bit:

				Type
Surface to	64.00	meters;	Tri con Roller 5½' Dia.
64.00 (m) to	221.25	meters;	Diamond HQ
221.25 (m) to	300.11	meters;	Diamond NQ
(m) to		meters;	

9. Drilling fluid Bentonite

10. Casing set from

				Type
Surface to	8.24	(m)	5½"
Surface to	64.30	(m)	4½" flush-joint HW
64.30 (m) to	65.00	(m)	4½" flush-joint HW
Surface (m) to	224.01	(m)	3½" flush-joint NW

11. Geologists Mohammad Siddique Khan

    Naimatullah

    Mohammad Ali Tariq

(UAK-1, cont.)

12. Geophysical Logs

Type								
4-π density	from	Surface	(m) to	289.00	(m) through	NQ drill pipe		
Gamma/Neutron	from	Surface	(m) to	287.00	(m) through	NQ drill pipe		
3-Arm Caliper	from	70.00	(m) to	167.00	(m) through	Open hole		
Resistivity - G/N	from	Surface	(m) to	165.00	(m) through	Open hole		
High Resolution Density	from		(m) to		(m) through			

13. Remarks:

Unconsolidated sandstone and mechanical problems with the drill rig contributed to early termination of drilling. Rods stuck frequently in the loose sediment.

Geophysics

3-Arm Caliper= 2K range, 3% standard deviation, .4" deflection,
Gamma= 10 counts per inch, 3% standard deviation, log speed 6m per minute
Neutron=50 counts per inch, 1% standard deviation, log speed 6m per minute.

Resistivity= 10 ohms per inch, 1000 bias, log speed 6m per minute.

DRILL HOLE UAK- 1

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
March 23, 1987	17:00	Surface	Drilling started with Tricon 5½"
25	12:00	64.0	Stopped non-coring
25	05:00	64.0	Washed hole, prepared for casing
25	09:00	64.0	Lowered HW casing to 64.30 m
25	15:00	64.0	Cleaned mud pits, prepared mud
25	16:00	64.0	Drilling resumed, coring started
March 26, 1987	05:00	87.1	Stopped to clean inner-tube and mud
26	06:15	87.1	Drilling resumed
March 27, 1987	12:00	116.05	Stopped to lower casing to 65.0 m
27	12:00	116.05	Pulled rods due to bit blocked
27	12:00	116.05	Wire line broken
27	04:30	116.05	Drilling resumed
March 28, 1987	1500	173.25	Stopped, pulled 21.0 m of rods
28	2100	173.25	Drained mixed cuttings from mud, cleaned pits, repaired mud pump, prepared mud
28	2330	173.25	Lowered rods, washed hole
March 29, 1987	0100	173.25	Drilling resumed
29	0530	181.20	Stopped to free stuck rods, bentonite mixed
29	0830	181.20	Drilling Resumed

DRILL HOLE UAK- 1 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
March 30, 1987	1700	219.95	Stopped to repair mud pump and electric generator
30	2300	219.95	Drilling resumed
March 31, 1987	12:00	221.25	Stopped to pull 30 m of rods, prepared mud, repaired mud pump.
31	0700	221.25	Battery failure
April 1, 1987	1900	221.25	Started to lower NW casing
2	0700	221.25	Lowered 221.5 m of NW casing
3	1330	221.25	Drilling resumed
3	2300	234.01	Stopped to prepare mud and generator
4	2430	234.01	Drilling resumed
4	0845	243.11	Stopped due to leakage of mud equilizer and ream casing
5	0700	243.11	Reamed casing up to 244.01 m
5	0830	243.11	Lowered NQ rods and repaired mud pump
5	1740	243.11	Drilling resumed
5	2200	248.46	Stopped to wrap wireline
6	2400	248.46	Drilling resumed
6	0100	249.61	Stopped to repair electric generator, mud equilizer leaked, cleaned mud pits and mixed bentonite

DRILL HOLE UAK-1 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
April 6, 1987	0700	249.61	Welded equilizer and repaired
6	1430	249.61	Drilling resumed
6	1630	252.21	Run 2.60, CR 2.60, 100%
6	1630	252.21	Coal from 249.96-250.46 (0.50)
6	2145	255.26	Run 3.05, CR 1.90m
April 7, 1987	0200	255.26	Pulled out-9.0 m of rods, circulated mud due to jamming
7	0430	258.31	Run 3.05m, CR 1.05 m
7	0700	261.31	Run 3.00m, CR 1.00m
7	1030	263.76	Run 2.45, CR 1.35
7	1345	266.81	Run 3.05, CR 0.50
7	--	267.36	Run 0.55, CR 0.20
7	1730	270.36	Run 3.00, CR 0.60
7	1900	273.36	Run 3.00, CR 0.40
April 8, 1987	0345	273.36	Repaired mud pump
8	0530	276.41	Run 3.05, CR 0.70
8	0700	279.46	Run 3.05, CR 1.20
8	1115	282.51	Run 3.05, CR 1.50
8	1515	285.51	Run 3.00, CR 0.55
8	1800	287.96	Run 2.45, CR 2.40
			coal 285.76-286.16 (.40) + .05 loss

DRILL HOLE UAK- 1 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
April 8, 1987	1900	291.01	Run 3.05, CR 1.20
8	2045	291.56	Run 0.55, CR 0.30
April 9, 1987	1245	294.56	Run 3.00, CR 0.60
9	0200	297.61	Run 3.05, CR 2.00
9	0330	300.11	Run 2.50, CR 1.90
			Hole completed due to IVCC problems in drilling
9	0400		Caving problems, IVCC washing hole
9	2215		Geophysical logging started
9	2215	289.00	4 Pi Density through drill pipe (NQ)
9	2345	287.00	Gamma/Neutron through drill pipe
April 10, 1987	0130		3-Arm caliper stuck, pulled out
10	0220		Pulled out NW casing
10	0630	167.00	Ran 3-Arm caliper without casing
10	0800	165.00	Ran resistivity and gamma-neutron
			Completed hole

Drilling Record

COALREAP

DRILL HOLE UAK-2

1. Topographic sheet number 40 C/8
2. Grid reference: 8 24 466 (meters) Northing
   21 68 316 (meters) Easting
3. Altitude above mean sea level 14.00 meters
4. Drill rig type Longyear-38
5. Drilling started March 29, 1987
   Drilling completed April 09, 1987
6. Non-coring Surface (m) to 28.52 (m)
   Coring 28.52 (m) to 204.75 (m)
7. Total depth drilled 204.75 (m)
8. Drill bit:

			Type
Surface to	28.52	meters;	Tricon Roller 5½" dia.
28.52 (m) to	204.75	meters;	Diamond, 101 mm dia., 25 cm long, side discharge
(m) to		meters;	
(m) to		meters;	

9. Drilling fluid Bentonite
10. Casing set from

			Type
Surface to	134.22	(m)	HW 4½" dia. flush-joint
(m) to		(m)	
(m) to		(m)	

11. Geologists Mohammad Jaffar Qureshi
    Mohammad Riaz Khan
    M. Idrees Khanzada

(UAK-2, cont.)

12. Geophysical Logs

Type								
4-π density	from	Surface	(m)	to	204.40	(m)	through	Drill rods and casing
Gamma/Neutron	from	Surface	(m)	to	202.20	(m)	through	Drill rods
3-Arm Caliper	from	130.00	(m)	to	202.00	(m)	through	Open hole
Resistivity - G/N	from	130.00	(m)	to	204.00	(m)	through	Open hole
High Resolution Density	from	130.00	(m)	to	204.00	(m)	through	Open hole

13. Remarks:

Geophysics

3-Arm Caliper= 2K range, 3% standard deviation, .4" deflection, log speed 6m per minute

Gamma= 10 counts per inch, 3% standard deviation, log speed 6m per minute

Neutron= 50 counts per inch, 1% standard deviation

Resistivity= 10 ohms per inch, 1000 bias, log speed 6 m per minute

Core barrel broken at 203.50, unable to recover coal at this interval, driller fished inner tube out.

DRILL HOLE UAK- 2 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
March 29, 1987	1018	Surface	Drilling started
29	1715	28.52	Drilling stopped, coring started
29	1820	28.52	Casing hole
29	1910	28.52	Generator shorted, core barrel assembly not available, drilling stopped
March 30, 1987	0840	28.52	Coring started
March 31, 1987	0800	75.65	Drilling stopped, cased hole
31	1000	75.65	Started reaming and casing
April 01, 1987	0300	75.65	Started drilling
01	1700	103.00	Drilling stopped for casing hole
01	0700	103.00	Casing
April 02, 1987	0300	103.00	Drilling started
02	1545	120.00	Drilling stopped, mechanical fault
April 04, 1987	0300	120.00	Drilling started
04	1315	139.25	Drilling stopped for casing hole
April 05, 1987	0225	139.25	Drilling started
05	0330	140.15	Drilling stopped, mechanical fault
05	1545	140.15	Drilling started
April 06, 1987	1900	180.85	Drilling resumed
April 07, 1987	1300	190.75	Drilling continues

DRILL HOLE UAK- 2 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
April 07, 1987	1715	203.25	Drilling stopped, core barrel in hole
April 08, 1987	1600	203.25	Lowering rods, "fish" for core barrel
08	1730	203.25	Core barrel recovered, pipe left in hole.
April 09, 1987	1300	203.25	Drilling started
09	1530	204.40	Drilling stopped

Drilling Record

COALREAP

DRILL HOLE UAK- 3

1. Topographic sheet number 40 C/8
2. Grid reference: 8 20 422 (meters) Northing
   21 78 120 (meters) Easting
3. Altitude above mean sea level 9.10 meters
4. Drill rig type Longyear-38
5. Drilling started April 05, 1987
   Drilling completed April 19, 1987
6. Non-coring Surface (m) to 65.00 (m)
   Coring 65.00 (m) to 250.00 (m)
7. Total depth drilled 250.00 (m)
8. Drill bit:

			Type
Surface to	65.00	meters;	Tri con Roller 5½"
65.00 (m) to	250.00	meters;	HQ Diamond, bottom discharge
(m) to		meters;	
(m) to		meters;	

9. Drilling fluid Bentonite
10. Casing set from

			Type
Surface to	12.38	(m)	5½" casing
(m) to	145.29	(m)	4½" HW flush-joint
(m) to		(m)	

11. Geologists Zameer Mohammad Khan
    Shafique Ahmed Khan
    Sardar Saeed Akhtar

(UAK-3, cont.)

12. Geophysical Logs

Type								
4-π density	from	Surface	(m)	to	243.00	(m)	through	Drill rods and casing
Gamma/Neutron	from	Surface	(m)	to	243.00	(m)	through	Rods and casing
3-Arm Caliper	from	Surface	(m)	to	148.00	(m)	through	Open hole and casing
Resistivity - G/N	from		(m)	to		(m)	through	
High Resolution Density	from		(m)	to		(m)	through	

13. Remarks:

Hole collapsed after the casing was pulled out.

Hole collapsed below 148.00 m after the rods were pulled

Hole location staked by Rafiq A. Khan and Roger E. Thomas March 19, 1987.

Boiling sand problems at 136.05 m

Geophysics

4-Pi density= 500 counts per inch, 1% standard deviation, range 5K, log speed 6m per minute

Gamma = 20 counts per second per inch, 3% standard deviation, Log speed 6m per minute

Neutron = 50 counts per second per inch, 1% standard deviation,log speed 6m per min.

No resistivity, HRD, or Caliper logs

DRILL HOLE UAK- 3 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
April 05, 1987	1610	Surface	Drilling started
5	1730	12.38	Drilling stopped for 5½" HW casing
5	1900	12.38	Drilling Resumed, casing lowered to 12.38 m
April 06, 1987	0100	36.40	Drilling stopped due to shortage of water, rods pulled out
6	2115	52.99	Lowered HW casing up to 50 m
6	2200	62.00	Tapper roller bearing of mud pump broke
6	2200	62.00	Fuel pump broken on longyear, taken to Karachi for repair
April 08, 1987	2230	62.00	Drilling resumed
8	0130	65.00	Drilling stopped for reaming and casing
9	1100	65.00	Drilling resumed
April 10, 1987	0245	93.55	Drilling stopped due to fault in mach.
10	0830	93.55	Drilling resumed
10	1210	102.60	Drilling stopped, bit blocked, rods pulled out
10	1645	102.60	Drilling resumed
April 11, 1987	0830	136.05	Drilling stopped, rods stuck, rods pulled out for reaming and lowering casing

DRILL HOLE UAK- 3 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
April 13, 1987	1420	136.05	Drilling resumed after casing (HW) and lowering the rods
13	1800	145.05	Started pulling out rods due to problems in advancing and for lowering casing
April 14, 1987	0845	145.05	HW casing lowered to 145.29 m
14	1245	145.05	Mud pump faulty, repaired
14	1245	145.05	Drilling resumed
14	1415	148.10	Drilling mud prepared
14	1810	154.15	Mud pump faulty
April 15, 1987	0105	154.15	Drilling resumed, bit-blocked, pulled out all rods.
15	0720	154.15	Drilling resumed
15	1150	163.20	Drilling stopped, centralizer broken bit blocked, rods pulled out
15	1745	163.20	Drilling resumed, after lowering rods
April 16, 1987	1430	185.70	Drilling stopped for mud preparation
16	1540	185.70	Drilling resumed
16	1900	190.60	Drilling stopped, centralizer broken bit blocked, rods pulled out
April 17, 1987	2430	190.60	Drilling resumed
17	0600	198.95	Drilling stopped, centralizer broken, bit blocked, rods pulled out

DRILL HOLE UAK- 3 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
April 17, 1987	1100	198.85	Drilling resumed after lowering rods
April 18, 1987	1845	239.15	Drilling stopped for mud preparation
18	2000	239.15	Drilling resumed
April 19, 1987	0635	250.00	Drilling completed T.D., start washing
19	1010		Stopped washing
19	1035		Geophysical logging started
19	1200		Gamma/Neutron and 4 Pi completed
19	1215		Started circulating mud
19	1330		Started pulling out rods
19	1505		Pulled out rods, logging started
19	1535		3 Arm caliper run below casing
19	1545		Started pulling out casing
19	1900		Casing pulled out
19	2000		Caving below 148 m, geophysical logging not possible

Drilling Record

COALREAP

DRILL HOLE UAK- 4

1. Topographic sheet number 40 C/7
2. Grid reference: 8 43 281 (meters) Northing
   21 75 092 (meters) Easting
3. Altitude above mean sea level 18.00 meters
4. Drill rig type Longyear-38
5. Drilling started December 22, 1987
   Drilling completed December 30, 1987
6. Non-coring Surface (m) to 250.00 (m)
   Coring 250.00 (m) to 312.00 (m)
7. Total depth drilled 312.00 (m)
8. Drill bit:

				Type
Surface	to	30.90	meters;	Tricon Roller 5½" dia.
Surface (m)	to	77.00	meters;	Tricon Roller 4½" dia.
77.00 (m)	to	250.00	meters;	Crest bit 378
250.00 (m)	to	312.00	meters;	NQ Diamond

9. Drilling fluid Bentonite
10. Casing set from

				Type
Surface	to	30.90	(m)	PW 5½" dia., flush-joint
Surface (m)	to	77.51	(m)	HW 4½" dia., flush-joint
(m)	to		(m)	

11. Geologists Mumtaz Javed Khan
    M. Fariduddin

(UAK-4, cont.)

12. Geophysical Logs

Type								
4-π density	from	Surface	(m)	to	307.00	(m)	through	Drill pipe
Gamma/Neutron	from	Surface	(m)	to	306.00	(m)	through	Drill pipe
3-Arm Caliper	from	Surface	(m)	to	215.00	(m)	through	Casing and open hole
Resistivity - G/N	from	Surface	(m)	to	211.00	(m)	through	Casing and open hole
High Resolution Density	from		(m)	to		(m)	through	

13. Remarks:

Geophysics

4-Pi density = 500 counts per second per inch, 1% standard deviation, range 5K, log speed 6 m per minute

Gamma= 10 counts per second per inch, 3% standard deviation, log speed 6 m per min.

Neutron= 100 counts per second per inch, 1% standard deviation, log speed 6 m per minute

Resistivity = 10 ohms per inch, 900 bias,log speed 6 m per minute

Neutron= 50 counts per second per inch, 1% standard deviation,log speed 6 m per min.

3-Arm Caliper= 2K range, 3% standard deviation, .4" deflection, log speed 6 m per minute.

DRILL HOLE UAK- 4 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Dec. 22, 1987	1400	4.00	Drilling stopped due to shortage of water
22	1510	4.00	Drilling resumed
22	1900	19.80	Drilling stopped, Generator not working
Dec. 23, 1987	0900	19.80	Drilling resumed
23	1200	30.90	Drilling stopped for casing the hole
23	1730	30.90	Drilling resumed
23	1830	31.84	Drilling stopped, generator not workin
23	2000	31.84	Drilling resumed
Dec. 24, 1987	0700	77.00	Drilling stopped for casing set
Dec. 25, 1987	0100	77.00	Drilling resumed
25	1400	134.00	Drilling stopped, mud pump not working
25	1530	134.00	Drilling resumed
Dec. 26, 1987	1230	160.00	Drilling stopped, mud pump not working
26	0100	160.00	Drilling resumed
26	1900	250.00	Drilling stopped to start coring, pulled rods, cleaned pits, mixed mud
Dec. 27, 1987	1900	250.00	Drilling resumed, coring started
Dec. 28, 1987	0500	261.45	Drilling stopped due to shortage of water
28	1300	261.45	Drilling resumed
Dec. 30, 1987	0830	312.00	Drilling completed

Drilling Record

COALREAP

DRILL HOLE UAK- 5

1. Topographic sheet number 40 C/8
2. Grid reference: 8 37 643 (meters) Northing
   21 76 470 (meters) Easting
3. Altitude above mean sea level 20.4 meters
4. Drill rig type Longyear-44
5. Drilling started December 21, 1987
   Drilling completed January 06, 1988
6. Non-coring Surface (m) to 3.00 (m)
   Coring 3.00 (m) to 400.00 (m)
7. Total depth drilled 400.00 (m)
8. Drill bit:

				Type
Surface to	3.00	meters;	Tricon Roller 5½" dia.
3.00 (m) to	400.00	meters;	Diamond HQ
(m) to		meters;	
(m) to		meters;	

9. Drilling fluid Bentonite
10. Casing set from

			Type
Surface to	3.00	(m)	HW 4½" flush joint
(m) to		(m)	
(m) to		(m)	

11. Geologists Zameer Mohammad Khan
    Sardar Saeed Akhter
    Mohammad Riaz Khan

(UAK-5, cont.)

12. Geophysical Logs

Type							
4-Pi density	from	Surface	(m) to	373.00	(m) through	Drill rod	
Gamma/Neutron	from	Surface	(m) to	373.00	(m) through	Drill rod	
3-Arm Caliper	from	Surface	(m) to	225.00	(m) through	Open hole and casing	
Resistivity - G/N	from	Surface	(m) to	224.00	(m) through	Open hole and casing	
High Resolution Density	from	_____	(m) to	_____	(m) through	_____	

13. Remarks:

Drill hole collapsed below 225.00 m

Geophysics

3-Arm Caliper= 2K range, 3% standard deviation, .4" deflection, log speed 6 m per min.

Gamma= 10 counts per second per inch, 3% standard deviation, log speed 6 m per minute.

Neutron= 50 counts per second per inch, 1% standard deviation, log speed 6 m per minute

4-Pi density = 500 counts per second per inch, 1% standard deviation, range 5K, log speed 6 m per minute

Resistivity= 10 ohms per inch, 1000 bias, log speed 6 m per minute

DRILL HOLE UAK- 5 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Dec. 21, 1987	0930	Surface	Drilling started, non-coring
21	1400	3.00	Drilling stopped for casing lowering
21	1600	3.00	Drilling resumed
Dec. 23, 1987	1800	60.75	Drilling stopped, generator not working, rods pulled
23	2145	60.75	Drilling resumed
Dec. 24, 1987	0700	74.30	Drilling stopped, generator repair
24	0900	74.30	Drilling resumed
24	2000	86.40	Drilling stopped, mud pump not working
24	2345	86.40	Drilling resumed
Dec. 25, 1987	1000	104.60	Drilling stopped to clean pits and oil checking
25	1100	104.60	Drilling resumed
Dec. 26, 1987	1330	146.70	Drilling stopped, rods pulled to check bit, prepared mud
26	2000	146.70	Lowering of rods completed
26	2400	146.70	Hole washed
26	2400	146.70	Drilling started
Dec. 28, 1987	1730	201.65	Drilling stopped, mud pump not working Shortage of water, rods pulled
Dec. 29, 1987	0900	201.65	Lowering of rods started

DRILL HOLE UAK- 5 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Dec. 29 1987	1540	201.65	Drilling resumed
Dec. 30, 1987	0100	216.80	Drilling stopped, inner tube stuck in the rod. Rods pulled, shortage of HQ rods at site.
Dec. 30, 1987	1755	216.80	Drilling resumed
Dec. 31, 1987	1200	256.20	Drilling in progress
Jan. 01, 1988	0315	265.30	Drilling stopped for hole washing
01	0400	265.30	Drilling resumed
01	0700	268.35	Drilling stopped to clean pits and mud pump repaired
01	0800	268.35	Drilling resumed
Jan. 02, 1988	1230	293.55	Drilling stopped, bit blocked, rods pulled
02	1815	293.55	Drilling resumed
Jan. 03, 1988	0515	344.40	Drilling stopped to check the auto chuck, adjusted
03	0735	344.40	Drilling resumed
Jan. 05, 1988	0735	374.80	Drilling stopped inner tube stuck
05	0800	374.80	Washed hole
05	0930	374.80	Drilling resumed
Jan. 06, 1988	0700	400.00	TD, drilling completed

DRILL HOLE UAK- 5 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Jan. 06, 1988	1345	400.00	Carried out washing
06	1615	400.00	Geophysical logging, 4 Pi through HQ rods and Gamma Neutron
06	1945	400.00	Neutron and three arm caliper, logging completed

Drilling Record

COALREAP

DRILL HOLE UAK-6

1. Topographic sheet number 40 C/8
2. Grid reference: 8 30 970 (meters) Northing
   21 85 023 (meters) Easting
3. Altitude above mean sea level 13.10 meters
4. Drill rig type Longyear-38
5. Drilling started September 23, 1987
   Drilling completed October 18, 1987
6. Non-coring Surface (m) to 150.00 (m)
   Coring 150.00 (m) to 297.05 (m)
7. Total depth drilled 297.05 (m)
8. Drill bit:

					Type
Surface	to	56.00	meters;		Tricon 5½" dia.
56.00 (m)	to	--	meters;		Tricon 4½" dia.
(m)	to		meters;		
(m)	to		meters;		

9. Drilling fluid Bentonite
10. Casing set from

					Type
Surface	to	55.33	(m)		PW Flush-joint
55.33 (m)	to	150.25	(m)		HW Flush-joint
(m)	to		(m)		

11. Geologists Mohammad Ali Tariq
    Mohammad Riaz Khan

(UAK-6, cont.)

12. Geophysical Logs

Type								
4-Pi density	from	Surface	(m)	to	289.00	(m)	through	Drill pipe and casing
Gamma/Neutron	from	Surface	(m)	to	287.00	(m)	through	Drill pipe and casing
3-Arm Caliper	from	Surface	(m)	to	167.00	(m)	through	Casing and open hole
Resistivity - G/N	from	Surface	(m)	to	160.00	(m)	through	Outer casing, open hole
High Resolution Density	from	_____	(m)	to	_____	(m)	through	_____

13. Remarks:

3-Arm Caliper	from	Surface	(m)	to	163.00	(m)	through Outer casing, open hole
Gamma-Neutron Resistivity	from	Surface	(m)	to	159.00	(m)	through Outer casing, open hole
3-Arm Caliper	from	Surface	(m)	to	60.00	(m)	through Open hole
Gamma-Neutron & Resistivity	from	Surface	(m)	to	157.00	(m)	through Open hole

Geophysics

3-Arm Caliper= 2K range, 3% standard deviation, .4" defledtion, log speed 6 m per min.

4-Pi density = 500 counts per second per inch, 1% standard deviation, range 5K, log speed 6 m per minute.

Gamma= 10 counts per second per inch, 3% standard deviation,log speed 6 m per minute

Neutron= 50 counts per second per inch, 1% standard deviation, Log speed 6 m per min.

Resistivity= 10 ohms per inch, 1000 bias, log speed 6 m per minute

DRILL HOLE UAK- 6 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Sept. 23, 1987	0900	Surface	Drilling started
23	1900	28.92	Drilling stopped, generator not workin
Sept. 24, 1987	0700	28.92	Drilling started
24	1730	55.00	Drilling stopped to set PW casing
Sept. 25, 1987	1030	55.00	PW casing started
25	1700	55.00	Casing completed, started lowering rods
25	1745	55.00	Drilling started
25	1815	56.00	Drilling stopped due to spindle defect
Sept. 26, 1987	0800	56.00	No work today
Sept. 27, 1987	0915	56.00	Lowered drill rods
27	1015	56.00	Drilling started
Sept. 28, 1987	1205	99.00	Drilling stopped dut to mud preparatio
28	0100	99.00	Drilling resumed
Sept. 29, 1987	0200	150.00	Drilling stopped, pulled rods due to non-availibilty of core barrels at drill site
29	0900	150.00	No further progres
Sept. 30, 1987	1230	150.58	Drilling stopped for casing
Oct. 01, 1987	1000	150.58	No progress
Oct. 02, 1987	1000	150.58	No progress

DRILL HOLE UAK- 6 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Oct. 05, 1987	1300	150.58	Started casing HW from 55.33 to base
Oct. 09, 1987	1500	150.95	HW casing completed
09	1845	150.58	Drilling started
Oct. 10, 1987	0700	168.23	Drilling in progress
10	1900	171.27	Drilling in progress
Oct. 11, 1987	1040	181.40	Drilling in progress
11	2145	190.65	Drilling in progress
Oct. 12, 1987	0800	201.80	Started repair and oil changing of rig, prepared mud
12	1315	201.80	Started drilling
Oct. 13, 1987	0700	224.95	Drilling stopped for mud preparation
13	1115	224.95	Drilling started
13	2330	240.35	Drilling stopped due to defect in wire line
Oct. 14, 1987	0800	240.35	Rig being repaired
14	2200	240.35	Drilling started
Oct. 15, 1987	0735	252.25	Drilling in progress
Oct. 16, 1987	0230	275.80	Drilling in progress
Oct. 17, 1987	1800	281.85	Drilling in progress
Oct. 18, 1987	0445	297.05	Drilling stuck, drilling completed
Oct. 19, 1987	0120	289.00	Geophysical logging
19	1125	289.00	Geophysical logging completed

Drilling Record

COALREAP

DRILL HOLE UAK-7

1. Topographic sheet number 40 C/12
2. Grid reference: 8 28 194 (meters) Northing
   21 91 315 (meters) Easting
3. Altitude above mean sea level 12.5 meters
4. Drill rig type Longyear-44
5. Drilling started September 02, 1987
   Drilling completed October 15, 1987
6. Non-coring Surface (m) to 132.00 (m)
   Coring 132.00 (m) to 374.55 (m)
7. Total depth drilled 374.55 (m)
8. Drill bit:

					Type
Surface	to	92.00	meters;		Tricon Roller 5½" dia.
92.00 (m)	to	132.00	meters;		Tricon Roller 4½" dia.
132.00 (m)	to	374.55	meters;		HQ Diamond, bottom discharge
(m)	to		meters;		

9. Drilling fluid Bentonite
10. Casing set from

				Type
Surface	to	92.42	(m)	PW
92.42 (m)	to	133.82	(m)	HW
(m)	to		(m)	

11. Geologists Mohammad Siddiq Khan
    Iqbal A. Khan
    Mumtaz Javed Khan and Shafique Ahmed Khan

(UAK-7, cont.)

12. Geophysical Logs

Type								
4-π density	from	Surface	(m)	to	365.00	(m)	through	Casing and HQ rods
Gamma/Neutron	from	Surface	(m)	to	364.00	(m)	through	Casing and HQ rods
3-Arm Caliper	from	Surface	(m)	to	247.00	(m)	through	Casing and open hole
Resistivity - G/N	from	Surface	(m)	to	235.00	(m)	through	Casing and open hole
High Resolution Density	from		(m)	to		(m)	through	

13. Remarks:

Problem with mud pits filling with sand

Geophysics

4-Pi density= 500 counts per second per inch, 1% standard deviation, range 5K-2K, Log Speed 6 m per minute

3-Arm Caliper= 2K range, 3% standard deviation, .4" deflection, log speed 6 m per min.

Gamma = 10 counts per second per inch, 3% standard deviation, log speed 6 m per minute

Neutron= 100 counts per second per inch, 1% standard deviation, range 1 K, log speed 6 m per minute

Resistivity= 10 ohms per inch, 1000 bias, log speed 6 m per minute

Neutron= 50 counts per second per inch, 1% standard deviation, log speed 6 m per minute

DRILL HOLE UAK- 7 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Sept. 21, 1987	0830	Surface	Drilling started, non-coring
21	0830	surface	Using Tricon Rollar bit Dia: 5½"
21	0900	0.50	Drilling stopped to repair mud pump and water swival
21	0910	0.50	Stopped to mix mud
21	1930	36.00	Drilling resumed
21	2025	36.00	Drilling continues
Sept. 22, 1987	0630	64.00	Stopped to clean mud pits and prepared mud
22	1715	64.00	Drilling resumed
Sept. 23, 1987	0900	92.00	Stopped for rea,omg tje P size casing, circulated mud
Sept. 24, 1987	1200	92.00	Pulled out rods, Lowered P casing, stopped for genertor repair
24	0700	92.00	Started lowering casing
24	1900	92.00	Completed P casing up to 92.42 m
24	2300	92.00	Cleaned the pits, prepared mud, generator repair
Sept. 25,1987	1030	92.00	Drilling resumed Non-coring
25	1730	104.00	Stopped due to mud equalizer problem
25	1900	104.00	Drilling resumed

DRILL HOLE UAK- 7 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Sept. 26, 1987	0945	132.00	Stopped cleaned pits, prepared mud
26	1900	132.00	Stopped due to cleaning the drainage
Sept. 27, 1987	0700	132.00	Started reaming the casing HW size
27	1900	132.00	Reaming casing up to 132.0 m
Sept. 28, 1987	-	132.00	No work, waiting for core barrel head
Sept. 29, 1987	-	132.00	Waiting for core barrel head
Oct. 01, 1987	0500	132.00	Drilling resumed
Oct. 02, 1987	0630	152.75	Drilling stopped, cleaning pits.
02	1150	152.75	Drilling resumed
Oct. 03, 1987	1100	172.52	Drilling stopped due to inner tube blocked, pulled rods, lowered rods, mechanical problems in mud pump
Oct. 04, 1987	0230	172.52	Drilling resumed
04	0615	177.10	Drilling stopped for repair of single wire line
04	0700	177.10	Drilling resumed
04	0900	178.64	Drilling stopped, mechanical problems
04	1000	178.64	Drilling resumed
Oct. 07, 1987	0620	250.10	Drilling stopped due to maintenance of machine, repaired mud pump, repaired equilizer

DRILL HOLE UAK- 7 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Oct. 07, 1987	1130	250.10	Drilling resumed
07	1700	256.15	Drilling stopped due to wire line broken, pulled rods, replaced wire
Oct. 08, 1987	0615	256.15	Drilling resumed
Oct. 09, 1987	0100	277.45	Drilling stopped due to mixing mud
09	0200	277.45	Drilling resumed
09	1130	289.55	Drilling stopped, mechanical fault in mud pump, repaired
Oct. 10, 1987	1400	289.55	Drilling resumed
10	0620	304.85	Drilling stopped, wire line broken, pulled rods, repaired wire line and lowered rods
Oct. 11, 1987	1230	304.85	Drilling resumed
Oct. 12, 1987	2400	313.65	Drilling stopped due to repairing of mud pump and wire line
12	0140	313.65	Drilling resumed
Oct. 13, 1987	0500	341.25	Drilling stopped, mud pump repaired mixed mud
13	0845	341.25	Drilling resumed
Oct.14, 1987	0630	359.35	Drilling stopped due to repair of mud pump

DRILL HOLE UAK- 7 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Oct. 14, 1987	0900	359.35	Drilling resumed
14	1630	368.45	Drilling stopped due to mixing of mud and washing
14	2030	368.45	Drilling resumed
14	2300	371.50	Washing
Oct. 15,1987	1200	371.50	Drilling resumed
15	0200	374.55	Drilling stopped due to caving of sand, problems of rods sticking
			TD 374.55, hole completed
15	0930	374.55	Fresh mud circulated
15	1200	374.55	Started geophysical logging
15	1435	365.00	Run 4 Pi density up to 365.00 m and through casing and HQD drill pipes
15	1715	364.00	Run gamma-neutron
15	0915	247.00	Run 3-arm caliper in open hole
15	1915	235.00	Run gamma-Neutonn in casing
Oct. 16, 1987	-	-	Pulled out casing

Drilling Record

COALREAP

DRILL HOLE UAK- 8

1. Topographic sheet number 40 C/8
2. Grid reference: 8 21 607 (meters) Northing
   21 84 931 (meters) Easting
3. Altitude above mean sea level 11.60 meters
4. Drill rig type Longyear-44
5. Drilling started October 23, 1987
   Drilling completed November 09, 1987
6. Non-coring Surface (m) to 151.40 (m)
   Coring 151.40 (m) to 341.30 (m)
7. Total depth drilled 341.30 (m)
8. Drill bit: Type
   Surface to 92.35 meters; Tricon Rollar 5½" dia.
   92.35 (m) to 151.40 meters; Tricon Rollar 4½" dia.
   151.40 (m) to 341.30 meters; HQ Diamond, bottom discharge
   (m) to meters;
9. Drilling fluid Bentonite, causitc soda ash
10. Casing set from Type
    Surface to 92.35 (m) PW 5½" dia.
    92.35 (m) to 151.86 (m) HW 4½" dia.
    151.86 (m) to 243.15 (m) HW 4½" dia.
11. Geologists Mohammad Siddiq Khan
    IqBal Ahmed Khan
    Mohammad Ali Tariq and Kamran

(UAK-8, cont.)

12. Geophysical Logs

Type								
4-Pi density	from	Surface	(m)	to	320.00	(m)	through	Drill pipe and casing
Gamma/Neutron	from	Surface	(m)	to	318.00	(m)	through	Drill pipe and casing
3-Arm Caliper	from	Surface	(m)	to	247.00	(m)	through	Casing and open hole
Resistivity - G/N	from		(m)	to		(m)	through	
High Resolution Density	from		(m)	to		(m)	through	

13. Remarks:

No resistivity run

Loose sand problems

Geophysics

Gamma= 10 counts per second per inch, 3% standard deviation, log speed 6 m per minute

Neutron= 50 counts per second per inch, 1% standard deviation, log speed 6 m per min.

4-Pi density= 200 counts per second per inch, 1% standard deviation, Range 2K, Log speed 6 m per minute

DRILL HOLE UAK- 8 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Oct. 23, 1987	1015	Surface	Drilling started with Tricon bit Roller 5/8 dia.
23	1145	1.00	Stopped to connect mud pump
23	1215	1.00	Drilling resumed
Oct. 24, 1987	1900	91.00	Drilling stopped, lowered PW casing up to 92.0 m
Oct. 25, 1987	1345	91.00	Drilling resumed
Oct. 26, 1987	0730	142.00	Stopped to clean pits and prepared mud
26	0930	142.00	Drilling resumed
26	1730	151.40	Stopped to lower HW casing, reaming
Oct. 27, 1987	1545	151.40	Drilling resumed
Oct. 29, 1987	0400	207.80	Drilling stopped due to maintenance of rig and clutch adjustment
29	0800	207.80	Drilling resumed
29	1745	218.55	Drilling stopped for washing of bore hole, mixed mud, generator broken
29	2000	218.55	Drilling resumed with the help of tractor head lights, generator out of order
Oct. 30, 1987	1900	238.15	Drilling stopped, cleaning of pits
30	2000	238.15	Drilling resumed

DRILL HOLE UAK- 8 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Oct. 30, 1987	2350	242.20	Drilling stopped due to mud pump repai
Oct. 31, 1987	0125	242.20	Drilling resumed
31	0700	247.55	Drilling stopped for cleaning pits, prepared new mud
31	1000	247.55	Drilling resumed
31	1050	250.80	Drilling stopped due to bit blocked, pulled out all drill pipe, checked the bit and lowered the drill pipes
Nov. 01, 1987	0830	250.80	Drilling resumed
01	1900	260.75	Drilling stopped due to repair of mud pump, mixing of mud, washing
01	2200	260.75	Drilling resumed
Nov. 02, 1987	2410	263.80	Drilling stopped for reaming casing
Nov. 03, 1987	-	263.80	Reaming in progress from 195 m to 230 m, reamed up to 250 m
Nov. 04, 1987	-	263.80	Lowering of HW casing, casing stuck at 243.05 m, HW casing up to 243.05 m, started lowering drill rods by washing
Nov. 05, 1987	-	263.80	Started redrilling
Nov. 06, 1987	0400	263.80	Drilling resumed
Nov. 07, 1987	1200	286.80	Drilling stopped due to generator out of order

DRILL HOLE UAK- 8 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Nov. 07, 1987	0400	286.80	Drilling resumed with help of tractor lights
Nov. 08, 1987	0730	314.05	Drilling stopped due to cleaning of mud pits, replaced rubber gasket of mud pump
Nov. 08, 1987	1000	314.05	Drilling resumed
08	1630	323.10	Drilling stopped due to mud pump, ball sets changed on mud pump
08	2130	323.10	Drilling resumed
Nov. 09, 1987	2230	326.15	Drilling stopped due to broken mud pump
09	0130	326.15	Drilling resumed
09	0430	332.20	Drilling stopped due to broken pump
09	1300	326.15	Drilling resumed
09	1815	341.30	Drilling stopped due to rods stuck, thread on rods stripped
09	-	341.30	Drilling completed
Nov. 10, 1987	-		Start geophysical logging
10	0945	320.00	Run 4 Pi density through drill pipe and casing
10	1145	318.00	Run gamma-neutron through drill pipe and casing

Drilling Record

COALREAP

DRILL HOLE UAK- 9

1. Topographic sheet number 40 D/5
2. Grid reference: 8 11 921 (meters) Northing
   21 82 335 (meters) Easting
3. Altitude above mean sea level 11.30 meters
4. Drill rig type Longyear-44
5. Drilling started October 23, 1987
   Drilling completed November 06, 1987
6. Non-coring Surface (m) to 119.50 (m)
   Coring 119.50 (m) to 350.05 (m)
7. Total depth drilled 350.05 (m)
8. Drill bit:

				Type
Surface	to	55.16	meters;	Tricon 5½" dia.
55.16 (m)	to	350.05	meters;	Tricon 4½" dia.
(m)	to		meters;	
(m)	to		meters;	

9. Drilling fluid Bentonite
10. Casing set from

				Type
Surface	to	119.77	(m)	HW flush-joint 4½"
119.77 (m)	to	248.85	(m)	NW flush-joint 3½"
(m)	to		(m)	

11. Geologists Mohammed Riaz Khan
    Mohammad Ali Tariq

(UAK-9, cont.)

12. Geophysical Logs

Type								
4-π density	from	Surface	(m)	to	341.00	(m)	through	Drill pipe and casing
Gamma/Neutron	from	Surface	(m)	to	338.00	(m)	through	Drill pipe and casing
3-Arm Caliper	from	Surface	(m)	to	217.00	(m)	through	Casing and open hole
Resistivity - G/N	from		(m)	to		(m)	through	
High Resolution Density	from		(m)	to		(m)	through	

13. Remarks:

3-Arm caliper could not be run beyond 217.00 m due to caving sand

Geophysics

Gamma= 10 counts per second per inch, 3% standard deviation, Log speed 6 m per min.

Neutron= 50 counts per second per inch, 1% standard deviation, log speed 6 m per min.

4-Pi density= 200 counts per second per inch, 1% standard deviation, Range 2K, Log Speed 6 m per minute

DRILL HOLE UAK- 9 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Oct. 23, 1987	1000	Surface	Drilling started
23	1900	55.16	Drilling stopped for casing
Oct. 24, 1987	0715	55.16	Casing in progress to 55.33 m using
			PW 5½" dia., lowered rods
24	0915	55.16	Drilling resumed
24	1900	114.00	Stopped to repair mud pump
24	1945	114.00	Drilling resumed
24	2055	119.50	Casing HW
Oct. 25, 1987	2145	119.50	Drilling started
Oct. 26, 1987	0730	120.75	Drilling in progress
26	2240	145.10	Drilling in progress
Oct. 27, 1987	1045	163.10	Drilling in progress
27	1700	169.00	Drilling stopped for casing advance-
			ment but being stuck could not continue
Oct. 28, 1987	0700	169.00	Lowering rods
28	1345	169.00	Drilling resumed
Oct. 29, 1987	0800	181.55	Drilling in progress
29	1900	185.55	Passage of mud blocked, all rods
			pulled out, drill bit checked
Oct. 30, 1987	0230	185.65	Drilling started
Oct. 31, 1987	0200	214.90	Drilling stopped for the repair of
			the mud pump

DRILL HOLE UAK- 9 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Oct. 31, 1987	1245	214.90	Drilling resumed
Nov. 01, 1987	1700	248.50	Drilling stopped for lowering NW casing
Nov. 03, 1987	0700	248.50	Lowered HQ drill rods
03	0900	248.50	lowered rods
03	1315	248.50	washed drill hole
03	1520	248.50	Drilling started
03	2200	253.74	Drilling in progress
Nov. 04, 1987	0700	262.89	Drilling in progress
04	1730	287.04	Drilling in progress
Nov. 05, 1987	0830	298.84	Drilling in progress
05	1900	322.05	Drilling in progress
Nov. 06, 1987	0700	334.25	Drilling in progress
06	1900	350.05	Drilling completed

Drilling Record

COALREAP

DRILL HOLE UAK-10

1. Topographic sheet number 40 C/8
2. Grid reference: 8 17 186 (meters) Northing
   21 70 796 (meters) Easting
3. Altitude above mean sea level 14.6 meters
4. Drill rig type Longyear-44
5. Drilling started December 01, 1987
   Drilling completed December 14, 1987
6. Non-coring Surface (m) to 40.00 (m)
   Coring 40.00 (m) to 177.85 (m)
7. Total depth drilled 177.85 (m)
8. Drill bit:

					Type
Surface	to	40.00	meters;	Tricon Roller bit 5½" dia.
40.00 (m)	to	177.85	meters;	HQ bottom discharge, diamond
(m)	to		meters;	
(m)	to		meters;	

9. Drilling fluid Bentonite
10. Casing set from

				Type
Surface	to	70.03	(m)	HW 4½" flush-joint
(m)	to		(m)	
(m)	to		(m)	

11. Geologists Zameer Mohammad Khan
    Sardar Saeed Akhtar

(UAK-10, cont.)

12. Geophysical Logs

Type							
4-π density	from	Surface	(m) to	173.00	(m) through	Drill pipe and casing
Gamma/Neutron	from	Surface	(m) to	171.00	(m) through	Drill pipe and casing
3-Arm Caliper	from	Surface	(m) to	173.00	(m) through	Casing and open hole
Resistivity - G/N	from	Surface	(m) to	171.00	(m) through	Casing and open hole
High Resolution Density	from	_____	(m) to	_____	(m) through	_____

13. Remarks:

Geophysics

Gamma= 10 counts per second per inch, 3% standard deviation, log speed 6 m per min.

Neutron= 100 counts per second per inch, 1% standard deviation, range 1 K, log speed 6 m per minute

Resistivity= 10 ohms per inch, 900 bias, log speed 6 m per minute

4-Pi density= 500 counts per second per inch, 1% standard deviation, range 5K, log speed 6 m per minute

Neutron= 50 counts per second per inch, 1% standard deviation, log speed 6 m per min.

DRILL HOLE UAK- 10 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Dec. 12, 1987	1500	Surface	Drilling started, non-coring
12	1745	6.85	Drilling stopped, no night shift
Dec. 02, 1987	0715	6.85	Drilling resumed
02	1815	34.25	Drilling stopped, no night shift
Dec. 03, 1987	1720	34.25	Drilling resumed
03	1900	39.00	Drilling stopped to set casing
Dec. 04, 1987	1030	39.00	Lowering HW casing
04	1430	40.00	Lowering HW casing completed, washed hole up to 40 m, non-coring completed
Dec. 05, 1987	1030	40.00	Drilling started, coring
05	1300	44.10	Drilling stopped, rods pulled to check casing
05	1520	44.10	Drilling resumed, added casing and lowered rods
05	1630	47.15	Casing sunk down, drilling stopped and rods pulled out
Dec. 06, 1987	0700	47.15	Started lowering rods
06	0830	47.15	Lowering of rods completed drilling resumed after washing hole
06	0935	50.20	Drilling stopped, casing slipped, rods pulled out of hole

DRILL HOLE UAK- 10 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Dec. 06, 1987	1200	50.20	Drilling resumed
06	1715	59.25	Drilling stopped, bit blocked, rods pulled out
Dec. 07, 1987	0700	59.25	Lowered rods, washed hole
07	0900	59.25	Drilling resumed
07	1230	65.30	Drilling stopped for reaming of casing
07	1900	65.30	Cased hole, lowered rods
Dec. 08, 1987	0700	65.30	Drilling resumed
08	0710	65.30	Drilling stopped, bit blocked, mud pressure increased, rods pulled out ~~to check the bit~~
08	1030	65.30	Drilling resumed after checking the bit
08	1900	80.55	Drilling stopped due to overnight shift missing
Dec. 09, 1987	0700	80.55	Prepared mud, lowered rods
09	0845	80.55	Drilling resumed
09	1800	80.55	Drilling stopped to set casing
Dec. 10, 1987	0700	80.55	Rods lowered
10	1000	80.55	Drilling resumed
10	1900	104.85	Drilling stopped, no night shift
Dec. 11, 1987	0700	104.85	No drilling, mechanical problems

DRILL HOLE UAK- 10 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Dec. 11, 1987	1345	104.85	Drilling resumed
Dec. 12, 1987	0500	126.05	Bit blocked, drilling stopped, rods pulled to check bit
12	0700	126.05	Lowering of rods started
12	1030	126.05	Drilling resumed
Dec. 13, 1987	1600	156.55	Drilling stopped due to water swival under repair
13	1820	156.55	Drilling resumed
Dec. 14, 1987	0900	171.80	Drilling stopped to check wire line
14	1000	171.80	Drilling resumed
14	1430	177.85	Drilling completed, TD
14	1700	177.85	Washed hole through rotation, geophysical logging started
14	1720	173.00	4 Pi log through drill pipe and casing run to 173.00 m
14	2035	171.00	Gamma-Neutron run through drill pipe and casing to 171.00 m
14	2235	173.00	Three arm caliper through open hole
14	2350	171.00	Gamma-Neutron and resistivity through casing and open hole

Drilling Record

COALREAP

DRILL HOLE UAK- 11

1. Topographic sheet number 40 C/8
2. Grid reference: 8 24 471 (meters) Northing
   21 73 676 (meters) Easting
3. Altitude above mean sea level 14.3 meters
4. Drill rig type Longyear-38
5. Drilling started November 23, 1987
   Drilling completed December 08, 1987
6. Non-coring Surface (m) to 101.00 (m)
   Coring 101.00 (m) to 251.30 (m)
7. Total depth drilled 251.30 (m)
8. Drill bit:

				Type
Surface	to	101.00	meters;	Tricon Roller 5½" dia.
101.00 (m)	to	251.30	meters;	Diamond, HQ 4½" dia.
(m)	to		meters;	
(m)	to		meters;	

9. Drilling fluid Bentonite
10. Casing set from

				Type
Surface	to	55.33	(m)	PW 5½" flush-joint
55.33 (m)	to	153.56	(m)	HW 4½" flush-joint
(m)	to		(m)	

11. Geologists Mumtaz Javed Khan
    Saleem Rasheed

(UAK-11, cont.)

12. Geophysical Logs

Type								
4-π density	from	Surface	(m)	to	246.00	(m)	through	PW casing and rods
Gamma/Neutron	from	Surface	(m)	to	244.00	(m)	through	HW casing and rods
3-Arm Caliper	from	Surface	(m)	to	220.00	(m)	through	Casing and open hole
Resistivity - G/N	from	Surface	(m)	to	219.00	(m)	through	Casing
High Resolution Density	from	_____	(m)	to	_____	(m)	through	_____

13. Remarks:

3Arm caliper Surface to 89.0 through Broken casing

No core recovery from 227.05 to 251.30 m

Geophysics

Gamma= 10 counts per second per inch, 3% standard deviation, log speed 6 m per minute

Neutron= 100 counts per second per inch, 1% standard deviation, Range 1K, Log speed 6 m per minute

Resistivity= 10 ohms per inch, 900 bias, log speed 6 m per minute

3-Arm Caliper= 2K range, 3% standard deviation, .4" deflection, log speed 6 m per min.

4-Pi density= 500 counts per second per inch, 1% standard deviation, Range 5K-2K, Log speed 6 m per minute

DRILL HOLE UAK- 11 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Nov. 23, 1987	0945	4.50	Drilling stopped for leveling rig, shortage of crews
Nov. 24, 1987	0900	4.50	Drilling resumed
24	0230	41.00	Drilling stopped, generator problems, pulled rods
Nov. 25, 1987	1000	41.00	Drilling resumed after reaming casing
25	1500	55.25	Drilling stopped, pulled out rods for inserting casing
Nov. 26, 1987	0230	55.25	Drilling resumed after lowering casing
26	0400	60.00	Drilling stopped due to mud pump not working
26	0630	60.00	Drilling resumed
26	0800	62.00	Drilling stopped mud pump not working
26	1130	62.00	Drilling resumed
26	2030	101.00	Drilling stopped for setting HW casing and to start coring, pulled rods and changed mud
Nov. 27, 1987	1100	101.00	Drilling resumed
27	1400	105.55	Drilling stopped for mechanical fault
27	1600	105.55	Drilling resumed
Nov. 28, 1987	0400	132.90	Drilling stopped due to generator not working

DRILL HOLE UAK- 11 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Nov. 28, 1987	0630	132.90	Drilling resumed
28	0900	139.00	Drilling stopped due to water not circulating, pulled rods
Nov. 29, 1987	1800	139.00	Drilling resumed
29	1920	145.00	Drilling stopped, rod stuck, pulled rods
Dec. 03, 1987	0930	145.00	Drilling resumed
03	1105	154.15	Drilling stopped, HW casing slipped down, pulled rods, set casing to 153.56
03	1630	154.15	Drilling resumed
Dec. 04, 1987	0110	172.40	Drilling stopped due to bit blocked, pulled rods changed mud, equilizer broken
Dec. 05, 1987	0355	172.40	Drilling resumed
05	0755	187.60	Drilling stopped due to water blockage
05	0945	187.60	Drilling resumed
05	1200	190.65	Drilling stopped, core barrel stuck, pulled rods and lowered rods, mud pump broken, repaired mud pump
05	2130	190.65	Drilling resumed
Dec. 06, 1987	0200	196.75	Lowered rods to wash hole
06	0355	196.75	Drilling resumed
06	0600	199.75	Drilling stopped, mud pump not working

DRILL HOLE UAK-11 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Dec. 06, 1987	1100	199.75	Drilling resumed
06	1300	202.75	Washing of hole
06	1400	202.75	Drilling resumed
06	1500	205.80	Washed
06	1530	205.80	Drilling resumed
06	1630	208.85	Washed
06	1700	208.85	Drilling resumed
06	1730	211.90	Drilling stopped for mud preparation
06	1900	211.90	Drilling resumed
06	1930	211.90	Washed
06	2030	211.90	Drilling resumed
06	2100	218.00	Washed
06	2300	218.00	Drilling resumed
06	2325	218.00	Washed
Dec. 07, 1987	0200	218.00	Drilling resumed
07	0225	224.00	Drilling stopped, pulled rods, core recovery is nil from 214.95 m
07	1340	224.00	Drilling resumed
07	1400	227.00	Washed
07	1515	227.00	Drilling resumed
07	1535	227.05	Washed

DRILL HOLE UAK- 11 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Dec. 07, 1987	1650	227.05	Drilling resumed
07	1710	233.15	Washed
07	1820	233.15	Drilling resumed
07	1840	236.20	Washed
07	1950	236.20	Drilling resumed
07	2030	239.20	Washed, mixed mud
07	2155	239.20	Drilling resumed
07	2215	242.25	Washed
Dec. 08, 1987	1215	242.25	Drilling resumed
08	1235	245.30	Washed
08	0150	245.30	Drilling resumed
08	0210	248.30	Washed
08	0315	248.30	Drilling resumed
08	-	251.30	Drilling completed, TD

Drilling Record

COALREAP

DRILL HOLE UAK-12

1. Topographic sheet number 40 C/8
2. Grid reference: 8 26 905 (meters) Northing
   21 81 498 (meters) Easting
3. Altitude above mean sea level 12.50 meters
4. Drill rig type Longyear-38 (0.00 to 163.05 m); Longyear-44 (163.05 to 310.00 m)
5. Drilling started January 02, 1988
   Drilling completed January 19, 1988
6. Non-coring Surface (m) to 160.00 (m)
   Coring 160.00 (m) to 310.00 (m)
7. Total depth drilled 310.00 (m)
8. Drill bit:

				Type
Surface to	33.87	meters;		Tricon Roller bit 5½" dia.
33.87 (m) to	160.00	meters;		Tricon Roller bit 3 7/8" dia.
160.00 (m) to	310.00	meters;		Diamond, bottom discharge NQ
(m) to		meters;		

9. Drilling fluid Bentonite
10. Casing set from

				Type
Surface to	33.87	(m)		PW
Surface (m) to	163.30	(m)		HW
(m) to		(m)		

11. Geologists Shafique Ahmed Khan
    Mohammad Fariduddin

(UAK-12, cont.)

12. Geophysical Logs

Type								
4-Pi density	from	Surface	(m)	to	302.00	(m)	through	Drill rods and casing
Gamma/Neutron	from	Surface	(m)	to	302.00	(m)	through	Drill pods and casing
3-Arm Caliper	from	Surface	(m)	to	247.00	(m)	through	Casing and open hole
Resistivity - G/N	from	Surface	(m)	to	238.00	(m)	through	Casing and open hole
High Resolution Density	from		(m)	to		(m)	through	

13. Remarks:

High resolution density probe was lowered down to 179.00 m but hole caved.

GEOPHYSICS

Gamma= 10 counts per second per inch, 3% standard deviation, Log speed 6 m per minute

Neutron= 50 counts per second per inch, 1% standard deviation, log speed 6m per min.

4-Pi density= 500 counts per second per inch, 1% standard deviation, Range 5K, log speed 6 m per minute

DRILL HOLE UAK- 12 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Jan. 02, 1988	1600	Surface	Drilling started
02	1900	12.00	Drilling in progress
Jan. 03, 1988	0700	50.00	Drilling in progress
03	1900	60.00	Drilling in progress
03	2300	76.00	Hydraulic pump broken
Jan. 04, 1988	1500	76.00	Drilling resumed
04	1900	100.00	Mechanical breakdown
04	1945	100.00	Drilling started
Jan. 05, 1988	1030	160.00	Non-coring completed
05	1040	160.00	Started taking out rods
05	1135	160.00	All rods pulled, stopped drilling, waiting for more rods
Jan. 06, 1988	1430	160.00	Drilling started
06	1545	163.05	Rods stuck, started hammering
06	1700	163.05	Pulled out few rods by hammering
Jan. 07, 1988	0700	163.05	Mechanical breakdown
07	1600	163.05	Reamed casing from 58.35 to 71.35 m
Jan. 08, 1988	1900	163.05	Reamed and lowered HW casing to 95 m
08	0700	163.05	Continued reaming
Jan. 09, 1988	1900	163.05	Coupling on hydralic pump was repaired
09	2100	163.05	Reamed to 118.00 m
Jan. 10, 1988	1745	163.05	Continued reaming

DRILL HOLE UAK- 12 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Jan. 11, 1988	0300	163.05	Mechanical breakdown, casing at 136 m
11	1800	163.05	Longyear 44 arrived, started erecting
Jan. 12, 1988	1700	163.05	Started lowering casing
12	1930	163.05	Rods freed
12	2115	163.05	Pulled rods, no night work
Jan. 13, 1988	0915	163.05	Started reaming and lowering casing
13	1700	163.05	Casing lowered to 163.30 m
13	2400	163.05	Cleaned pits, prepared mud
Jan. 14, 1988	0800	164.05	Lowered rods and washed hole
14	1030	164.05	Pulled rods, cleaned bit, lowered rods
14	1200	182.10	Drilling in progress
Jan. 15, 1988	2230	206.40	Drilling in progress
Jan. 16, 1988	2330	239.80	Drilling in progress
Jan. 17, 1988	2330	276.30	Drilling in progress
Jan. 18, 1988	2400	296.90	Drilling in progress
Jan. 19, 1988	0830	310.00	Drilling in progress
19	0930	310.00	Prepared mud
19	1300	310.00	Geophysical logging, ran 4 Pi and gamma-Neutron
19	1500	310.00	Took out rods
19	1655	310.00	Ran 3-arm caliper and resistivity logs
19	1912	310.00	Completed geophysical logging

Drilling Record

COALREAP

DRILL HOLE UAK- 13

1. Topographic sheet number 40 C/8

2. Grid reference: 8 18 421 (meters) Northing

   21 74 299 (meters) Easting

3. Altitude above mean sea level 12.8 meters

4. Drill rig type Longyear-?

5. Drilling started January 12, 1988

   Drilling completed January 17, 1988

6. Non-coring surface (m) to 63.00 (m)

   Coring 63.00 (m) to 206.00 (m)

7. Total depth drilled 206.00 (m)

8. Drill bit:

				Type
Surface	to	63.39	meters;	Tricon Roller 5½" dia.
63.39 (m)	to	206.00	meters;	Diamond, HQ
(m)	to		meters;	
(m)	to		meters;	

9. Drilling fluid Bentonite

10. Casing set from

				Type
Surface	to	23.17	(m)	PW
23.17 (m)	to	63.39	(m)	HW
(m)	to		(m)	

11. Geologists Mohammad Riaz Khan

(UAK-13, cont.)

12. Geophysical Logs

Type						
4-π density	from	Surface	(m) to	198.00	(m) through	Drill pipe and casing
Gamma/Neutron	from	Surface	(m) to	200.00	(m) through	Drill pipe and casing
3-Arm Caliper	from	Surface	(m) to	198.00	(m) through	Open hole and casing
Resistivity - G/N	from	Surface	(m) to	200.00	(m) through	Open hole and casing
High Resolution Density	from	Surface	(m) to	67.00	(m) through	Hole caved, open hole

13. Remarks:

HRD probe was lowered but could not go beyond casing, hole caved

Geophysics

3-Arm Caliper = 2K range, 3% standard deviation, .4" deflection, log speed 6 m per min.

4-Pi density= 500 counts per second per inch, 1% standard deviation, Range 5K, log speed 6 m per minute

Gamma= 10 counts per second per inch, 3% standard deviation, log speed 6 m per min.

Neutron= 50 counts per second per inch, 1% standard deviation, log speed 6 m per min.

Neutron= 100 counts per second per inch, 1% standard deviation, Range 1K, log speed 6 m per minute.

Resistivity= 10 ohms per inch, 1000 bias, log speed 6 m per minute

DRILL HOLE UAK- 13 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Jan. 12, 1988	1400	Surface	Drilling started
12	1700	22.00	Drilling stopped for casing
12	2200	22.00	Started drilling
Jan. 13, 1988	1000	63.39	Casing completed
13	1617	63.39	Started drilling
Jan. 14, 1988	1400	96.75	Drilling in progress
14	1600	100.15	Drilling stopped for mud preparation
14	2130	100.15	Drilling started
Jan. 15, 1988	1315	133.20	Drilling in progress
15	1500	136.25	Drilling stopped for mud preparation
15	1700	136.25	Started drilling
Jan. 16, 1988	1040	166.60	Drilling in progress
Jan. 17, 1988	0845	206.00	Drilling completed

Drilling Record

COALREAP

DRILL HOLE UAK-14

1. Topographic sheet number 40 C/8

2. Grid reference: 8 20 335 (meters) Northing

   21 67 709 (meters) Easting

3. Altitude above mean sea level 13.1 meters

4. Drill rig type Unknown

5. Drilling started January 24, 1988

   Drilling completed January 31, 1988

6. Non-coring Surface (m) to 62.30 (m)

   Coring 62.30 (m) to 180.00 (m)

7. Total depth drilled 180.00 (m)

8. Drill bit:

				Type
Surface	to	3.09	meters;	Tricon Roller 5½" dia.
3.09 (m)	to	180.00	meters;	Tricon Roller 4½" dia.
(m)	to		meters;	
(m)	to		meters;	

9. Drilling fluid Bentonite

10. Casing set from

				Type
Surface	to	22.00	(m)	PW flush-joint
22.00 (m)	to	30.72	(m)	HW flush-joint
(m)	to		(m)	

11. Geologists S. Farah Fatmi

    Mohammad Riaz Khan

(UAK-14, cont.)

12. Geophysical Logs

Type							
4-Π density	from	Surface	(m) to	176.00	(m) through	Rods and casing
Gamma/Neutron	from	Surface	(m) to	177.00	(m) through	Rods and casing
3-Arm Caliper	from	Surface	(m) to	179.00	(m) through	Open hole and casing
Resistivity - G/N	from	Surface	(m) to	178.00	(m) through	Open hole and casing
High Resolution Density	from	Surface	(m) to	170.00	(m) through	Open hole and casing

13. Remarks:

Geophysics

4-Pi density= 500 counts per second per inch, 1% standard deviation, Range 5K, log speed 6 m per minute

3-Arm Caliper= Range 2K, .4" deflection, Log speed 6 m per minute

Gamma=10 counts per second per inch, 3% standard deviation, Log speed 6 m per minute

Neutron= 50 counts per second per inch, 1% standard deviation, Log speed 6 m per min.

Resistivity= 10 ohms per inch, 1000 bias, Log speed 6m per minute

DRILL HOLE UAK- 14 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Jan. 24, 1988	1030	Surface	Started drilling
24	2130	30.00	Drilling stopped for unloading of supply pump and mud mixed
24	2245	30.00	Drilling started
Jan. 25, 1988	0920	62.30	Non-coring completed, started casing
25	1600	62.30	Core drilling started
Jan. 26, 1988	1630	99.40	Stopped drilling, main clutch failure
Jan. 27, 1988	0120	99.40	Drilling started
Jan. 28, 1988	0700	109.35	Stopped drilling, wire line defective
28	2325	109.35	Drilling started
Jan. 31, 1988	0940	180.00	Drilling completed

Drilling Record

COALREAP

DRILL HOLE UAK- 15

1. Topographic sheet number 40 C/8

2. Grid reference: 8 27 604 (meters) Northing

   21 69 200 (meters) Easting

3. Altitude above mean sea level 15.50 meters

4. Drill rig type Longyear-38

5. Drilling started February 08, 1988

   Drilling completed February 23, 1988

6. Non-coring Surface (m) to 75.00 (m)

   Coring 75.00 (m) to 229.20 (m)

7. Total depth drilled 229.20 (m)

8. Drill bit:

				Type
Surface	to	9.40	meters;	Tricon Roller 5½" dia.
9.40 (m)	to	64.90	meters;	Crest bit 4½" dia.
64.90 (m)	to	75.00	meters;	Crest 3 7/8" dia.
75.00 (m)	to	229.20	meters;	Diamond bit HQ, bottom discharge

9. Drilling fluid Bentonite

10. Casing set from

				Type
Surface	to	9.40	(m)	PW 5½" dia. flush-joint
9.40 (m)	to	65.73	(m)	HW 4½" dia. flush-joint
(m)	to		(m)	

11. Geologists Syed Salim Abid Jaffery

    Sardar Saeed Akhtar

(UAK-15, cont.)

12. Geophysical Logs

Type								
4-π density	from	Surface	(m) to	223.00	(m) through	Drill pipe and casing		
Gamma/Neutron	from	Surface	(m) to	223.00	(m) through	Drill pipe and casing		
3-Arm Caliper	from	Surface	(m) to	227.00	(m) through	HW casing and open hole		
Resistivity - G/N	from	Surface	(m) to	225.00	(m) through	Casing and open hole		
High Resolution Density	from		(m) to		(m) through			

13. Remarks:

Geophysics

3-Arm Caliper=2K Range, 3% standard deviation, Log speed 6 m per minute

Gamma =10 counts per second per inch, 3% standard deviation,Log speed 6 m per minute

Neutron= 100 counts per second per inch, 1% standard deviation, Range 1 K, Log speed 6 m per minute

Resistivity= 10 ohms per inch, 1000 bias,Log speed 6 m per minute

4-Pi density = 500 counts per second per inch, 1% standard deviation, Range 5K, Log speed 6 m per minute

DRILL HOLE UAK-15 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Feb. 08, 1988	1710	Surface	Started drilling
08	2200	16.00	Drilling stopped, pulled rods, no water, autochuck out of order
Feb. 09, 1988	2345	64.90	Drilling resumed
Feb. 10, 1988	1515	64.90	Drilling stopped, rods pulled, casing lowered
10	2000	64.90	Drilling resumed
10	2100	68.00	Drilling stopped due to lack of water
Feb. 11, 1988	1020	68.00	Drilling resumed
11	1135	75.00	Drilling stopped, non-coring completed rods pulled
11	1745	75.00	Core drilling resi,ed
Feb. 12, 1988	0910	92.20	Drilling stopped., rods pulled due to non-recovery of case
12	1055	92.20	Drilling resumed
Feb. 14, 1988	0615	137.90	Drilling stopped, rods pulled out
14	1005	137.90	Drilling resumed
Feb. 15, 1988	0700	163.30	Drilling stopped to change mud mix
15	1105	163.30	Drilling resumed
Feb. 16, 1988	0100	181.45	Drilling stopped for repair of auto chuck

DRILL HOLE UAK- 15 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Feb. 17, 1988	-----	181.45	Rig under repair
Feb. 18, 1988	-----	181.45	Rig under repair
Feb. 19, 1988	1150	181.45	Autochuck needed modification, sent to Hyderabad for repair
Feb. 20, 1988	1430	181.45	Rig under repair
Feb. 21, 1988	0245	181.45	Drilling resumed
Feb. 23, 1988	0500	229.20	Drilling completed

Drilling Record

COALREAP

DRILL HOLE UAK- 16

1. Topographic sheet number 40 C/8
2. Grid reference: 8 30 634 (meters) Northing
   21 77 140 (meters) Easting
3. Altitude above mean sea level 12.50 meters
4. Drill rig type Longyear-44
5. Drilling started February 05, 1988
   Drilling completed February 20, 1988
6. Non-coring Surface (m) to 50.00 (m)
   Coring 50.00 (m) to 344.65 (m)
7. Total depth drilled 344.65 (m)
8. Drill bit:

					Type
Surface	to	18.00	meters;		Tricon Roller bit 5½" dia.
18.00 (m)	to	50.00	meters;		Crest bit 4½" dia.
50.00 (m)	to	344.65	meters;		Diamond, HQ, bottom discharge
(m)	to		meters;		

9. Drilling fluid Bentonite
10. Casing set from

					Type
Surface	to	21.53	(m)		PW 5½" flush-joint
Surface (m)	to	69.00	(m)		HW 4½" flush-joint
(m)	to		(m)		

11. Geologists Shafique Ahmed Khan

(UAK-16, cont.)

12. Geophysical Logs

Type							
4-π density	from	Surface	(m) to	331.00	(m) through	Drill pipe and casing
Gamma/Neutron	from	Surface	(m) to	330.00	(m) through	Drill pipe and casing
3-Arm Caliper	from	Surface	(m) to	175.00	(m) through	Casing and open hole
Resistivity - G/N	from	Surface	(m) to	172.00	(m) through	Casing and open hole
High Resolution Density	from	Surface	(m) to	142.00	(m) through	Casing and open hole

13. Remarks:

Geophysics

4-Pi density= Range 5K, 500 counts per second per inch, 1% standard deviation, Log speed 6 m per minute

Gamma= 10 counts per second per inch, 3% standard deviation, Log speed 6 m per minute

Neutron= 50 counts per second per inch, 1% standard deviation, Log speed 6 m per min.

DRILL HOLE UAK- 16 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Feb. 05, 1988	0915	Surface	Drilling started
05	1840	18.00	Pipe on hydraulic broken
Feb. 06, 1988	1330	18.00	Under repair
06	1600	18.00	PW casing lowered to 18.44 m
06	1700	21.00	Drilling in progress
06	1800	21.00	Lowered PW casing from 18.44m to 21.53
06	2030	21.00	Drilling started
Feb. 07, 1988	1210	36.00	Drilling in progress
07	0525	50.00	Drilling in progress
07	0630	50.00	Prepared to lower casing
07	0945	50.00	HW casing lowered to 50.39 m
07	1700	50.00	Drilling started with bottom discharge
			HQ 3½" bit and HQ 3½" reaming shell
Feb. 08, 1988	0700	75.20	Drilling in progress
08	1000	75.20	Rods stuck, pulled rods and cleaned
			bit, lowered rods
08	1130	75.20	Drilling started
Feb. 09, 1988	0700	98.60	Drilling in progress
09	0800	75.20	Cleaned pits
09	1310	103.35	Drilling in progress
09	1430	103.35	No work, water shortage
09	2000	107.65	Drilling in progress

DRILL HOLE UAK-16 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Feb. 09, 1988	2100	107.65	Added 0.57 m of HW casing
Feb. 10, 1988	0700	122.85	Drilling in progress
10	0800	122.85	Cleaned pits
10	1715	134.95	Drilling in progress
10	1745	134.95	Added 0.38 HW casing
Feb. 11, 1988	0700	155.57	Drilling in progress
11	0845	155.57	Mixed mud
11	1730	167.72	Drilling in progress
11	1800	167.72	HW casing sunk down, pulled rods
11	0300	167.72	Generator out of order, casing lowered to 70.51
Feb. 12, 1988	0700	167.72	Washed and reamed
12	1700	177.55	Drilling in progress
12	1800	177.55	Mixed mud
Feb. 13, 1988	0700	192.65	Drilling in progress
Feb. 14, 1988	0700	218.83	Drilling in progress
14	0800	218.83	Cleaned pits, mixed mud
14	2145	232.20	Drilling in progress
14	0300	232.20	No water, generator not working
Feb. 15, 1988	0700	238.25	Drilling in progress
15	0900	238.25	Cleaned pits, mixed mud

DRILL HOLE UAK-16 (cont.)

DRILLING LOG

DATE	TIME	DEPTH	REMARKS
Feb. 16, 1988	0300	259.55	Drilling in progress
16	1000	259.55	No water
16	1100	259.55	Mixed mud
16	1400	262.55	Drilling in progress
16	1630	262.55	Machine repair
16	1830	264.84	Drilling in progress
Feb. 17, 1988	0700	274.70	Drilling in progress
17	0930	274.70	Mixed mud, cleaned pits
17	1155	277.75	Drilling in progress
17	1200	277.75	Fault in wiring repaired
Feb. 18, 1988	0700	301.05	Drilling in progress
18	0930	301.05	Cleaned pits, prefared mud
18	1245	305.00	Drilling in progress
18	1345	305.00	Problem with the inner tube
Feb. 19, 1988	0630	323.30	Drilling in progress
19	0915	323.30	Cleaned pits, prepared mud
Feb. 20, 1988	0500	344.65	Circulated mud
20	0900	344.65	Circulated mud
20	1120	344.65	Geophysical logging
20	1405	344.05	Pulled rods
20	1605	344.65	Geophysical logging