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Slant Hole Completion Test (1991) Sidetrack "As Built" Report

Topical Report

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For
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1.0 Introduction and Background

During the summer of 1990, a slant hole test well, funded by the U.S. Department of Energy, was drilled to 9,466 ft to evaluate the effectiveness of directional drilling in the tight, naturally fractured gas sands and coals of the Mesaverde Group. Figure 1 illustrates the location of the SHCT No. 1 within the Piceance Basin while Figure 2 illustrates the drillsite plan. The surface location of the SHCT No. 1 is 700 ft south of the DOE Multiwell Experiment (MWX) site in Section 34, T6S, R94W, Garfield County, Colorado, approximately 7.5 miles west of Rifle. Mechanical problems following cementing of a production liner resulted in loss of the completion interval, and operations were suspended.

In early 1991, DOE decided to sidetrack the hole to permit production testing of the lost interval. The sidetrack was designed to parallel the original wellbore, but to be drilled 1,000 ft to the east to minimize the chances of encountering formation damage from the original hole. The sidetrack, like the original hole, was to intersect the paludal lenticular sands and coals at 60° and to penetrate the underlying Cozzette sand horizontally. The sidetrack was spudded May 12, 1991, and reached 9,407 ft TMD on August 19, 1991.

Sidetrack drilling was initiated at 4,162 ft in the original hole. All subsequent depths are given as measured depth. An 8-3/4-in. hole was drilled at 11 to 16° inclination, on a complex azimuth starting at S71°E at the first KOP at 6,550 ft, and ending at N13°E at the end of the first build at 7,309 ft. Drilling proceeded satisfactorily with 6-3/4-in. motors, until a bit and stabilizer were lost at 6,708 ft. Fishing operations created a 15°/100 ft dogleg, and subsequent efforts to ream out the hole resulted in sidetracking the wellbore. The hole was plugged back to 6,450 ft and was then successfully redrilled with motors to the top of a long tangent section at a 57° inclination on an azimuth of N14.6°E. A 1,230 ft tangent section was rotary drilled at 60° through the paludal Mesaverde, the Rollins sand, and the Mancos Tongue shale at 8,588 ft. The tangent was logged using drillpipe-conveyed tools; the well was cased to 8,588 ft and cemented to isolate the tight target sands and preserve caving coals. A 3-1/2-in. drillpipe was picked up to drill a 6-in. hole to final depth. The second build to near-horizontal was drilled using 4-1/2-in. motors to 9,051 ft, at an angle of 86.5° and an azimuth of N10°E. The Cozzette lateral was then rotaried to 9,308 ft, using an underbalanced mud weight of 14 ppg to prevent formation damage to natural fractures. A brief but quickly controlled blowout, resulting from inadvertently swabbing the well in during a trip, then forced the use of 16+ ppg mud over the rest of the hole. Significant mud losses during the last footage in the Cozzette lateral resulted in drilling being terminated at a total depth of 9,407 ft. A permanent packer with a landing nipple was set at 8,453 ft, just above the 7-in. casing shoe. The well was flowed through the drillpipe to remove as much mud as possible from the Cozzette fractures. It then was briefly tested at very high, but unmeasured, gas volumes from the Cozzette open hole before being shut in to await the formal testing program. Appendix 1 presents a daily chronology of the drilling activity.

After re-entering the well in late 1991, early production testing of the Cozzette showed that the 300 ft of in-pay horizontal hole can produce at rate 5 to 10 times higher than vertical wells in the same area.

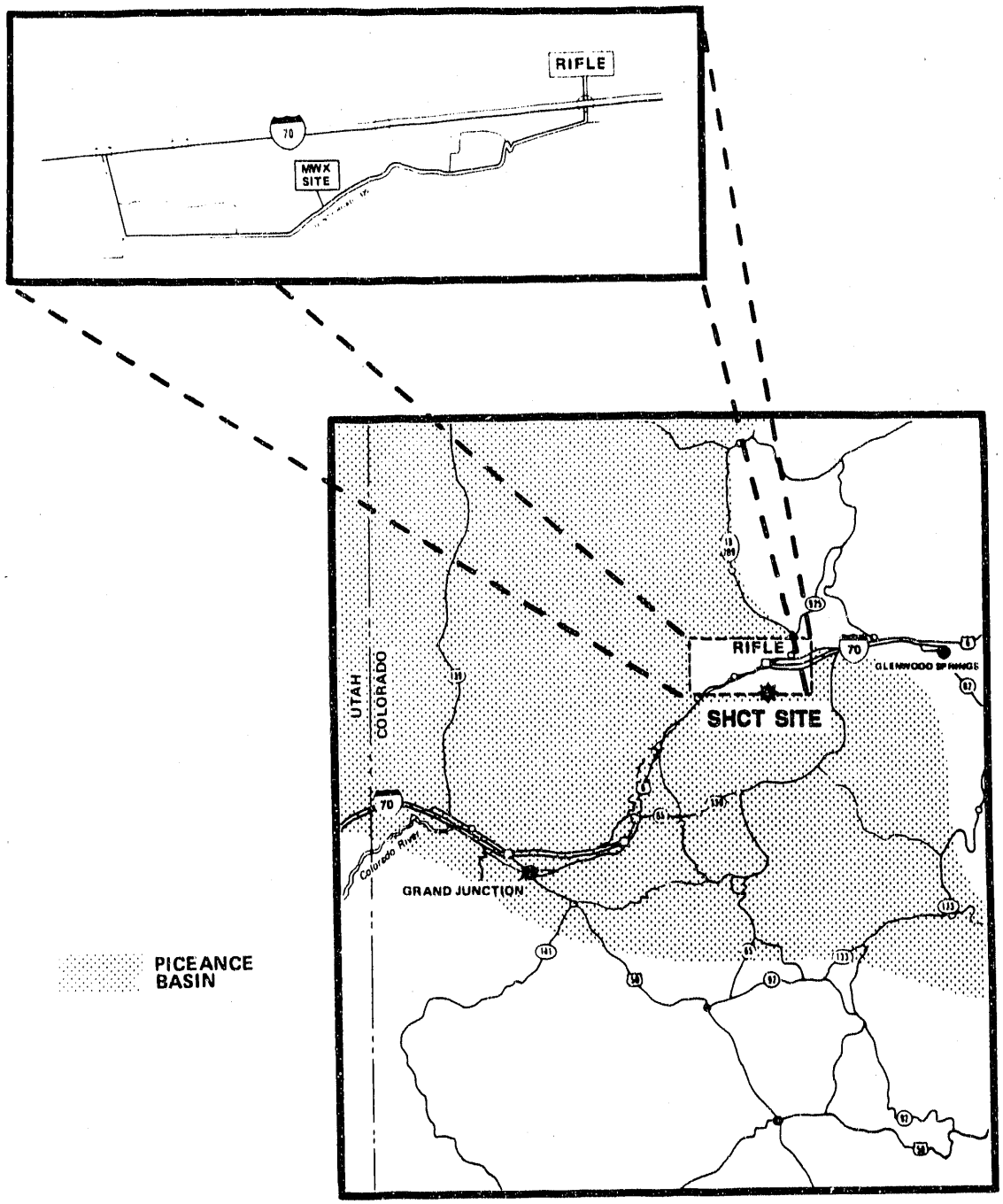


Figure 1 Location of SHCT Within the Piceance Basin

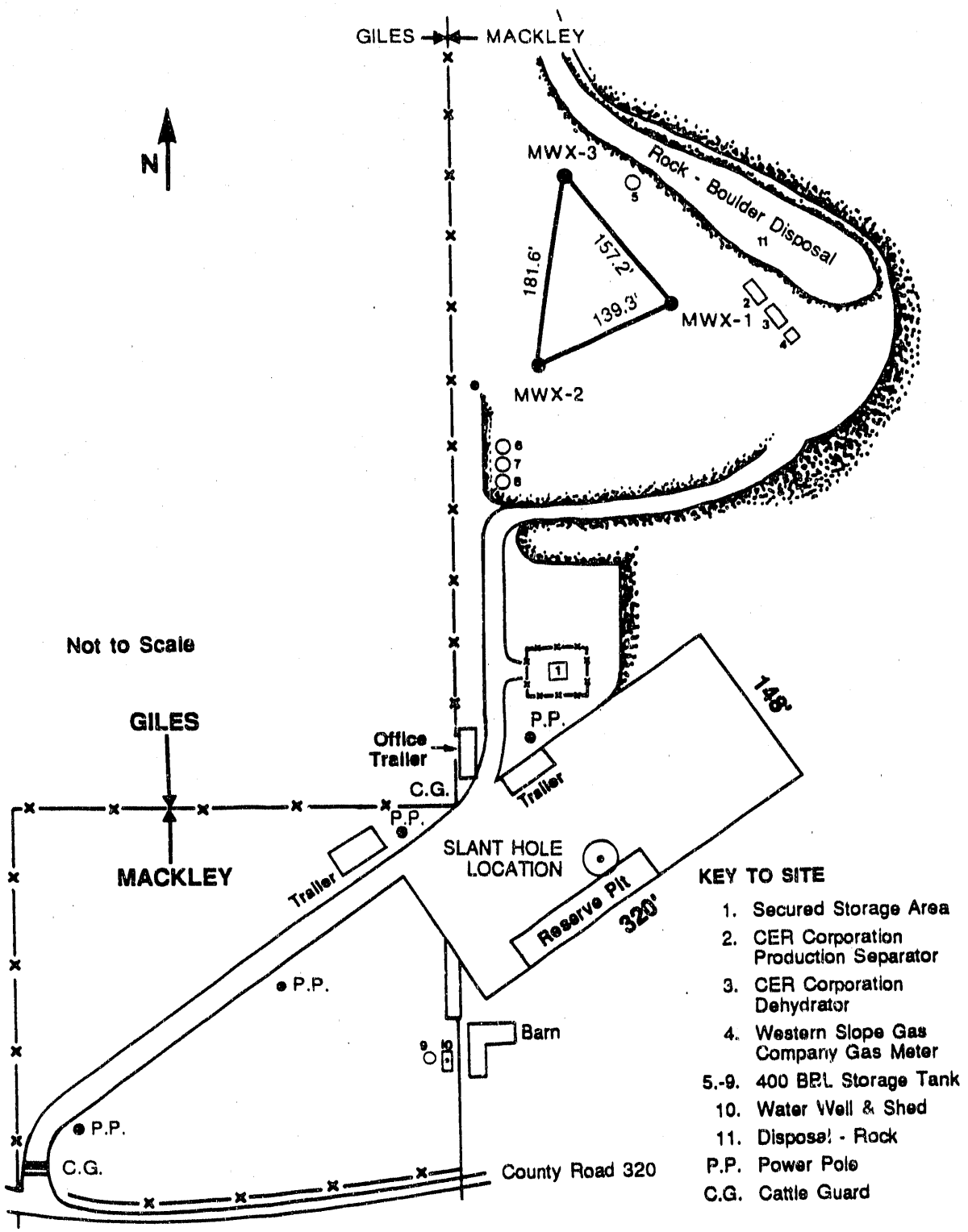


Figure 2 SHCT Drillsite, Plan View

2.0 Geological Summary

The principal objective of the SHCT No. 1 sidetrack well is the upper Cozzette Sandstone which is approximately 65 ft thick at the MWX site. Secondary targets include the Mesaverde sandstones and coals within the paludal depositional interval. The sidetrack wellbore, as illustrated in Figure 3, slants through the paludal Mesaverde interval at approximately 60° and then builds to nearly horizontal through the upper half of upper Cozzette Sandstone. Regional structural studies using surrounding well control in adjacent sections show that the local strike and dip in the north-central portion of Section 34 is N75°W, 1.8°NE.

Although the sidetrack wellbore trajectory through the Cozzette interval is approximately 1,000 ft east of the original SHCT No. 1 wellbore, regional correlation studies and mud log descriptions suggest that the character of Cozzette in the sidetrack well is similar to the Cozzette in the MWX and SHCT No. 1 wells. One difference, however, is that the sidetrack well is more highly deviated, and therefore, less vertical Cozzette section is penetrated as compared to the original well. The approximate top of the Cozzette in the sidetrack well is 8,863 ft measured depth (7,901 ft TVD). The drilled depth of this well is 9,407 ft (7,948 TVD). Therefore the total drilled footage through the Cozzette is 544 ft.

The Cozzette interval was not logged in open-hole, and the only correlation data available at this time is drilling data and mud log data. Therefore, it is not possible to evaluate the Cozzette-penetrated interval in the sidetrack wellbore using log data. Pyrobitumen was described in the upper portion of the Cozzette in the sidetrack well. MWX core data shows that pyrobitumen reduces porosity and permeability. It is believed that the majority of the wellbore that penetrates the Cozzette Sandstone is confined to a fairly well-developed sand which underlies the pyrobitumen zone. The well is nearly horizontal (87°±), and this deviation is effectively 88.5°± since the well is drilled toward the down-dip direction. The actual Cozzette vertical section is considerably less than the 47 true vertical feet penetrated.

Natural fracture permeability is known to be an important gas production mechanism for Mesaverde wells in the area. For example, in the MWX-1 well in Section 34, T6S, R94W, formation permeability is at least an order of magnitude higher than core or log calculated permeability. Many natural fractures were noted in the core taken in the original wellbore, and it may be inferred from mud log gas shows that the Cozzette in the sidetrack wellbore is also naturally fractured. The natural fractures in the cores are partially mineral-filled and typically occur in closely-spaced swarms. The natural fractures are near-vertical and are subparallel, having a predominantly west-northwest azimuth. The azimuth of the sidetrack wellbore is roughly perpendicular to the natural fracture azimuth.

Regional geologic work in the vicinity of SHCT No. 1 showed that a correlatable marker exists approximately 100 ft above the Cozzette. This marker is apparently a volcanic ash fall bentonite. The marker is characterized by a higher gamma ray and a higher neutron porosity than is otherwise exhibited by the Mancos Tongue. This marker was used as the key correlation point during the drilling of the SHCT No. 1 sidetrack well. A gamma ray/neutron log was run through drillpipe to facilitate this correlation. The shale marker provided excellent control to determine the precise depth for initiating the second build.

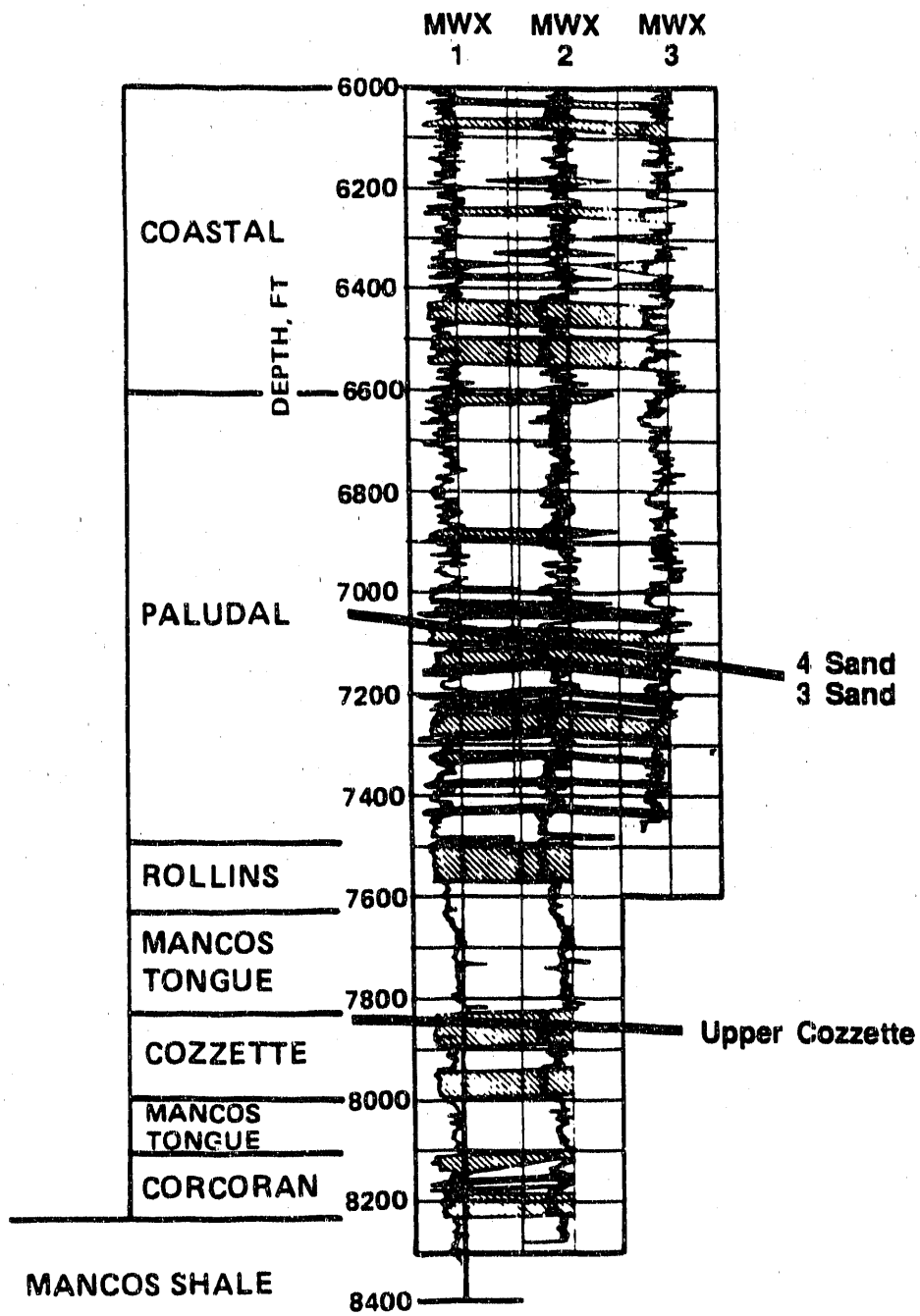


Figure 3 MWX Well Logs Across Paludal and Cozzette Reservoirs

The paludal Mesaverde interval was successfully logged in the sidetrack well using drillpipe-conveyed logging. The log analysis results are detailed in a CER log analysis report (CER Corporation, 1992). A total of 19 coals were penetrated through the paludal Mesaverde over the interval 8,054 to 6,738 ft. The coals vary considerably in thickness from less than 2 ft to 20 ft. Other potential completion targets in the paludal interval are the paludal 3 (7,429.5 to 7,519.5 ft MD) and paludal 4 (7,360.0 to 7,398.0 ft MD) sandstones. These zones correlate to the paludal 3 and 4 in the MWX wells. The paludal 7 (7,005.5 to 7,034.5 ft MD) sandstone also has gas production potential. This sand is absent in the MWX wells.

3.0 Sidetrack Drilling Operations Summary

3.1 DRILLING EQUIPMENT AND MUD SYSTEM

3.1.1 Drilling Rig

The drilling rig chosen to drill the sidetrack had a depth capacity of 15,000 ft with 5-in. drillpipe. This diesel electric rig was equipped with a 142-ft mast having a 960,000 lb hook load capacity with 10 lines. The rig was equipped with a 30-ft substructure rated at 1,200,000 lbs capacity sufficient to rack 7,600 ft of 5-in., 19.50 lb/ft drillpipe and 2,100 ft of 5-in., 50 lb/ft heavy weight drillpipe.

3.1.2 Drillpipe and Heavy Weight

Five-inch, 19.50 lb/ft, Grade 'E' drillpipe with 4-1/2-in. IF tool joints were chosen as the lightest pipe that could be used in the long 60° tangent, without buckling under the expected 30,000 to 40,000 lb weight on bit. Five-inch, 50 lb/ft, heavy weight drillpipe was selected for handling the reverse bending stresses induced by rotating the pipe through the build intervals. The 5-in. drillstring was later changed out to 3-1/2-in., 15.50 lb/ft, S135 drillpipe and 3-1/2-in., 25.3 lb/ft, heavy weight drillpipe, after the 7-in. casing had been run and cemented at 8,588 ft. The physical properties of the 3-1/2-in. S135 drillpipe and 3-1/2-in. IF tool joint were sufficient to handle the buckling and reverse bending stresses imposed during rotary drilling operations in the build intervals, and in the Cozzette horizontal hole.

3.1.3 Mud Pumps

The rig was equipped with two PZ-9 triplex 1,000 HP mud pumps. The circulation rate required by the mud motors to drill an 8-3/4-in. hole through the first and second build and through the tangent interval required 400 gpm at 3,000 psi. One of the pumps, with 5-1/2-in. liners at 150 spm, could supply the expected required circulating rate. Drilling the 6-in. diameter hole below the 7-in. casing set at 8,588 ft required a circulating rate of 165 gpm at 3,000 psi.

3.1.4 Mud System

A low solids non-dispersed (LSND) mud system was chosen to drill the sidetrack hole. This system was chosen over an oil-base mud based on the excellent results with that mud while drilling the original slant hole. This highly-shear thinning system contained a minimum of solids for improved penetration rate along with minimum viscosity at the bit, resulting in maximum annular velocity for hole cleaning. The mud system had the following properties: (1) Ph at 9.0 to 9.5; (2) 30 minute filtrates at 5 cc to 6 cc; (3) mud weights maintained with barite to 16.4 ppg; and (4) 8 percent diesel and a non-hydrocarbon lubricant to increase lubricity. The rig was equipped with a fine screened shale shaker, desander, desilter, mud cleaner, vacuum degasser, and a high capacity mud/gas separator (gas buster).

3.1.5 Mud Weight

Figure 4 presents a comparison of mud weight with true vertical depth between the original slant hole wellbore and the sidetrack wellbore. It is interesting to note that the first 413 ft of Cozzette

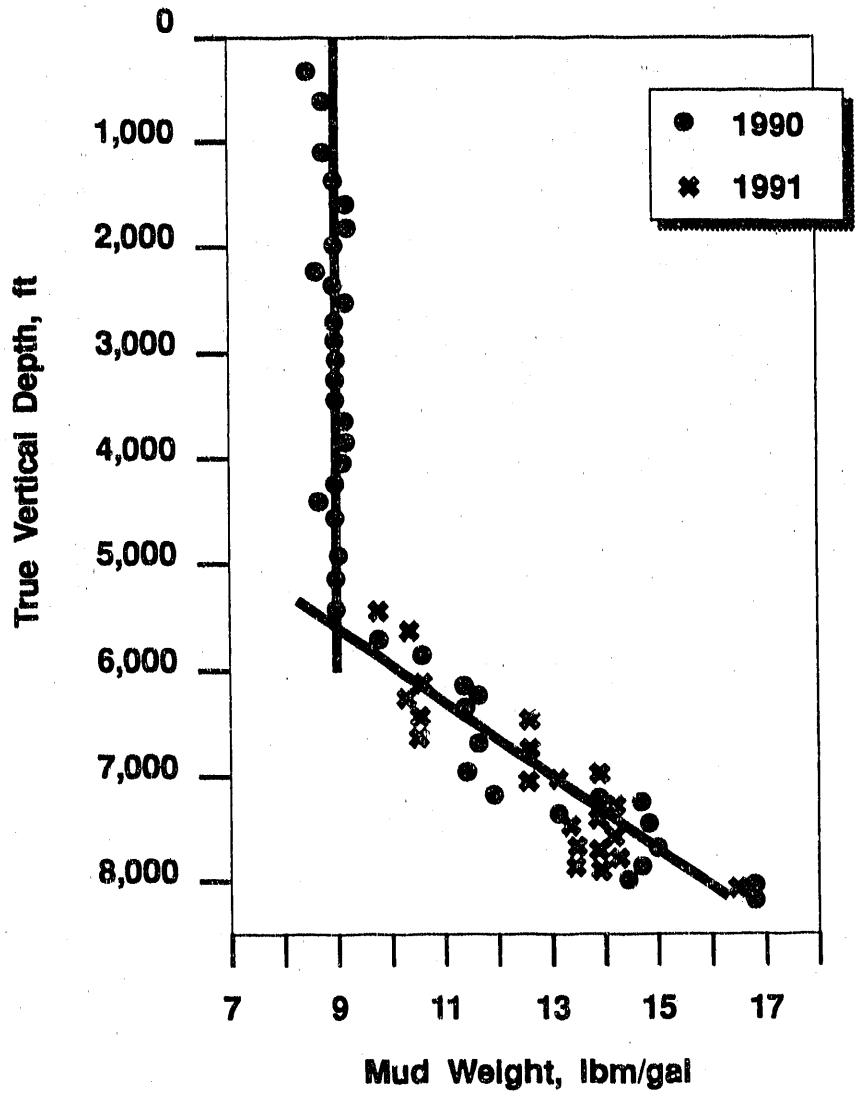


Figure 4 Mud Weight Vs. True Vertical Depth

sidetrack was drilled with 14.0 ppg mud as compared with the original slant hole where 16.3 ppg mud weight was employed. Table 1 presents a daily chronology of drilling fluid properties.

3.2 SIDETRACK PREPARATIONS

3.2.1 Opening a Window

The sidetracking plan originally called for pulling of about 5,300 ft of the 7-in. casing from the old well, so that the lower hole could be redrilled with 8-3/4-in. bits. Pipe recovery operations were initiated on April 26, 1991, using a well service unit and casing jacks; operations came to a halt 10 days later at 4,100 ft when no more joints came free. A stuck pipe log was run at this time which indicated that the 7-in. casing was tight from 4,180 to 4,215 ft. It became evident that approximately 140 ft of tightly held 7-in. casing would have to be washed over to provide a 100-ft open-hole window below the 9-5/8-in. intermediate casing shoe.

The well directional plan was adjusted to the shallower than expected kickoff point from which to sidetrack the hole. It was believed that washover operations could be performed more efficiently with the drilling rig. Consequently, the service unit was moved off and the drilling rig was moved on the hole on May 12, 1991. A pilot mill was run, and 2 ft of the casing stub was milled to 4,102 ft to smooth the top of the cut. An 8-5/8-in. washover shoe and five joints of 8-5/8-in. wash pipe were then used to over core the 7-in. casing stub from 4,100 to 4,239 ft. The casing was chemically cut at 4,237 ft; 136 ft of casing was recovered from the well. A Class G cement plug was set in the 7-in. casing stub from the cut-off at 4,237 ft to 5,087 ft to seal off the lower portion of the old hole. An additional Class G plug containing 2 percent $CaCl_2$ was set from 4,237 to 4,019 ft to serve as the actual kickoff plug.

3.2.2 Sidetrack Operations at 4,160 ft

The kickoff plug was dressed off to 4,160 ft. A bottomhole assembly, consisting of an 8-3/4-in. IADC Code D8X5 sidetrack bit, a steerable mud motor with a 2° bent sub, and eleven 6-1/4-in. drill collars were used to kick off the sidetrack. At 4,254 ft, the kickoff BHA was pulled after drilling a distance of 92 ft. The hole inclination had been built to 6°, while the hole azimuth was S88°E. The sidetrack bit was replaced with an 8-3/4-in. IADC Code 537 insert bit, and a 1.5° bent sub was run with the steerable motor. Drilling continued to 4,504 ft at which time the motor and the sidetrack drilling assembly were laid down. At 4,504 ft MD, 4,499 ft TVD, the hole inclination was 12° and the azimuth was S78°E.

3.3 DRILLING THE SIDETRACK

3.3.1 First Build

Getting There

The upper part of the new hole was rotary drilled using conventional surface rotation, single shot surveys for position control, and an 8-3/4-in. IADC Code 517 insert bit on a packed hole assembly. The well was drilled away from the old hole on a more or less straight tangent, at an inclination of 12 to 15 degrees and a southeasterly azimuth. Over this section, from 4,504 ft to the first kickoff point at 6,550 ft MD, the average penetration rate was 6.81 ft/hr, while rotary drilling 2,046 ft of hole.

Table 1 Mud Properties

Date	TVD Depth	Wt	Vis	API WL	% Solids	Gels	PV	YP	pH	% Oil	% Sand	API Cake	PV/YP Ratio	Meas. Depth	Incr. Depth
5/12/91	4100	8.5	37	20.0	2.0	4/6	12	6	9.0	0.0	0/0	2/32	2.00	4100	0
5/13/91	4100	8.4	36	10.0	1.5	3/4	12	6	9.5	0.0	0/0	2/32	2.00	4100	0
5/14/91	4100	8.7	38	11.6	2.5	2/4	10	5	9.0	0.0	0/0	2/32	2.00	4100	0
5/15/91	4100	8.6	41	11.6	2.0	3/5	10	5	8.5	0.0	0/0	2/32	2.00	4100	0
5/16/91	4060	8.7	42	12.0	2.0	3/5	10	5	8.5	0.0	0/0	2/32	2.00	4060	-40
5/17/91	4060	8.8	40	18.4	2.0	12/16	10	12	12.0	0.0	0/0	2/32	0.83	4060	0
5/18/91	4099	8.7	36	10.6	2.0	4/7	6	6	10.5	0.0	0/0	2/32	1.00	4174	114
5/19/91	4247	8.7	49	10.4	3.0	10/17	10	18	10.5	0.0	0/0	2/32	0.55	4248	74
5/20/91	4353	8.8	54	9.4	3.5	10/20	12	20	10.0	0.0	0/0	2/32	0.60	4355	107
5/21/91	4499	9.0	47	9.4	4.5	4/15	16	12	10.0	0.0	0/0	2/32	1.33	4504	149
5/22/91	4560	9.6	46	8.6	8.0	4/10	8	14	10.0	0.0	0/0	2/32	0.57	4566	62
5/23/91	4700	9.5	51	8.4	8.0	4/10	8	10	10.0	0.0	0/0	2/32	0.80	4708	142
5/24/91	4828	9.4	52	8.4	7.0	5/15	12	16	9.5	0.0	0/0	2/32	0.75	4840	132
5/25/91	4970	9.5	48	8.0	8.0	4/12	9	12	9.5	0.0	0/0	2/32	0.75	4986	146
5/26/91	5076	9.4	58	8.0	8.0	8/17	20	24	10.0	0.0	0/0	2/32	0.83	5092	106
5/27/91	5244	9.5	53	8.2	8.0	4/12	15	10	9.5	0.0	0/0	2/32	1.50	5265	173
5/28/91	5400	9.7	55	6.8	10.0	6/10	10	12	10.0	2.5	0/0	2/32	0.83	5424	159
5/29/91	5572	9.6	46	6.6	10.0	4/10	9	9	9.5	2.0	0/0	2/32	1.00	5600	176
5/30/91	5672	9.7	46	6.6	10.0	4/10	10	10	9.5	4.0	0/0	2/32	1.00	5702	102
5/31/91	5859	10.0	48	6.8	11.0	2/10	14	8	9.5	6.0	0/0	2/32	1.75	5894	192
6/01/91	6020	10.0	50	6.6	10.0	4/8	10	12	9.5	6.0	0/0	2/32	0.83	6071	177
6/02/91	6154	10.1	52	7.2	10.0	8/16	10	15	9.5	8.0	0/0	2/32	0.67	6200	129
6/03/91	6270	10.1	52	6.8	10.0	6/10	10	12	9.5	7.0	0/0	2/32	0.83	6280	80
6/04/92	6413	10.2	47	7.0	11.0	3/6	6	8	9.5	6.0	0/0	2/32	0.75	6470	190
6/05/91	6490	10.2	51	8.0	11.0	4/10	12	13	9.5	6.0	0/0	2/32	0.92	6550	80
6/06/91	6645	10.1	47	8.0	11.0	4/10	8	12	9.5	6.0	0/0	2/32	0.67	6720	170
6/07/91	6749	10.2	53	8.0	11.0	5/12	11	12	9.5	5.0	0/0	2/32	0.92	6857	137
6/08/91	6749	10.1	51	6.6	10.0	6/14	10	17	9.5	8.0	0/0	2/32	0.59	6857	0
6/09/91	6826	10.3	54	6.8	12.0	6/18	10	20	9.5	8.0	0/0	2/32	0.50	6972	115
6/10/91	6905	10.3	53	6.8	12.0	10/18	20	22	9.5	6.5	0/0	2/32	0.91	7101	129
6/11/91	6951	10.3	56	6.6	12.0	10/24	13	24	9.5	6.0	0/0	2/32	0.54	7180	79
6/12/91	6951	10.4	49	6.6	14.0	10/16	12	18	9.5	6.0	0/0	2/32	0.67	7180	0

Table 1, Continued

Date	TVD Depth	Wt	Vis	API WL	% Solids	Gels	PV	YP	pH	% Oil	% Sand	API Cake	PV/YP Ratio	Meas. Depth	Incr. Depth
6/13/91	6994	10.4	58	7.8	14.0	12/20	13	22	9.5	6.0	0/0	2/32	0.59	7258	78
6/14/91	7110	10.2	46	7.6	12.0	8/16	12	20	9.5	6.0	0/0	2/32	0.60	7309	51
6/15/91	7110	11.1	56	7.9	17.0	10/18	14	18	9.5	5.0	0/0	2/32	0.78	7309	0
6/16/91	7110	11.1	51	7.6	14.0	8/14	14	18	9.5	5.0	0/0	2/32	0.88	7309	0
6/17/91	7110	11.7	56	7.4	15.0	18/26	20	24	9.5	6.0	0/0	2/32	0.83	7309	0
6/18/91	6398	11.9	54	7.6	18.0	15/24	20	24	9.5	8.0	0/0	2/32	0.83	6450	-859
6/19/91	6398	11.5	47	8.8	14.0	3/6	10	8	10.0	8.0	0/0	2/32	1.25	6450	0
6/20/91	6418	12.0	51	8.0	14.0	6/14	18	12	10.0	6.0	0/0	2/32	1.67	6475	25
6/21/91	6476	11.8	48	8.0	14.0	6/10	12	16	10.0	6.0	0/0	2/32	0.75	6535	60
6/22/91	6476	11.3	47	8.6	12.0	3/7	14	10	10.0	5.0	0/0	2/32	1.40	6535	0
6/23/91	6476	12.0	54	7.6	14.0	8/14	14	16	10.0	6.0	0/0	2/32	0.88	6535	0
6/24/91	6514	12.5	54	7.2	15.0	7/15	14	18	9.5	7.0	0/0	2/32	0.78	6575	40
6/25/91	6557	12.4	58	6.6	15.0	8/20	10	20	9.0	8.0	0/0	2/32	0.50	6642	67
6/26/91	6707	12.5	61	6.2	15.0	8/15	12	18	9.0	8.0	0/0	2/32	0.67	6782	140
6/27/91	6759	12.4	61	6.2	16.0	12/26	16	19	9.5	8.0	0/0	2/32	0.84	6840	58
6/28/91	6866	12.5	52	6.4	15.0	10/20	14	16	9.5	8.0	0/0	2/32	0.88	6964	124
6/29/91	6932	12.5	54	6.0	15.0	8/20	14	18	9.5	7.0	0/0	2/32	0.78	7048	84
6/30/91	7038	12.5	57	6.0	15.0	8/16	12	18	9.0	8.0	0/0	2/32	0.67	7196	148
7/01/91	7081	12.5	61	6.0	15.0	12/22	16	22	9.0	8.0	0/0	2/32	0.73	7261	65
7/02/91	7138	12.5	60	6.0	15.0	10/14	14	18	9.5	8.0	0/0	2/32	0.78	7358	97
7/03/91	7182	13.2	54	6.6	18.0	10/22	15	20	9.5	7.0	0/0	2/32	0.75	7440	82
7/04/91	7249	13.4	53	6.2	18.0	12/18	12	16	9.5	6.0	0/0	2/32	0.75	7566	126
7/05/91	7274	13.9	64	6.2	22.0	14/20	34	22	9.5	6.0	0/0	2/32	1.55	7616	50
7/06/91	7351	14.2	50	6.4	25.0	8/20	12	14	9.0	8.0	0/0	2/32	0.86	7754	138
7/07/91	7441	14.2	54	6.4	26.0	10/24	12	14	9.5	7.0	0/0	2/32	0.86	7920	166
7/08/91	7534	14.2	64	6.4	26.0	8/26	20	24	9.5	8.0	0/0	2/32	0.83	8088	168
7/09/91	7534	14.0	66	6.2	25.0	12/20	18	18	9.0	8.0	0/0	2/32	1.00	8088	0
7/10/91	7563	13.6	53	7.6	25.0	8/20	14	24	9.0	8.0	0/0	2/32	0.58	8143	55
7/11/91	7616	13.6	56	6.0	24.0	6/15	12	16	9.0	7.0	0/0	2/32	0.75	8245	102
7/12/91	7652	13.9	60	6.0	25.0	11/25	12	24	9.0	9.0	0/0	2/32	0.50	8318	73
7/13/91	7693	14.1	59	6.4	27.0	12/25	18	20	9.0	8.0	0/0	2/32	0.90	8405	87
7/14/91	7702	14.2	59	6.4	27.0	10/14	16	20	9.0	6.0	0/0	2/32	0.80	8422	17

Table 1, Continued

Date	TVD Depth	Wt	Vis	API WL	% Solids	Gels	PV	YP	pH	% Oil	% Sand	API Cake	PV/YP Ratio	Meas. Depth	Incr. Depth
7/15/91	7702	14.6	63	6.4	26.0	13/20	23	14	9.0	6.0	0/0	2/32	1.64	8422	0
7/16/91	7702	14.2	49	6.2	26.0	4/12	12	15	9.0	5.0	0/0	2/32	0.80	8422	0
7/17/91	7702	14.2	63	6.2	27.0	4/14	30	25	9.0	5.0	0/0	2/32	1.20	8422	0
7/18/91	7750	14.3	54	6.4	27.0	5/14	40	20	9.0	5.0	0/0	2/32	2.00	8525	103
7/19/91	7781	14.2	60	6.0	25.0	4/12	35	20	9.5	8.0	0/0	2/32	1.75	8588	63
7/20/91	7781	14.1	54	6.0	25.0	4/10	34	16	9.5	8.0	0/0	2/32	2.13	8588	0
7/21/91	7781	14.3	50	6.0	26.0	4/8	27	18	9.5	8.0	0/0	2/32	1.50	8588	0
7/22/91	7781	14.2	51	6.0	26.0	4/10	32	20	9.5	6.0	0/0	2/32	1.60	8588	0
7/23/91	7781	14.7	53	6.0	26.0	4/8	30	18	9.5	6.0	0/0	2/32	1.67	8588	0
7/24/91	7781	14.8	64	6.0	28.0	5/15	28	22	9.5	6.0	0/0	2/32	1.27	8588	0
7/25/91		RAN 7", 29 LB/FT, N80 CASING TO 8,588 FT AND CEMENTED 1ST STAGE													
7/26/91		CEMENTED 2ND STAGE													
7/27/91	7781	13.7	47	6.6	25.0	3/5	20	10	9.5	4.0	0/0	2/32	2.00	8588	8588
7/28/91	7781	13.7	45	6.6	26.0	3/7	22	12	10.0	4.0	0/0	2/32	1.83	8588	0
7/29/91	7807	13.6	47	6.4	25.0	3/7	30	18	10.0	7.0	0/0	2/32	1.67	8642	54
7/30/91	7825	13.4	52	6.2	25.0	4/10	34	21	9.5	7.0	0/0	2/32	1.62	8680	38
7/31/91	7842	13.6	50	6.0	26.0	4/10	34	22	9.5	11.0	0/0	2/32	1.55	8717	37
8/01/91	7855	13.8	49	6.0	27.0	3/7	27	18	9.5	10.0	0/0	2/32	1.50	8746	29
8/02/91	7887	13.8	52	6.2	27.0	4/18	29	19	9.5	10.0	0/0	2/32	1.53	8812	66
8/03/91	7909	13.7	47	6.0	27.0	3/7	30	20	9.5	9.0	0/0	2/32	1.50	8892	80
8/04/91	7921	13.7	46	6.0	27.0	3/7	30	18	9.5	8.0	0/0	2/32	1.50	8945	53
8/05/91	7929	14.0	53	6.0	28.0	5/10	36	22	9.5	7.0	0/0	2/32	1.64	9006	61
8/06/91	7930	14.0	49	6.2	28.0	3/7	32	19	9.5	7.0	0/0	2/32	1.68	9030	24
8/07/91	7935	14.0	51	6.2	28.0	4/8	34	20	9.5	6.0	0/0	2/32	1.70	9119	89
8/08/91	7938	13.9	48	6.0	28.0	3/7	28	18	9.5	8.0	0/0	2/32	1.56	9197	78
8/09/91	7940	13.8	52	6.0	27.0	4/10	34	21	9.5	8.0	0/0	2/32	1.62	9235	38
8/10/91	7943	14.0	56	6.0	28.0	5/12	34	24	9.5	8.0	0/0	2/32	1.42	9289	54
8/11/91	7944	13.9	52	6.0	28.0	5/10	32	22	9.5	7.0	0/0	2/32	1.45	9308	19
8/12/91	7944	16.0	57	6.0	32.0	8/30	47	18	10.0	6.0	0/0	2/32	2.61	9308	0
8/13/91	7944	16.1	60	6.0	32.0	8/34	55	19	10.0	6.0	0/0	2/32	2.89	9308	0
8/14/91	7944	16.1	63	6.2	36.0	10/36	67	22	10.0	4.0	0/0	2/32	3.04	9308	0

Table 1, Continued

Date	TVD Depth	Wt	Vis	API WL	% Solids	Gels	PV	YP	pH	% Oil	% Sand	API Cake	PV/YP Ratio	Meas. Depth	Incr. Depth
8/15/91	7944	17.1	60	6.5	37.0	7/40	67	26	9.0	3.0	0/0	2/32	2.58	9308	0
8/16/91	7944	16.5	65	6.0	37.0	7/40	60	26	9.0	3.0	0/0	2/32	2.31	9308	0
8/17/91	7944	16.4	57	8.0	31.0	10/38	60	20	9.0	3.0	0/0	2/32	3.00	9308	0
8/18/91	7947	16.4	61	5.6	36.0	6/18	65	30	9.0	5.0	0/0	2/32	2.17	9381	73
8/19/91	7948	16.4	68	6.4	37.0	8/30	81	44	8.5	4.0	0/0	2/32	1.84	9407	26
8/20/91	7948	16.4	59	6.0	39.0	8/25	63	22	9.0	4.0	0/0	2/32	2.86	9407	0
8/21/91	7948	16.4	58	6.0	39.0	7/20	62	20	9.0	4.0	0/0	2/32	3.10	9407	0
8/22/91	SET 'R' PLUG IN PACKER, SET RETRIEVABLE BP AT 8,358 FT, REVERSE CIRCULATE WELL														
8/23/91	RIGGING DOWN														
8/24/91	RIG RELEASED AT 5:00 PM AUGUST 24, 1991.														

Making the Turn (and Associated Problems)

The kickoff point was reached at 6,550 ft at a hole inclination of 15.8°, on an azimuth of S67.7°E. Drilling of the first build proceeded satisfactorily, completing the compound turn at 7,309 ft and a hole inclination of 56° on an azimuth of N13.3°E. A 10.4 ppg mud weight was carried throughout the first build to 7,309 ft.

At this depth, a packed hole rotary assembly was run in the hole to begin drilling the tangent section. The assembly became stuck at 6,708 ft in a portion of the build having a 15°/100 ft dogleg. On jarring loose, the bit and a near-bit stabilizer were left in the hole, but were subsequently recovered. Efforts to ream out a second 15°/100 ft dogleg between 6,803 ft and 6,833 ft in a coaly section ultimately resulted in the hole being sidetracked at 6,833 ft. It was then decided to plug back to 6,450 ft and attempt a second kickoff. The first cement plug failed to set and was circulated from the hole. The second plug was satisfactory and a second kickoff was undertaken at 6,475 ft.

Redrilling of the first build proceeded slowly to 7,358 ft. The mud weight ultimately was raised to 12.5 ppg to stabilize sloughing shales and coal stringers. Extreme care was taken to hold dogleg severity below 8°/100 ft while drilling through the fractured interval where the 15°/100 ft doglegs occurred in the original hole. At the end of the build at 7,358 ft, the wellbore inclination was 57.1° and the hole azimuth was N14.6°E. The average penetration rate while drilling the 823 ft of the first build was 6.11 ft/hr.

3.3.2 Tangent

8-3/4-in. Tangent Section to 8,588 Ft

The first 208 ft of the tangent to 7,566 ft were drilled with both motor and surface rotation. An 8-3/4-in. insert bit was utilized with the steerable and rotatable motor to hold the hole inclination at 57.3° while turning the azimuth to N9.7°E. The remainder of the 1,230 ft tangent section to 8,588 ft was rotary drilled using an insert rock bit beefed up with heel buttons and stabilizer lugs. At 8,588 ft MD, the hole inclination was 60.4° and the hole azimuth was N9.7°E. While drilling the tangent section, it was necessary to steadily increase the mud weight to 14.3 ppg at 8,588 ft in the Mancos Shale to maintain wellbore stability. The lost circulation zone in the Rollins sand, where over 1,000 bbl of mud had been lost in the original slant hole, was drilled without incident. The mudlogger's background gas peaked at about 1,000 units while drilling through two paludal sand lenses. The coal (pressure-cored in the original slant hole[3]) above the upper sand peaked at 950 units, while the coal (conventionally cored in the slant hole[3]) below the lower sand peaked at about 900 units. Figure 4 presents a plot of mud weight versus true vertical depth for the sidetrack ('1991') and for the original slant hole ('1990').

Fishing Operations

Two separate fishing operations had to be conducted while drilling the tangent section. The first problem began while tripping out for a bit change after drilling to 8,422 ft, when the pipe got stuck part way out of the hole. Circulation with full returns was maintained even though the drillpipe could not be rotated or reciprocated. Apparently, hole caving occurred at a major coal encountered at 7,280 ft. The drillpipe was backed off at 7,283 ft and pulled, and a fishing assembly consisting of a cut lip screw-in sub and bumper and oil jars was run to the top of the fish. After screwing

into the fish, it came free following several minutes of down-jarring. The fish was then washed and reamed through the caving rough hole area around 7,280 ft and pulled from the hole.

After drilling to 8,588 ft, the second fishing operation also occurred on a trip out of the hole. The top IBS in the drilling assembly became key seated at 7,645 ft in a shale above a coalseam. The drillpipe was backed off at 7,602 ft, and the hole was circulated clean. The previous fishing assembly was run in the well to the top of the fish and screwed in. The fish was jarred up the hole just 10 ft when it stuck again. A second backoff was performed at 7,622 ft. The fishing assembly was rerun and screwed into the fish, which was finally jarred free and pulled from the well.

With the increased frequency of hole instability, particularly caving in the paludal coals, it was decided to run drillpipe-conveyed logs across the paludal Mesaverde completion target, and then to run and cement the 7-in. casing at the present TD of 8,588 ft to stabilize the wellbore.

7-in. Casing Set Through the Rollins

Two-hundred-one joints of 7-in., 29 lb/ft N80 LT&C casing were run in the hole to 8,579 ft, 459 ft below the Rollins, and into the Mancos Shale. Fifty-one centralizers were placed with one centralizer above every collar through the tangent and build sections of the hole to the stage tool at 6,364 ft. Ten additional centralizers were placed above every second collar above that point. Some difficulty was experienced running the casing below 8,083 ft, but it was worked and washed down to bottom at 8,588 ft MD, 7,780 ft TVD. Full returns were experienced throughout the washdown operation. The string weight was 165,000 lb, and the casing was landed in tension with 205,000 lbs setting on the slips.

The casing was cemented in two stages. The first stage consisted of 385 sx Class G cement containing silica flour and additives to control cement weight and water loss. The well was circulated through the stage collar for ten hours prior to cementing the second stage. The second stage consisted of 285 sx Class G cement containing additives to control weight and water loss. Full returns were experienced while cementing both stages. Table 2 presents the complete casing program for the SHCT No. 1 sidetrack wellbore.

Table 2 Casing Program

	Hole Diameter, in.	Depth, ft	Casing, in.	Weight, lb/ft	Grade	Comments
Surface	17-1/2	115	13-3/8	54.5	K55	ST&C, 8RD
Intermediate	12-1/4	4,130	9-5/8	36.0	K55	LT&C, 8RD
Production	8-3/4	8,588	7	29.0	N80	LT&C, 8RD

3.3.3 Second Build

The second kickoff point was determined as the well was being drilled, using detailed structural mapping of the Cozzette sand target in conjunction with well-to-well correlation of geologic markers. These markers include the major paludal coals, Rollins Sandstone, Mancos Tongue, a thin geologic marker in the Mancos Tongue characterized by high gamma ray and neutron porosity signatures, and the top of the Upper Cozzette Sandstone. A gamma ray log was run through drillpipe to fine tune the geologic correlation points and to accurately select the second kickoff point.

A 6-in. diameter hole was drilled out from under the 7-in. casing shoe at 8,588 ft to the second kickoff point at 8,660 ft, using surface rotation and an angle building BHA with an insert bit.

The first part of the second build interval, from 8,660 to 8,812 ft, was drilled with 5°/100 ft steerable motors and two insert bits. The average penetration rate was poor at 3.61 ft/hr. Three different fixed angle-build assemblies were run over this 152 ft interval attempting to build angle. These BHAs seriously underperformed, and only built 7° of hole angle over the distance. The remainder of the second build, from 8,812 to 9,020 ft, was drilled with an 11.6°/100 ft fixed angle-build motor and three insert bits. The average penetration rate was 4.17 ft/hr, and the build rate improved. The overall build rate through the second build interval averaged 6.9°/100 ft. At this point, the wellbore inclination was 85.9°, and the Cozzette was reached.

3.3.4 Cozzette Horizontal Section

The First 300 Ft

The top of the upper Cozzette target interval was encountered at a depth of approximately 9,006 ft MD, 7,928 ft TVD, where the hole azimuth was N10.9°E. Detailed structural mapping indicated that the Cozzette dips to the north at about 1.7°. The intent was to gradually drop through the 60-ft thick Cozzette sand over a planned course length of 500 ft. Consequently, the required average angle of penetration of the Cozzette was 87.6°.

The Cozzette lateral from 9,006 to 9,289 ft was drilled using an IADC Code D2R2 natural diamond bit on a rotary angle hold assembly. Surveys from 9,050 to 9,112 ft indicated that the hole inclination was locked on 87.7°; unexpectedly, the bit tended to remain parallel to bedding, and the borehole was not cutting across the sand's thickness as planned. This problem did not occur in the original slant hole; in fact there the hole dropped out of the sand a little ahead of schedule. An attempt was made with a steerable motor to increase the drop angle, but with marginal results. The diamond bit run averaged a penetration rate of 4.04 ft/hr. The lateral to 9,308 ft was rotary drilled ahead with an insert bit at an average penetration rate of 2.5 ft/hr.

The mud weight was held at 14 ppg to drill the naturally fractured Cozzette pay. By design, this weight underbalanced reservoir pressure to minimize the loss of drilling fluid to the fracture system, as experienced in the original slant hole, as well as to minimize suppression of gas shows. The mud log indicated at least ten major gas shows with chromatograph readings ranging from 190 units to 800 units between 9,138 ft and 9,308 ft. The produced gas was successfully handled through the rig's gas buster.

Fire at 9,308 ft

While tripping out of the hole for a bit change and with the bit at 5,200 ft, a very heavy gas kick threatened to blow out the well. The BOP was closed with 2,100 psi on the kelly, and an attempt was made to check the annular pressure. At that point, the 4-in. return line from the BOP stack ruptured just upstream of the choke manifold house. The released gas pressure pulled loose some electrical wiring and ignited. The resulting flash fire was quickly extinguished by closing the lower pipe rams on the BOP stack. Two rig site employees were injured. Only minor damage was done to the choke manifold house, but the 4-in. line to the choke manifold house had to be replaced.

As a result of the gas kick, the retrievable MWD tool was blown up the inside of the drillpipe approximately 1,000 ft, before it wedged in a tool joint and plugged the drillstring. Since it was not possible to circulate during subsequent well control efforts, a hole volume (250 bbl) of 16 ppg mud was bull headed down the drillpipe-casing annulus to kill the well. After a short quiet period, the well resumed flowing gas. Finally, 250 bbls of 18.7 ppg mud were pumped down the annulus to control the well. The pipe trip out was completed, and the MWD tool was located and recovered. A cleanout trip was made to 9,234 ft to circulate out the 18.7 ppg kill mud and replace it with 16.3 ppg mud prior to drilling the remainder of the Cozzette lateral.

Drilling to 9,407 ft TMD

An IADC Code D2R2 natural diamond bit was selected to drill the remainder of the hole to TMD, projected at 9,500 ft, using an angle drop BHA and surface rotation. Seventy-five barrels of mud were lost while drilling from 9,308 to 9,358 ft. The presence of natural fractures was indicated by calcite and quartz crystals in cuttings samples. The mud weight was sufficiently overbalanced to suppress most of the gas shows. An additional 60 barrels of mud were lost as more fractured intervals were intersected between 9,376 ft and 9,407 ft. Three hundred feet of horizontal, highly-fractured Cozzette pay had been cut. At that point, it was decided to stop drilling operations at 9,407 ft TMD, 7,948 ft TVD, to minimize further mud loss to the fracture system. Approximately 400 bbls of drilling mud were lost into the Cozzette natural fracture system as a result of drilling and the post-fire well control operations. Figure 5 presents a diagram of the slant hole sidetrack wellbore at the end of drilling. Figure 6 presents a profile and plan view of the sidetrack wellbore. Figure 7, the wellsite plat, illustrates the relationship between the well path and lease boundaries.

3.4 COZZETTE FLOWBACK TESTING

The Cozzette bottomhole completion assembly is illustrated on Figure 8. A permanent production packer with one 6-ft joint of 2-7/8-in. tubing and an 'R' nipple was run on drillpipe and set at 8,453 ft. The mud in the drillpipe was displaced with 2 percent KCl water, and the seal assembly was stung into the packer. The Cozzette was allowed to flow back to the burn pit through a choke manifold. Gas began arriving at the flare after 40 minutes while KCl load water slowly flowed from the well. Gas, water, mud and clouds of steam continued to flow at rapidly increasing rates, until approximately 200 bbls of water and drilling mud were recovered. After recovery of liquids stopped, up to 15.8 MMCFD of gas production were tested over a 3-hour period. The wellhead details for SHCT No. 1 are presented in Figure 9.

Following the brief flow test, a plug was set in the packer's 'R' nipple to isolate the Cozzette open hole, a retrievable bridge plug was set in at 8,372 ft as a safety precaution, and the hole was displaced with 2 percent KCl water. The drilling rig was released on August 24, 1991.

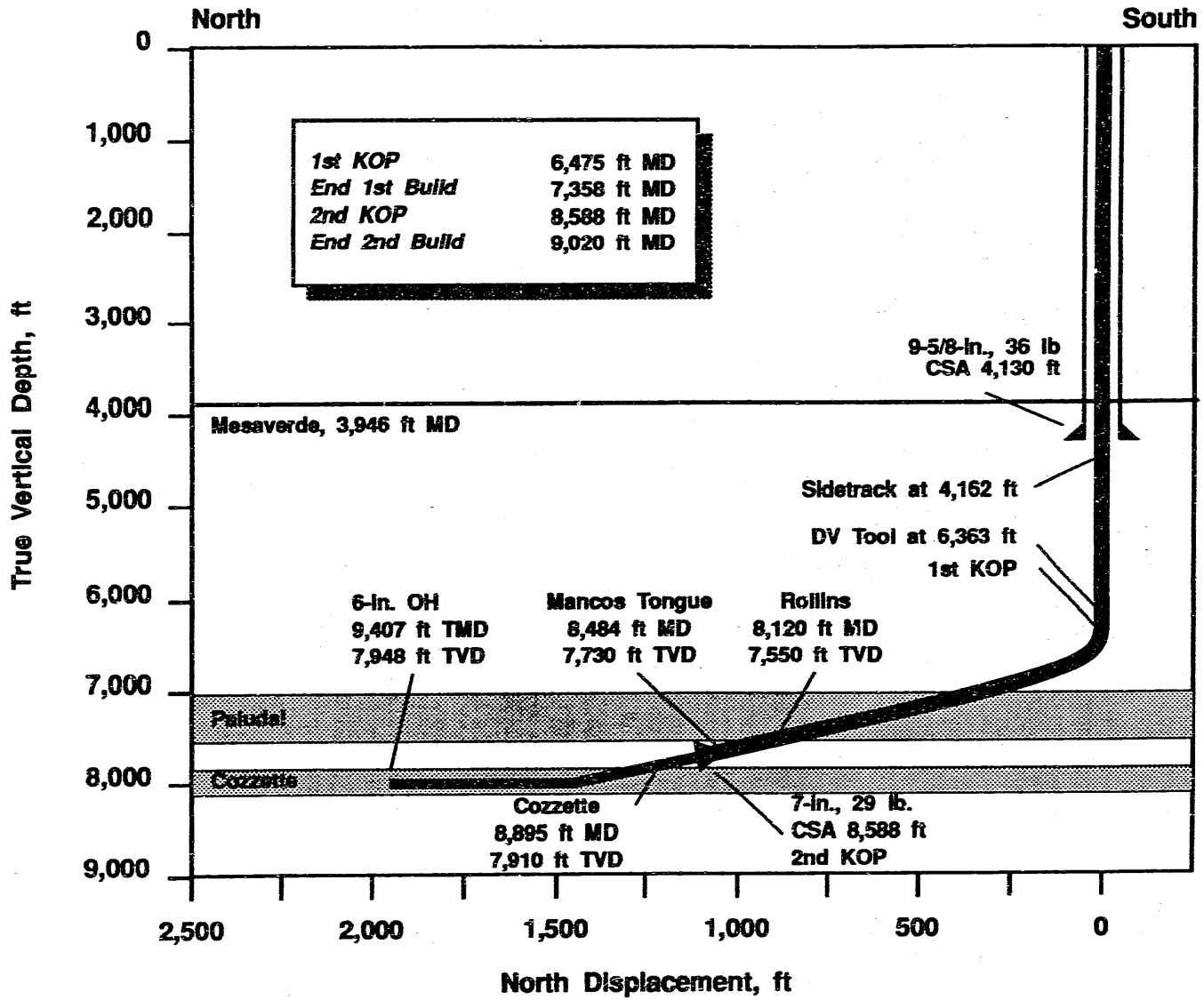


Figure 5 Slant Hole Sidetrack "As Built" Profile

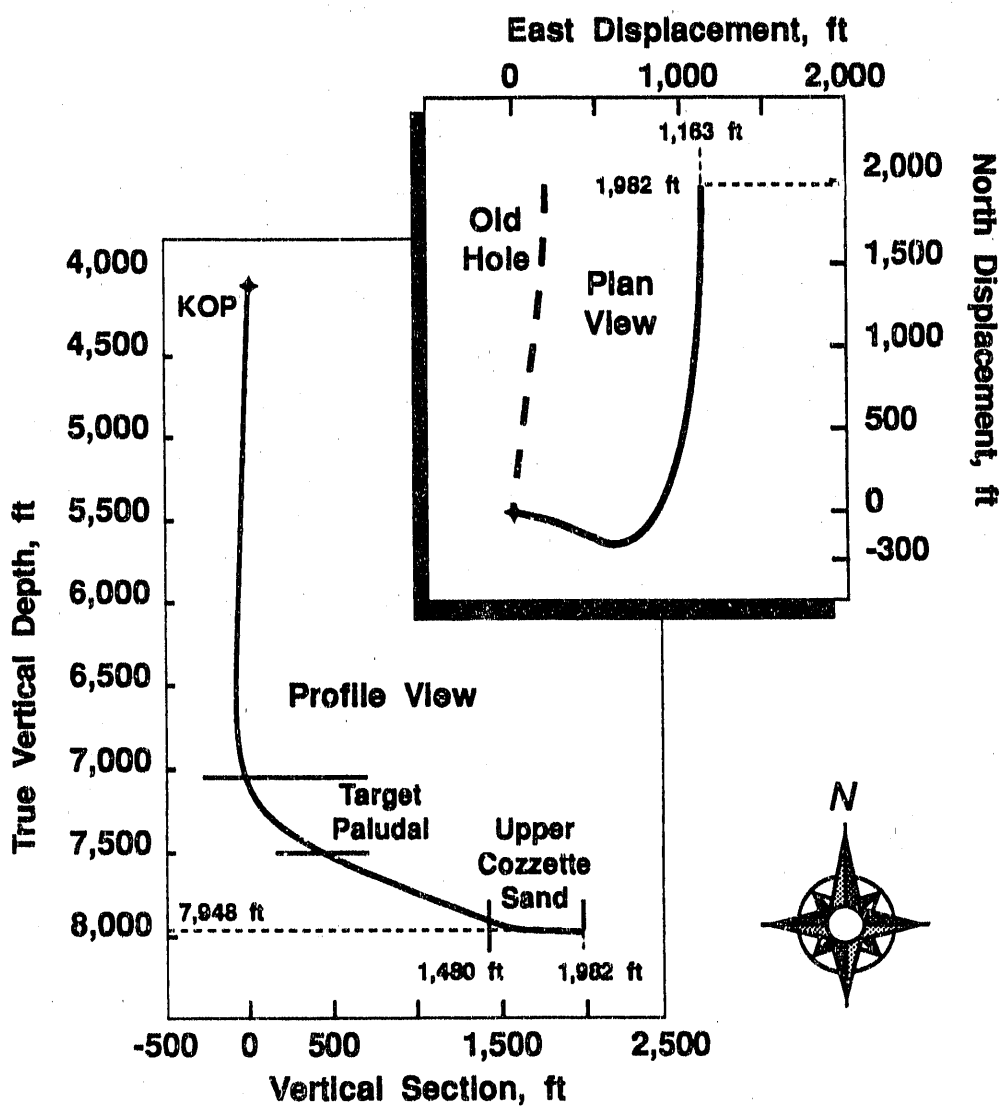
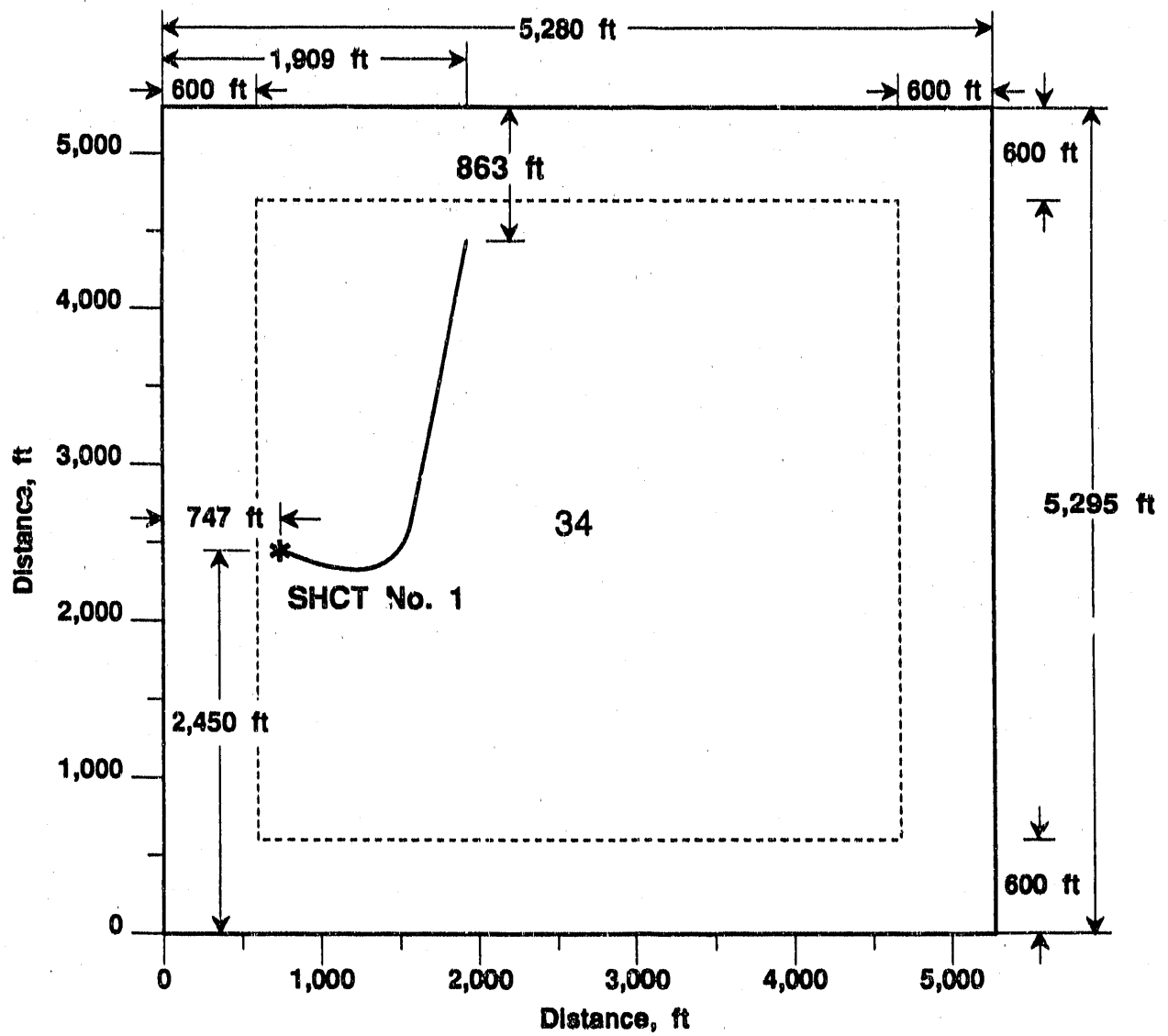


Figure 6 Slant Hole Sidetrack Wellbore Profile and Plan Views



Surface Location: 747 FWL, 2,450 FSL, Sec 34, T6S, R94W
Bottomhole Location: 1,909 FWL, 863 FNL, Sec 34, T6S, R94W
Borehole Length: 9,407 ft MD
Azimuth: N 10.2° E (Cozzette Open-Hole)

Figure 7 Slant Hole Sidetrack Wellsite Plat

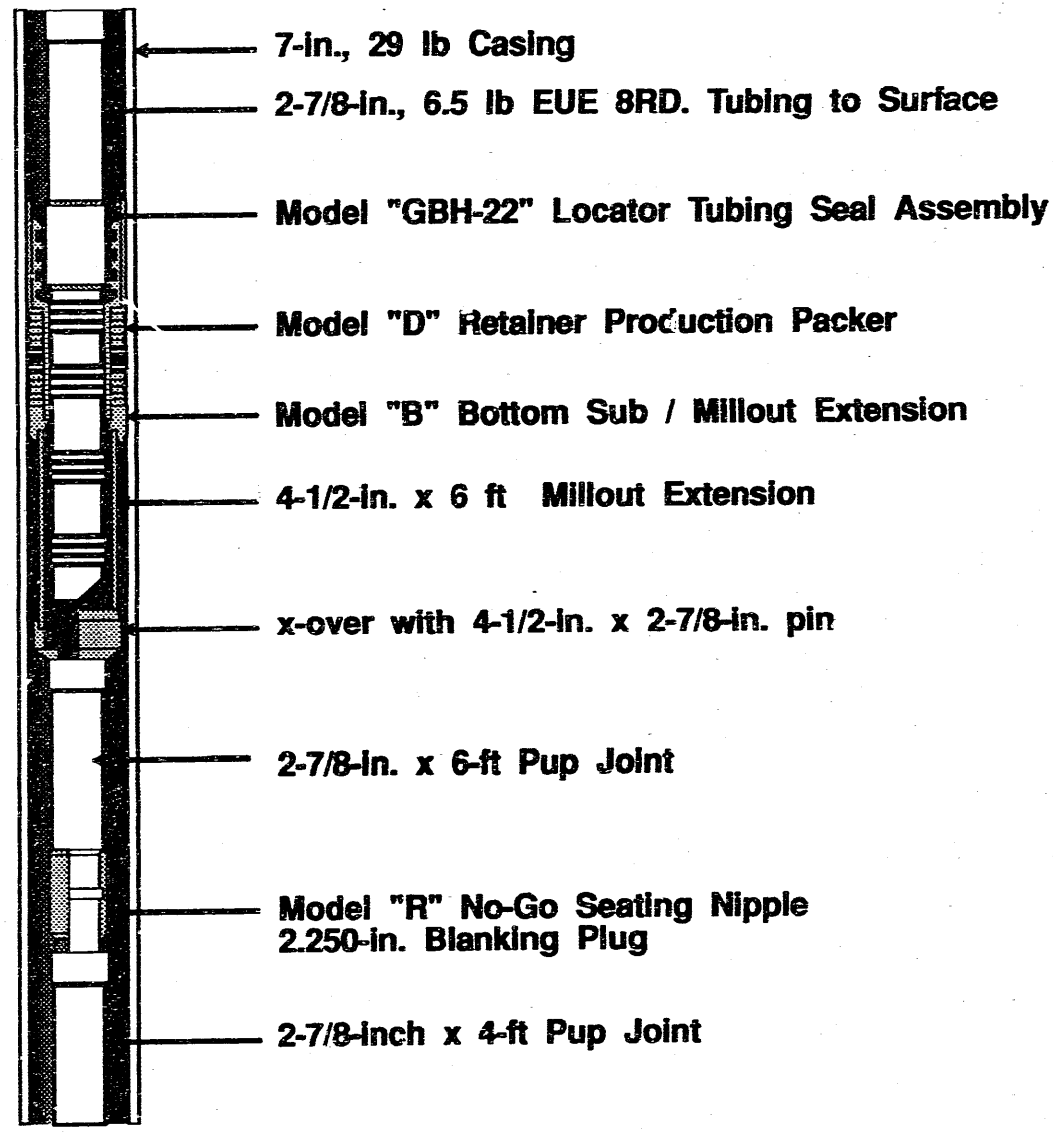


Figure 8 Cozzette Completion Assembly

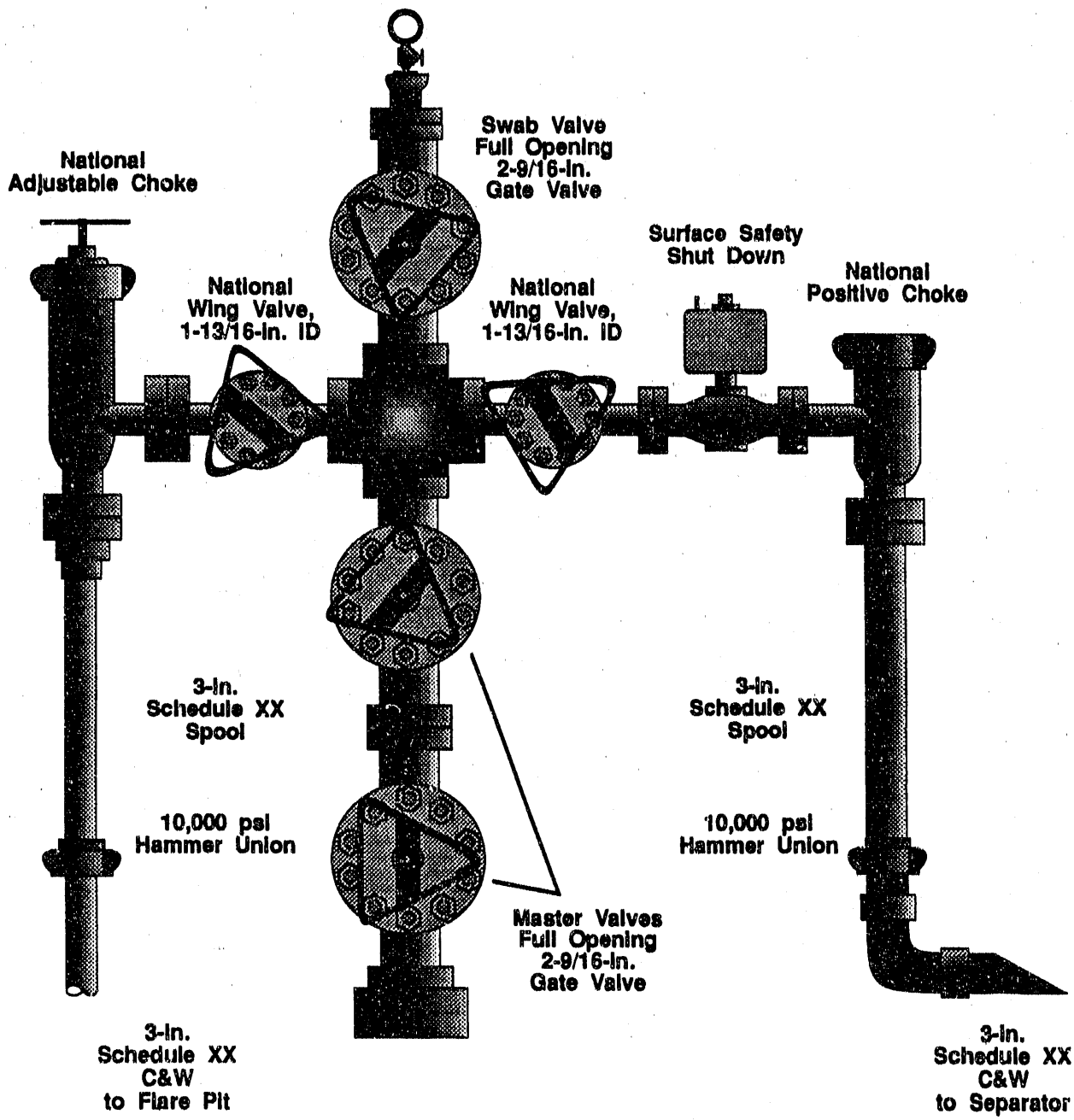


Figure 9 SHCT No. 1 Wellhead Details

3.5 DRILLING TIME SUMMARY

Figure 10 presents the drilling time versus depth versus cost information for drilling the SHCT No. 1 sidetrack. Table 3 shows the cumulative time distribution in hours.

3.6 FORMATION TOPS, CASING DEPTHS AND TOTAL DEPTH

Table 4 presents the formation tops, casing depths and total depth the SHCT No. 1 sidetrack. Appendix 3 presents the mud log on measured depth while Appendix 4 presents the mud log on true vertical depth.

3.7 DRILLPIPE-CONVEYED LOGGING PROGRAM

The log suite for the paludal Mesaverde interval consisted of phasor induction spherically focused log, lithodensity, compensated neutron, gamma ray, and caliper tools. The first logging run for the SHCT No. 1 was attempted July 9, 1991, using wireline conveyed logging techniques. Problems with the logging tool malfunction and thickening of drilling fluid due to calcium contamination and heat precluded completion of wireline logging operations.

The second logging run was performed July 23, 1991, using drillpipe-conveyed logging techniques. The following services were provided by Schlumberger:

Service	Interval, ft
LithoDensity/Compensated Neutron Log with Gamma Ray and Caliper Logs	6,582 to 8,230
Phasor Dual Induction/Spherically Focused Log	6,582 to 8,230

The entire pipe-conveyed logging operation took approximately 18 hours; no major problems were encountered during either logging run, and log quality was excellent for the hole conditions. This operation required careful coordination between the rig and logging crews, since logging was performed while tripping drillpipe into and out of the hole.

MWD survey information was input to generate logs on true vertical depth for correlation purposes with offset wells; logs were also printed in measured depth format.

3.8 DIRECTIONAL SURVEY

Table 5 presents the definitive downhole survey information for the first build, tangent and the second build portion of the SHCT No. 1 wellbore from 4,160 to 9,407 ft MD. This data was obtained using two separate instrument systems. Wellbore inclination and azimuth information in the build sections of the 8-3/4-in. hole between 6,450 and 8,588 ft MD was obtained using the Eastman Christensen 6-3/4-in. Accu-Trak Directional MWD System. Wellbore inclination and azimuth information in the 6-in. wellbore between 8,588 and 9,407 ft MD was obtained using the Eastman Christensen fully-retrievable 4-3/4-in. DMWD System.

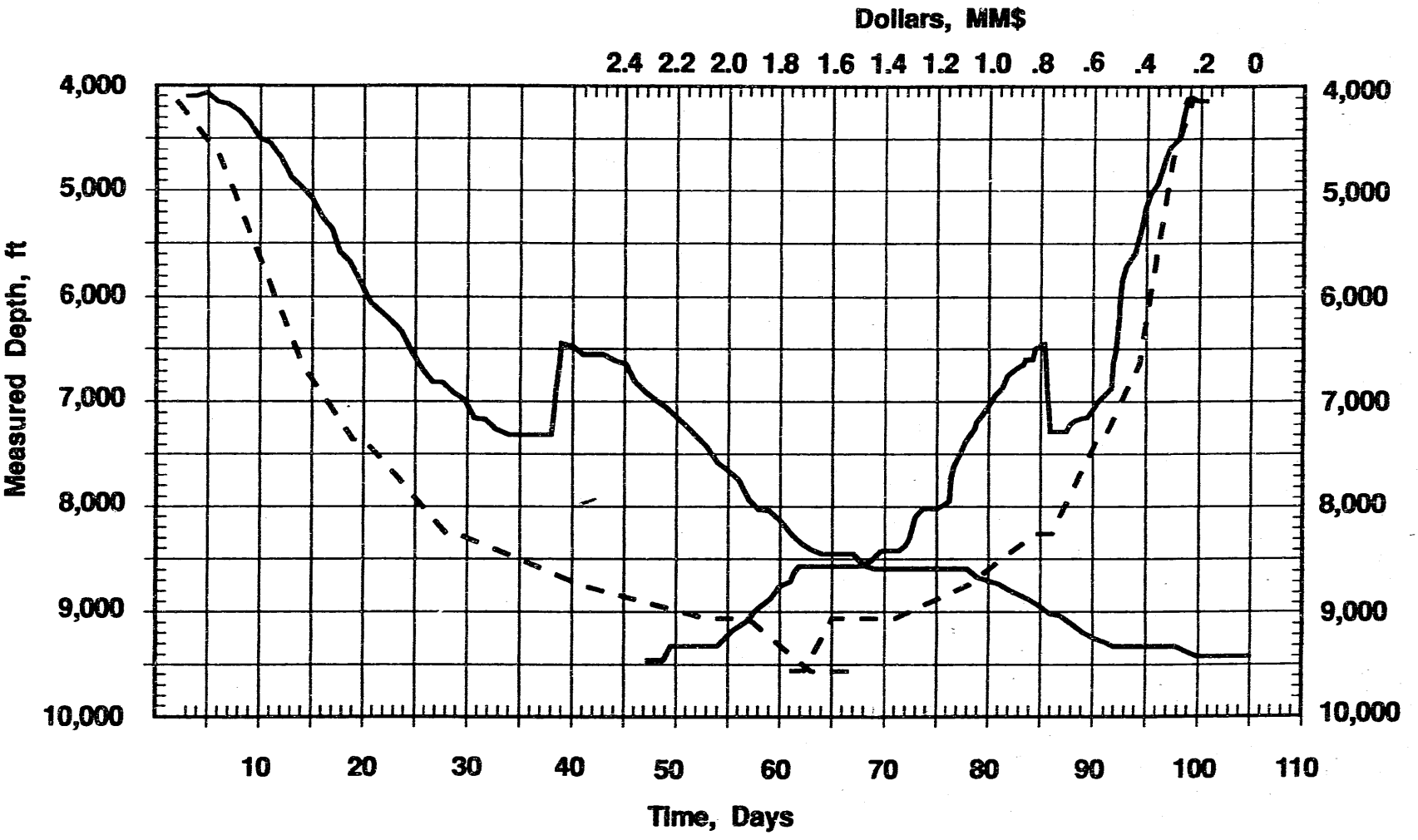


Figure 10 SHCT No. 1 (Sidetrack), Drilling Time Vs. Depth Vs. Cost

Table 3 Drilling Time Summary

Cumulative Time Distribution	Hours
Drilling	1,041.25
Deviation Surveys	75.25
Trips	519.25
Reaming	160.00
Circulate & Condition Mud	147.25
RU and Run Casing and Liner	18.25
Install and Test BOP's, Casing, Remove, etc.	61.00
Control Pressure	79.25
Lost Circulation	0.00
Rig Maintenance	8.00
Rig Repair	3.75
Wireline Logging	40.50
Fishing	29.75
Washover Operations	10.75
PU, Lay Down Drill Collars, Pipe, Change BHA's	146.50
Wait On Orders, Equipment	0.00
Other	155.25
TOTAL	2,496.00

Table 4 Formation Tops, Casing Depths and Total Depths

	Measured Depth, ft	TVD Depth, ft	MSL Elevation, ft
FORMATION TOPS			
Mesaverde	3,946	3,946	1,480
Rollins	8,120	7,550	-2,111
Cozzette	8,863	7,901	-2,462
CASING DEPTHS			
13-3/8-in. Surface	115	115	5,292
9-5/8-in. Intermediate	4,130	4,130	1,296
7-in. Production	8,588	7,780	-2,341
TOTAL DEPTHS			
Drillers' TD	9,407	7,948	-2,509

Note: SHCT No. 1 Elevation - 5,407 ft GL, 5,439 ft KB

Table 5 Directional Survey

EASTMAN CHRISTENSEN — **SURVEY CALCULATION AND FIELD WORKSHEET** Job No. 0410-12721 Sidetrack No. 1 Page 1 of 5

Company CER CORPORATION | Rig Contractor & No. VECO - 10 | Field RULISON

Well Name & No. SHCT-1 S.T.#1 | Survey Section Name Definitive Survey | EC Representative HALSTED/ STAPLES

WELL DATA

Target TVD (FT) | Target Coord. N/S | Slot Coord. N/S 0.00 | Grid Correction 0.000 | Depths Measured From: RKB [X] MSL [ ] SS[ ]

Target Description | Target Coord. E/W | Slot Coord. E/W 0.00 | Magn. Declination 12.360 | Calculation Method RADIUS OF CURVATURE

Target Direction (DD) | Build\Walk\DL per: 100ft [X] 30m [ ] 10m [ ] | Vert. Sec. Azim. 0.00 | Magn. to Map Corr. 12.360 | Map North to: TRUE NORTH

SURVEY DATA

Date	Survey Tool Type	Survey Depth (FT)	Incl. Angle (DD)	Hole Direction (DD)	Course Length (FT)	TVD (FT)	Vertical Section	Total Coordinate N(+) / S(-) (FT)	Total Coordinate E(+) / W(-) (FT)	DL (Per 100 FT)	Build Rate Build (+) Drop (-)	Walk Rate Right (+) Left (-)	Comment
	RGMS	4100.00	0.95	91.57		4099.37	21.06	21.05	45.96				TIE IN POINT
19-MAY-91	MSS	4180.00	2.05	73.90	80.00	4179.34	21.81	21.81	47.91	1.44	1.37		
20-MAY-91	MSS	4212.00	3.98	84.00	32.00	4211.30	22.10	22.10	49.56	6.16	6.03		
21-MAY-91	MSS	4269.00	6.73	96.80	57.00	4268.04	22.06	22.06	54.87	5.23	4.82	22.46	
21-MAY-91	MSS	4322.00	8.60	102.00	53.00	4320.58	20.91	20.91	61.84	3.76	3.53	9.81	
21-MAY-91	MSS	4384.00	10.50	93.00	62.00	4381.70	19.57	19.57	72.03	3.89	3.06	-14.52	
21-MAY-91	MSS	4444.00	12.90	90.00	60.00	4440.45	19.25	19.25	84.19	4.12	4.00	-5.00	
22-MAY-91	MSS	4504.00	12.00	102.00	60.00	4499.04	17.90	17.90	97.03	4.58	-1.50	20.00	
23-MAY-91	MSS	4566.00	12.00	103.00	62.00	4559.68	15.11	15.11	109.62	0.34	0.00	1.61	
23-MAY-91	MSS	4629.00	11.75	103.00	63.00	4621.34	12.19	12.19	122.25	0.40	-0.40	0.00	
24-MAY-91	MSS	4721.00	11.75	103.00	92.00	4711.41	7.96	7.98	140.50	0.00	0.00	0.00	
25-MAY-91	MSS	4814.00	11.75	103.00	93.00	4802.46	3.72	3.72	158.96	0.00	0.00	0.00	
25-MAY-91	MSS	4905.00	11.75	103.00	91.00	4891.55	-0.45	-0.45	177.01	0.00	0.00	0.00	
26-MAY-91	MSS	4967.00	11.50	105.00	62.00	4952.28	-3.47	-3.47	189.13	0.76	-0.40	3.22	
27-MAY-91	MSS	5049.00	11.50	103.00	82.00	5032.64	-7.43	-7.43	205.00	0.49	0.00	-2.44	
27-MAY-91	MSS	5113.00	11.50	103.00	64.00	5095.35	-10.30	-10.30	217.43	0.00	0.00	0.00	
27-MAY-91	MSS	5175.00	11.50	104.00	62.00	5156.11	-13.18	-13.18	229.45	0.32	0.00	1.61	
28-MAY-91	MSS	5270.00	11.75	104.00	95.00	5249.16	-17.81	-17.81	248.02	0.26	0.26	0.00	
29-MAY-91	MSS	5362.00	11.75	104.00	92.00	5339.23	-22.34	-22.34	266.20	0.00	0.00	0.00	
29-MAY-91	MSS	5457.00	12.00	105.00	95.00	5432.20	-27.24	-27.24	285.12	0.34	0.26	1.05	
30-MAY-91	MSS	5551.00	12.00	107.00	94.00	5524.14	-32.63	-32.63	303.91	0.44	0.00	2.13	
31-MAY-91	MSS	5678.00	12.25	109.00	127.00	5648.31	-40.65	-40.65	329.35	0.28	0.20	0.79	
31-MAY-91	MSS	5771.00	12.75	109.00	93.00	5739.10	-47.03	-47.03	348.44	0.58	0.54	1.08	
01-JUN-91	MSS	5865.00	13.50	109.00	94.00	5830.65	-53.98	-53.98	368.62	0.80	0.80	0.00	

Table 5, Continued

EASTMAN CHRISTENSEN **SURVEY CALCULATION AND FIELD WORKSHEET** Job No. 0410-12721 Sidetrack No. 1 Page 2 of 5

Company CER CORPORATION | Rig Contractor & No. VECO - 10 | Field RULISON

Well Name & No. SHCT-1 S.T.#1 | Survey Section Name Definitive Survey | EC Representative HALSTED/ STAPLES

WELL DATA

Target TVD (FT) | Target Coord. N/S | Slot Coord. N/S 0.00 | Grid Correction 0.000 | Depths Measured From: RKB [X] MSL [ ] SS [ ]

Target Description | Target Coord. E/W | Slot Coord. E/W 0.00 | Magn. Declination 12.360 | Calculation Method RADIUS OF CURVATURE

Target Direction (DD) | Build\Walk\DL per: 100ft [X] 30m [ ] 10m [ ] | Vert. Sec. Azim. 0.00 | Magn. to Map Corr. 12.360 | Map North to: TRUE NORTH

SURVEY DATA

Date	Survey Tool Type	Survey Depth (FT)	Incl. Angle (DD)	Hole Direction (DD)	Course Length (FT)	TVD (FT)	Vertical Section	Total Coordinate N(+) / S(-) (FT)	Total Coordinate E(+) / W(-) (FT)	DL (Per 100 FT)	Build Rate Build (+) Drop (-)	Walk Rate Right (+) Left (-)	Comment
01-JUN-91	MSS	5959.00	14.50	109.00	94.00	5921.86	-61.39	-61.39	390.12	1.06	1.06	0.00	
02-JUN-91	MSS	6051.00	15.50	109.00	92.00	6010.72	-69.14	-69.14	412.64	1.09	1.09	0.00	
03-JUN-91	MSS	6145.00	16.25	110.00	94.00	6101.13	-77.72	-77.72	436.67	0.85	0.80	1.06	
04-JUN-91	MSS	6270.00	16.75	107.00	125.00	6220.99	-88.99	-88.99	470.54	0.79	0.40	-2.40	
04-JUN-91	MSS	6361.00	18.25	108.00	91.00	6308.24	-96.76	-96.76	495.19	0.63	-0.55	1.10	
05-JUN-91	MSS	6485.00	15.75	109.00	124.00	6427.44	-107.60	-107.60	527.60	0.48	-0.40	0.81	
25-JUN-91	MWD	6524.00	16.30	110.00	39.00	6464.92	-111.20	-111.20	537.75	1.58	1.41	2.56	
25-JUN-91	MWD	6555.00	16.70	107.30	31.00	6494.64	-114.01	-114.01	546.09	2.79	1.29	-8.71	
25-JUN-91	MWD	6586.00	17.40	102.00	31.00	6524.28	-116.31	-116.31	554.88	5.50	2.26	-17.10	
26-JUN-91	MWD	6616.00	18.30	94.40	30.00	6552.84	-117.62	-117.62	563.97	8.32	3.00	-25.33	
26-JUN-91	MWD	6648.00	19.70	87.70	32.00	6583.09	-117.81	-117.81	574.38	8.09	4.37	-20.94	
26-JUN-91	MWD	6679.00	21.20	83.50	31.00	6612.14	-116.98	-116.98	585.18	6.77	4.84	-13.55	
27-JUN-91	MWD	6708.00	22.50	80.10	29.00	6639.05	-115.44	-115.44	595.66	6.25	4.48	-11.72	
27-JUN-91	MWD	6739.00	23.50	77.20	31.00	6667.59	-113.06	-113.06	607.74	4.87	3.22	-9.35	
27-JUN-91	MWD	6770.00	24.30	73.90	31.00	6695.93	-109.92	-109.92	619.90	5.02	2.58	-10.64	
28-JUN-91	MWD	6802.00	25.30	70.30	32.00	6724.98	-105.80	-105.80	632.67	5.66	3.12	-11.25	
28-JUN-91	MWD	6833.00	26.40	66.50	31.00	6752.88	-100.82	-100.82	645.23	6.41	3.55	-12.26	
28-JUN-91	MWD	6864.00	28.10	61.70	31.00	6780.43	-94.63	-94.63	658.00	8.96	5.48	-15.48	
29-JUN-91	MWD	6896.00	29.80	57.20	32.00	6808.42	-86.74	-86.74	671.35	8.84	5.62	-14.06	
29-JUN-91	MWD	6927.00	32.40	53.20	31.00	6834.95	-77.59	-77.59	684.52	10.46	8.06	-12.90	
30-JUN-91	MWD	6958.00	35.10	49.80	31.00	6860.72	-66.88	-66.88	697.99	10.63	8.71	-10.97	
30-JUN-91	MWD	6989.00	37.20	46.40	31.00	6885.75	-54.66	-54.66	711.60	9.36	6.77	-10.97	
30-JUN-91	MWD	7020.00	38.90	43.40	31.00	6910.16	-41.13	-41.13	725.06	8.10	5.48	-9.68	
30-JUN-91	MWD	7052.00	40.60	40.60	32.00	6934.76	-25.93	-25.93	738.76	7.71	5.31	-8.75	

Table 5, Continued

EASTMAN CHRISTENSEN

SURVEY CALCULATION AND FIELD WORKSHEET

Job No. 0410-12721 Sidetrack No. 1 Page 3 of 5

Company CER CORPORATION Rig Contractor & No. VECO - 10 Field RULISON

Well Name & No. SHCT-1 S.T.#1 Survey Section Name Definitive Survey EC Representative HALSTED/ STAPLES

WELL DATA

Target TVD (FT) Target Coord. N/S Slot Coord. N/S 0.00 Grid Correction 0.000 Depths Measured From: RKB [X] MSL [ ] SS [ ]

Target Description Target Coord. E/W Slot Coord. E/W 0.00 Magn. Declination 12.360 Calculation Method RADIUS OF CURVATURE

Target Direction (DG) Build\Walk\DL per: 100ft [X] 30m [ ] 10m [ ] Vert. Sec. Azim. 0.00 Magn. to Map Corr. 12.360 Map North to: TRUE NORTH

SURVEY DATA

Date	Survey Tool Type	Survey Depth (FT)	Incl. Angle (DG)	Hole Direction (DG)	Course Length (FT)	TVD (FT)	Vertical Section	Total Coordinate N(+) / S(-) (FT)	Total Coordinate E(+) / W(-) (FT)	DL (Per 100 FT)	Build Rate Build (+) Drop (-)	Walk Rate Right (+) Left (-)	Comment
30-JUN-91	MWD	7083.00	42.30	37.40	31.00	6958.00	-9.98	-9.98	751.69	8.78	5.48	-10.32	
01-JUL-91	MWD	7114.00	43.40	34.60	31.00	6980.73	7.07	7.07	764.08	7.09	3.55	-9.03	
01-JUL-91	MWD	7145.00	44.80	31.80	31.00	7002.99	25.12	25.12	775.89	7.74	4.52	-9.03	
01-JUL-91	MWD	7177.00	46.40	29.30	32.00	7025.38	44.81	44.81	787.51	7.49	5.00	-7.81	
02-JUL-91	MWD	7208.00	48.10	26.50	31.00	7046.42	64.92	64.92	798.16	8.60	5.48	-9.03	
02-JUL-91	MWD	7240.00	49.90	23.50	32.00	7067.41	86.81	86.81	808.36	9.04	5.62	-9.38	
02-JUL-91	MWD	7271.00	51.30	21.00	31.00	7087.09	108.98	108.98	817.43	7.70	4.52	-8.06	
02-JUL-91	MWD	7302.00	52.90	17.70	31.00	7106.13	132.05	132.05	825.54	9.66	5.16	-10.64	
03-JUL-91	MWD	7332.00	55.30	16.10	30.00	7123.72	155.30	155.30	832.60	9.09	8.00	-5.33	
04-JUL-91	MWD	7363.00	57.10	14.60	31.00	7140.98	180.14	180.14	839.42	7.06	5.81	-4.84	
04-JUL-91	MWD	7394.00	58.00	13.20	31.00	7157.60	205.53	205.53	845.70	4.79	2.90	-4.52	
04-JUL-91	MWD	7425.00	58.10	12.20	31.00	7174.00	231.19	231.19	851.49	2.76	0.32	-3.22	
04-JUL-91	MWD	7457.00	58.00	10.90	32.00	7190.94	257.80	257.80	856.92	3.46	-0.31	-4.06	
04-JUL-91	MWD	7488.00	57.80	10.10	31.00	7207.41	283.62	283.62	861.71	2.26	-0.64	-2.58	
05-JUL-91	MWD	7564.00	57.30	9.70	76.00	7248.19	346.80	346.80	872.74	0.79	-0.66	-0.53	
06-JUL-91	MWD	7595.00	57.30	9.50	31.00	7264.94	372.52	372.52	877.09	0.54	0.00	-0.64	
06-JUL-91	MWD	7626.00	57.20	9.70	31.00	7281.71	398.22	398.22	881.43	0.63	-0.32	0.64	
06-JUL-91	MWD	7658.00	57.30	9.80	32.00	7299.02	424.75	424.75	885.99	0.41	0.31	0.31	
06-JUL-91	MWD	7689.00	57.00	9.90	31.00	7315.84	450.41	450.41	890.45	1.00	-0.97	0.32	
07-JUL-91	MWD	7720.00	57.10	10.10	31.00	7332.70	476.02	476.02	894.96	0.63	0.32	0.64	
07-JUL-91	MWD	7752.00	57.10	9.80	32.00	7350.08	502.49	502.49	899.61	0.79	0.00	-0.94	
07-JUL-91	MWD	7783.00	56.90	9.80	31.00	7366.96	528.11	528.11	904.03	0.64	-0.64	0.00	
07-JUL-91	MWD	7815.00	57.20	10.00	32.00	7384.37	554.56	554.56	908.65	1.07	0.94	0.62	
07-JUL-91	MWD	7846.00	57.20	10.00	31.00	7401.16	580.22	580.22	913.17	0.00	0.00	0.00	

Table 5, Continued

SURVEY CALCULATION AND FIELD WORKSHEET

Job No. 0410-12721 Sidetrack No. 1 Page 4 of 5

Company CER CORPORATION | Rig Contractor & No. VECO - 10 | Field BULISON

Well Name & No. SHCT-1 S.T.#1 | Survey Section Name Definitive Survey | EC Representative HALSTED/ STAPLES

WELL DATA

Target TVD (FT) | Target Coord. N/S | Slot Coord. N/S 0.00 | Grid Correction 0.000 | Depths Measured From: RKB [X] MSL [ ] SS [ ]

Target Description | Target Coord. E/W | Slot Coord. E/W 0.00 | Magn. Declination 12.360 | Calculation Method RADIUS OF CURVATURE

Target Direction (DD) | Build\Walk\DL per: 100ft [X] 30m [ ] 10m [ ] | Vert. Sec. Azim. 0.00 | Magn. to Map Corr. 12.360 | Map North to: TRUE NORTH

SURVEY DATA

Date	Survey Tool Type	Survey Depth (FT)	Incl. Angle (DD)	Hole Direction (DD)	Course Length (FT)	TVD (FT)	Vertical Section	Total Coordinate N(+) / S(-) (FT)	Total Coordinate E(+) / W(-) (FT)	DL (Per 100 FT)	Build Rate Build (+) Drop (-)	Walk Rate Right (+) Left (-)	Comment
08-JUL-91	MWD	7877.00	57.20	9.90	31.00	7417.95	605.89	605.89	917.68	0.27	0.00	-0.32	
08-JUL-91	MWD	7910.00	56.90	9.90	33.00	7435.90	633.17	633.17	922.44	0.91	-0.91	0.00	
08-JUL-91	MWD	7941.00	56.90	10.40	31.00	7452.83	658.73	658.73	927.01	1.35	0.00	1.61	
08-JUL-91	MWD	7973.00	56.90	10.20	32.00	7470.31	685.10	685.10	931.81	0.52	0.00	-0.62	
08-JUL-91	MWD	8004.00	56.90	10.20	31.00	7487.24	710.66	710.66	936.40	0.00	0.00	0.00	
08-JUL-91	MWD	8035.00	56.80	10.40	31.00	7504.19	736.20	736.20	941.05	0.63	-0.32	0.64	
09-JUL-91	MWD	8067.00	56.60	10.80	32.00	7521.78	762.49	762.49	945.97	1.22	-0.62	1.25	
10-JUL-91	MWD	8098.00	56.90	10.50	31.00	7538.75	787.97	787.97	950.76	1.26	0.97	-0.97	
11-JUL-91	MWD	8129.00	57.30	10.30	31.00	7555.59	813.57	813.57	955.46	1.40	1.29	-0.64	
11-JUL-91	MWD	8159.00	57.80	10.50	30.00	7571.69	838.47	838.47	960.03	1.76	1.67	0.67	
11-JUL-91	MWD	8189.00	58.40	10.20	30.00	7587.54	863.52	863.52	964.60	2.17	2.00	-1.00	
12-JUL-91	MWD	8221.00	59.10	9.90	32.00	7604.14	890.46	890.46	969.38	2.33	2.19	-0.94	
12-JUL-91	MWD	8252.00	59.80	9.70	31.00	7619.90	916.77	916.77	973.92	2.32	2.26	-0.64	
12-JUL-91	MWD	8284.00	60.40	9.70	32.00	7635.85	944.11	944.11	978.59	1.67	1.87	0.00	
13-JUL-91	MWD	8315.00	60.90	9.50	31.00	7651.04	970.75	970.75	983.10	1.71	1.61	-0.64	
13-JUL-91	MWD	8347.00	61.60	9.20	32.00	7666.44	998.44	998.44	987.66	2.34	2.19	-0.94	
14-JUL-91	MWD	8379.00	62.20	9.40	32.00	7681.51	1026.29	1026.29	992.22	1.95	1.87	0.62	
02-AUG-91	MWD	8402.00	62.50	9.50	23.00	7692.18	1046.39	1046.39	995.56	1.36	1.30	0.43	
16-JUL-91	MWD	8414.00	62.60	9.10	12.00	7697.71	1056.90	1056.90	997.29	3.07	0.83	-3.33	
16-JUL-91	MWD	8445.00	62.40	9.20	31.00	7712.03	1084.05	1084.05	1001.66	0.70	-0.64	0.32	
16-JUL-91	MWD	8476.00	61.90	8.90	31.00	7726.51	1111.11	1111.11	1005.97	1.82	-1.61	-0.97	
16-JUL-91	MWD	8508.00	61.40	9.50	32.00	7741.70	1138.91	1138.91	1010.47	2.27	-1.56	1.88	
16-JUL-91	MWD	8538.00	61.00	9.50	30.00	7756.16	1164.64	1164.64	1014.61	1.33	-1.33	0.00	
16-JUL-91	MWD	8570.00	60.40	9.70	32.00	7771.62	1192.36	1192.36	1019.46	1.95	-1.88	0.62	

Table 5, Continued

SURVEY CALCULATION AND FIELD WORKSHEET

Job No. 0410-12721 Sidetrack No. 1 Page 5 of 5

Company CER CORPORATION | Rig Contractor & No. VECO - 10 | Field RULISON

Well Name & No. SHCT-1 S.T.#1 | Survey Section Name Definitive Survey | EC Representative

WELL DATA

Target TVD (FT) | Target Coord. N/S | Slot Coord. N/S 0.00 | Grid Correction 0.000 | Depths Measured From: RKB [X] MSL [ ] SS [ ]

Target Description | Target Coord. E/W | Slot Coord. E/W 0.00 | Magn. Declination 12.360 | Calculation Method RADIUS OF CURVATURE

Target Direction (DD) | Build\Walk\DL per: 100ft [X] 30m [ ] 10m [ ] | Vert. Sec. Azim. 0.00 | Magn. to Map Corr. 12.360 | Map North to: TRUE NORTH

SURVEY DATA

Date	Survey Tool Type	Survey Depth (FT)	Incl. Angle (DD)	Hole Direction (DD)	Course Length (FT)	TVD (FT)	Vertical Section	Total Coordinate N(+) / S(-) (FT)	Total Coordinate E(+) / W(-) (FT)	DL (Per 100 FT)	Build Rate Build (+) Drop (-)	Walk Rate Right (+) Left (-)	Comment
31-JUL-91	MWD	8638.00	61.10	9.60	68.00	7805.04	1250.85	1250.85	1029.41	1.04	1.03	-0.15	
31-JUL-91	MWD	8670.00	61.70	9.50	32.00	7820.36	1278.55	1278.55	1034.07	1.89	1.88	-0.31	
02-AUG-91	MWD	8732.00	63.70	9.50	62.00	7848.80	1332.69	1332.69	1043.16	3.22	3.22	0.00	
02-AUG-91	MWD	8764.00	64.60	10.20	32.00	7862.75	1361.26	1361.26	1048.09	3.43	2.81	2.19	
03-AUG-91	MWD	8796.00	66.20	10.90	34.00	7876.90	1391.65	1391.65	1053.75	5.06	4.70	2.06	
03-AUG-91	MWD	8830.00	68.20	10.90	32.00	7889.30	1420.62	1420.62	1059.33	6.25	6.25	0.00	
04-AUG-91	MWD	8860.00	71.30	10.90	30.00	7899.68	1448.25	1448.25	1064.65	10.33	10.33	0.00	
05-AUG-91	MWD	8891.00	74.20	10.90	31.00	7908.88	1477.32	1477.32	1070.25	9.35	9.35	0.00	
05-AUG-91	MWD	8923.00	77.50	10.90	32.00	7916.70	1507.79	1507.79	1076.11	10.31	10.31	0.00	
06-AUG-91	MWD	8954.00	80.70	10.90	31.00	7922.56	1537.67	1537.67	1081.87	10.32	10.32	0.00	
07-AUG-91	MWD	8988.00	84.60	10.90	34.00	7926.91	1570.78	1570.78	1088.24	11.47	11.47	0.00	
07-AUG-91	MWD	9020.00	85.90	10.90	32.00	7929.56	1602.09	1602.09	1094.27	4.08	4.06	0.00	
07-AUG-91	MWD	9051.00	86.50	10.20	31.00	7931.61	1632.50	1632.50	1099.94	2.97	1.94	-2.26	
07-AUG-91	MWD	9083.00	87.50	10.90	32.00	7933.29	1663.92	1663.92	1105.79	3.61	3.12	2.19	
08-AUG-91	MWD	9112.00	87.70	10.20	29.00	7934.50	1692.40	1692.40	1111.09	2.51	0.69	-2.41	
08-AUG-91	MWD	9144.00	87.50	10.20	32.00	7935.84	1723.87	1723.87	1116.76	0.62	-0.62	0.00	
09-AUG-91	MWD	9175.00	87.70	9.50	31.00	7937.14	1754.39	1754.39	1122.05	2.35	0.64	-2.26	
10-AUG-91	MWD	9207.00	86.90	10.20	32.00	7938.65	1785.88	1785.88	1127.52	3.32	-2.50	2.19	
10-AUG-91	MWD	9238.00	86.70	10.20	31.00	7940.36	1816.34	1816.34	1133.00	0.64	-0.64	0.00	
11-AUG-91	MWD	9269.00	87.90	10.20	31.00	7941.84	1846.82	1846.82	1138.49	3.87	3.87	0.00	
19-AUG-91	MWD	9407.00	86.90	10.20	138.00	7948.10	1982.49	1982.49	1162.90	0.72	-0.72	0.00	PROJECTED TO BIT

3.9 DRILL BIT SUMMARY

Table 6 details the drill bit summary. The 8-3/4-in. hole from 4,160 to 8,588 ft MD was drilled with 20 insert bits and 1 natural diamond sidetracking bit. The insert type bits in the angle build and tangent section of the 8-3/4-in. hole were equipped with heel buttons and stabilizer lugs for gauge protection.

The 6-in. hole from 8,588 to 9,407 ft TMD, through the second build and in the Cozzette horizontal section, was drilled with 7 insert type bits and two natural diamond bits.

Table 6 Drill Bit Summary

BIT NO.	SIZE	MAKE	TYPE	JETS-32ND 1	2	3	4	DEPTH OUT	FEET	HOURS	FT/HR	DULL COND T	B	G
1	8-3/4	SMITH	AO1	O	O	O		4162.00	127.00	2.75	46.18	2	2	I
2	8-3/4	ESTMN	D411ST	14	14	14		4254.00	92.00	31.25	2.90	1	1	I
3	8-3/4	SMITH	F3HL	13	13	13		4504.00	250.00	23.25	10.80	6	6	4/16
4	8-3/4	HUGHES	ATJ33L	12	12	12		4994.00	490.00	78.75	6.20	3	4	1/16
5	8-3/4	HUGHES	ATJ22	12	12	12		5612.00	618.00	81.00	7.60	4	4	1/16
6	8-3/4	SMITH	F3HL	12	12	12		6215.00	603.00	80.50	7.50	2	2	1/16
7	8-3/4	HUGHES	ATJ22	12	12	12		6550.00	335.00	43.50	7.70	2	2	1/16
8	8-3/4	SMITH	F3HL	11	11	12		6857.00	307.00	32.50	9.40	2	2	1/16
9	8-3/4	SMITH	F3HL	11	11	12		7180.00	323.00	51.50	6.30	3	4	1/16
10	8-3/4	SMITH	F3HL	11	11	12		7309.00	129.00	23.25	5.50	2	2	1/16
11	8-3/4	HUGHES	ATJ22	11	11	12		7309.00	0.00	PB to Redrill 1st Build				
11R1	8-3/4	HUGHES	ATJ22	11	11	12		7309.00	0.00					
11R2	8-3/4	HUGHES	ATJ22	11	11	12		7309.00	0.00			2	2	I
1R1	8-3/4	SMITH	AO1	O	O	O		6475.00	25.00	Begin to Redrill 1st Build				
12	8-3/4	HUGHES	ATJ22	11	12	12		6535.00	60.00	20.25	3.00			
12R1	8-3/4	HUGHES	ATJ22	12	12	12		6535.00	0.00	0.00	0.00	2	2	I
14	8-3/4	HUGHES	ATJ22	12	12	12		6642.00	107.00	15.50	6.90	2	2	I
15	8-3/4	SMITH	F2L	12	12	12		6821.00	179.00	29.75	6.00	2	2	I
16	8-3/4	SMITH	F2L	12	12	12		6978.00	157.00	32.00	4.90	4	4	1/16
17	8-3/4	SMITH	F2L	12	12	12		7233.00	255.00	39.00	6.50	2	2	1/16
18	8-3/4	HUGHES	ATJ22	12	12	12		7358.00	125.00	18.25	6.80	2	2	I
19	8-3/4	HUGHES	ATJ22	13	14	14		7358.00	0.00					
19R1	8-3/4	HUGHES	ATJ22	13	14	14		7566.00	208.00	30.75	6.80	-	-	1/8
20	8-3/4	SMITH	F3HL	13	14	14		8088.00	522.00	73.25	7.10	3	3	I
21	8-3/4	SMITH	F3HL	14	14	14		8422.00	334.00	85.00	3.90	6	6	1/8
22	8-3/4	HUGHES	ATJ33L	14	14	15		8588.00	166.00	32.75	5.10			
23	6	HUGHES	J3	O	O	O		8588.00	0.00	Run & Cement 7-in. Casing				
24	6	SMITH	F3	20	20	20		8660.00	72.00	17.00	4.20	2	2	1/16
25	6	SMITH	F3	24	24	24		8717.00	57.00	19.00	3.00	8	6	1/16
26	6	SMITH	F37	24	24	24		8717.00	0.00					
26R1	6	SMITH	F37	24	24	24		8812.00	95.00	21.00	4.50	2	2	I
27	6	SMITH	F37	24	24	24		8918.00	106.00	24.75	4.30			
28	6	SMITH	F5	24	24	24		8952.00	34.00	8.25	4.10	2	2	1/16
29	6	SMITH	F37	24	24	24		9006.00	54.00	13.25	4.10	4	4	1/16
30	6	ESTMN	D331EB	14	14	14		9119.00	113.00	26.25	4.30			
30R1	6	ESTMN	D331EB	14	14	14		9235.00	116.00	28.00	4.10			
30R2	6	ESTMN	D331EB	14	14	14		9289.00	54.00	16.25	3.30	4	2	I
31	6	SMITH	F37	24	24	24		9308.00	19.00	7.50	2.50			
32	6	HUGHES	J3	O	O	O		9308.00	0.00	Cleanout Hole after BO				
33	6	ESTMN	D331EB	14	14	14		9407.00	99.00	22.75	4.35	GREEN		

4.0 References and Relevant Publications

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Appendix 1

DAILY DRILLING REPORTS

APPENDIX 1

Daily Drilling Reports - 6 a.m. to 6 a.m.

Pipe recovery operations were initiated using a well service unit and casing jacks on April 26, 1991 and were terminated May 6, 1991 following recovery of 4,100 ft of 7-in., 29 lb/ft, N80 casing. At this depth, it became evident that we would have to washover approximately 140 ft of tightly held 7-in. casing below the 9-5/8-in. intermediate casing shoe at 4,130 ft to provide a 100 ft open hole section from which to sidetrack the 8-3/4-in. hole. It was believed that washover operations could be performed more efficiently with the drilling rig. Consequently, the service unit was moved off the hole and the drilling rig, Veco 10, was moved in and rigged up. Rig up operations were completed and the sidetrack hole was spudded at 12:00 Noon, May 12, 1991.

May 12, 1991, (1), Depth 4,100 ft: Footage Last 24 Hrs: 0 ft

Finished RURT. Mixed 500 BBLS mud and started to nipple up the 13-5/8-in. Class IV BOP's on the 9-5/8-in. intermediate casing. Veco 10 went on dayrate at 12:00 Noon May 13, 1991. Mud Properties: wt 8.5, vis 37, solids 2.0%, wl 20.0, gels 4/6, PV 12, YP 6, pH 9.0, oil 0%.

May 13, 1991, (2), Depth 4,100 ft: Footage Last 24 Hrs: 0 ft

Finished nippling up BOP's. Rigged up lay down machine. TIH with pilot mill, nine 6-1/4-in. drill collars and 5-in. 19.5 lb/ft drillpipe to the top of the 7-in. casing at 4,100 ft. Broke circulation and milled the 7-in. casing from 4,100 to 4,102 ft. Circulated the hole 30 min and POOH with mill. Mud Properties: wt 8.4, vis 36, solids 1.5%, wl 10.0, gels 3/4, PV 12, YP 6, pH 9.5, oil 0%.

May 14, 1991, (3), Depth 4,100 ft: Footage Last 24 Hrs: 0 ft

POOH with pilot mill. Picked up 8-5/8-in. washover shoe, five joints 8-5/8-in. wash pipe, bumper sub, and jars, TIH and tagged 7-in. casing stub at 4,102 ft. Washed over the 7-in. casing from 4,102 to 4,239 ft. (The washover results confirmed the stuck pipe log that showed the 7-in. casing tight from 4,180 to 4,215 ft.) Circulated the well and POOH with the wash pipe. Stood wash pipe back in derrick, tripped in hole with a casing spear and set the spear at 4,106 ft. Picked up to 225,000 lb, but pipe would not come free. Pipe apparently isn't completely cut at 4,240 ft. Mud Properties: wt 8.7, vis 38, solids 2.0%, wl 11.6, gels 2/4, PV 10, YP 5, pH 9.0, oil 0%.

May 15, 1991, (4), Depth 4,100 ft: Footage Last 24 Hrs: 0 ft

TIH with free point tool and set tool at 4,235 ft. Casing free at 4,235 ft. Unset spear, POOH with spear, and TIH with Dialog's chemical cutter, and cut 7-in. casing at 4,237 ft, three ft above the original cut at 4,240 ft. POOH with chemical cutter, TIH with spear and set spear at 4,110 ft. POOH with spear but no casing. TIH with spear and set spear at 4,120 ft, picked up 240,000 lbs and casing came free. POOH with spear and 7-in. casing, recovering 136.29 ft of 7-in., 29 lb/ft, N80 casing (two joints plus two cut offs). The total casing recovery was 4,207.46 ft of 7-in., 29 lb/ft N80 casing. TIH with 35 joints of 2-7/8-in., 6.5 lb/ft N80 tubing on 128 joints of 5-in., 19.5 lb/ft drillpipe to 5,095 ft, 858 ft inside the 7-in. casing stub in preparation for setting a cement plug. Mud Properties: wt 8.6, vis 41, solids 2%, wl 11.6, gels 3/5, PV 10, YP 5, pH 8.5, oil 0%.

May 16, 1991, (5), Depth 4,060 ft: Footage Last 24 Hrs: 0 ft

Circulated through the 2-7/8-in. tubing and 5-in. drillpipe. Cemented from 5,087 to 4,237 ft with 145 sx (178 cu ft) of Class G cement. POOH with drillpipe, circulated hole at 4,237 ft. Cemented second plug from 4,237 to 4,019 ft with 88 sx (101 cu ft) of Class G cement with 2% CaCl2. POOH to 4,019 ft and circulated hole clean. POOH with 2-7/8-in. tubing. Laid down 26 joints and dropped 9 joints in the hole. TIH with 8-3/4-in. bit and tagged the tubing at 3,774 ft (the bottom at 4,061 ft). POOH, picked up 5-3/4-in. overshot with 3-21/32-in. grapple, RIH and worked over the fish. POOH and recovered all 9 joints of 2-7/8-in. tubing. Laid down fishing tools. Mud Properties: wt 8.7, vis 42, wl 12, solids 2%, gels 3/5, PV 10, YP 5, pH 8.5, oil 0%.

May 17, 1991, (6), Depth 4,060 ft: Footage Last 24 Hrs: 0 ft

Finished laying down fishing tools, nippled down BOP's, changed out drilling spool adapter, pressure tested BOP's to 300 psig and 5,000 psig. Changed out 4-in., 5,000 psig manifold valve. The following bottomhole assembly, BHA 1, was run in the hole to drill off the cement plug to the sidetrack depth of 4,160 ft.

Bottomhole Assembly
(May 17, 1991)

Item	Description	OD	Length	Total
1.	Bit 1, AO1	8-3/4	0.70	0.70
2.	Bit Sub	6-1/4	2.53	3.23
3.	DC	6-1/2	31.25	34.48
4.	DC	6-11/16	31.06	65.54
5.	DC	6-1/2	31.19	96.73
6.	DC	6-11/16	29.89	126.62
7.	DC	6-1/8	29.83	156.45
8.	DC	6-1/2	31.24	187.69
9.	DC	6-1/4	29.52	217.21
10.	DC	6-7/16	31.24	248.45
11.	DC	6-3/16	30.05	278.50
12.	XO	6-1/4	2.07	280.57

BHA Effective Weight: 28,541 lbs

Mud Properties: wt 8.8, vis 40, wl 18.4, solids 2%, gels 12/16, PV 10, YP 12, pH 12, oil 0%.

May 18, 1991, (7), Depth 4,174 ft: Footage Last 24 Hrs: 12 ft

Finished TIH, tagged cement at 4,035 ft and drilled 127 ft of cement to 4,162 ft. Circulated the well clean and POOH and laid down mill toothed bit. BHA 2 consisting of an 8-3/4-in. Eastman Christensen D411ST sidetrack bit, a Mach III motor with a 2 degree bent sub, and eleven 6-1/4-in. x 2-1/4-in. drill collars is presented below.

Sidetrack Bottomhole Assembly
(May 18, 1991)

Item	Description	OD	Length	Total
1.	Bit 2, D411ST	8-3/4	1.00	1.00
2.	Mach III Motor	6-3/4	21.78	22.78
3.	2° Bent Sub	6-1/2	1.3	24.10
4.	Bit Sub	6-1/4	2.53	26.63
5.	Monel DC	6-13/16	30.84	57.47
6.	Monel DC	6-11/16	31.02	88.49
7.	DC	6-1/2	31.25	119.74
8.	DC	6-11/16	31.06	150.80
9.	DC	6-1/2	31.19	181.99
10.	DC	6-11/16	29.89	211.88
11.	DC	6-1/8	29.83	241.71
12.	DC	6-1/2	31.24	272.95
13.	DC	6-1/4	29.52	302.47
14.	DC	6-11/16	31.24	333.71
15.	DC	6-3/16	30.05	363.76
16.	XO	6-1/4	2.07	365.83

BHA Effective Weight: 28,541 lbs

This bottomhole assembly was run in the hole to the sidetrack point at 4,162 ft to start the actual sidetrack operation. Drilled from 4,162 to 4,174 ft circulating up formation cuttings at 4,174 ft. At 4,174 ft, the sidetrack hole should be 3 ft from the old wellbore considering the 5°/100 ft build rate resulting from the use of a 2 degree bent sub. Directional Data: md 4,100 ft, hole angle 0.95 °, azimuth N61,57°E, tvd 4,099.37 ft. Mud Properties: wt 8.7, vis 36, solids 3%, wl 10.6, gels 4/7, PV 6, YP 6, pH 10.5, oil 0%.

May 19, 1991, (8), Depth 4,248 ft: Footage Last 24 Hrs: 74 ft

Sidetrack drilling at 4,248 ft. Directional Data: md 4,180 ft, hole angle 2.05°, azimuth N75.9°E, tvd 4,179.34 ft. Mud Properties: wt 8.7, vis 49, solids 3%, wl 10.4, gels 10/17, PV 10, YP 18, pH 10.5, oil 0%.

May 20, 1991, (9), Depth 4,355 ft: Footage Last 24 Hrs: 107 ft

POOH and laid down the D411ST sidetrack bit and the 2° bent sub at 4,254 ft. BHA 3, bit 3 (an 8-3/4-in. F3HL insert bit), and a 1.5° bent sub were run in the hole to 4,254 ft to build hole angle to 15° and azimuth to N100°E. This bottomhole assembly is presented below.

Angle Build Assembly
(May 20, 1991)

Item	Description	OD	Length	Total
1.	Bit 3, F3HL	8-3/4	1.00	1.00
2.	Mach III Motor	6-3/4	21.78	22.78
3.	1.5° Bent Sub	6-7/16	1.15	23.93
4.	Bit Sub	6-1/4	2.53	26.46
5.	Monel DC	6-13/16	30.84	57.30
6.	Monel DC	6-11/16	31.02	88.32
7.	9 DC's	6-1/4	275.27	363.59
8.	XO	6-1/4	2.07	365.66

BHA Effective Weight: 28,500 lbs

PU D.O.T. tool and oriented the tool face to the high side. Resumed drilling sidetrack and building hole angle. Directional Data: md 4,212 ft, hole angle 3.98°, azimuth N84°E, tvd 4,211.30 ft; md 4,269 ft, hole angle 6.73°, azimuth N96.8°E, tvd 4,268.04 ft. Mud Properties: wt 8.8, vis 54, solids 3.5%, wl 9.4, gels 10/20, PV 12, YP 20, pH 10, oil 0%.

May 21, 1991, (10), Depth 4,504 ft: Footage Last 24 Hrs: 149 ft

POOH to lay down steering tools at 4,504 ft. Directional Data: md 4,322 ft, hole angle 8.6°, azimuth N102°E, tvd 4,320.57 ft; md 4,384 ft, hole angle 10.5°, azimuth N93°E, tvd 4,381.70 ft; md 4,444 ft, hole angle 12.9°, azimuth N90°E, tvd 4,440.45 ft. Mud Properties: wt 9.0, vis 47, solids 4.5%, wl 9.4, gels 4/15, PV 16, YP 12, pH 10.0, oil 0%.

May 22, 1991, (11), Depth 4,566 ft: Footage Last 24 Hrs: 62 ft

Lay down and release steering tools. The following bottomhole assembly, BHA 4, was run in the hole to rotary drill from 4,504 ft to the first KOP at 6,650 ft.

Angle Hold Assembly
(May 22, 1991)

Item	Description	OD	Length	Total
1.	Bit 4 ATJ33L	8-3/4	1.00	1.00
2.	Bit Sub	8-3/4	4.60	5.60
3.	Monel SDC	6-3/4	9.61	5.27
4.	Monel DC	6-13/16	30.84	46.11
5.	IBS	8-3/4	5.71	51.82
6.	DC	6-1/2	31.25	83.07
7.	IBS	8-3/4	4.72	87.79
8.	DC	6-11/16	31.06	118.85
9.	DC	6-1/2	31.19	150.04
10.	DC	6-11/16	29.89	179.93
11.	DC	6-1/8	29.83	209.76
12.	DC	6-1/2	31.24	241.00
13.	DC	6-1/4	29.52	270.52
14.	DC	6-7/16	31.24	301.76
15.	DC	6-3/16	30.05	331.81
16.	DC	6-3/16	30.74	362.55
17.	DC	6-1/16	29.78	392.33
18.	DC	6-1/2	31.24	423.57
19.	XO	6-1/4	2.07	425.64

BHA Effective Weight: 30,000 lbs.

Directional Data: md 4,504 ft, hole angle 12°, azimuth N102°E, tvd 4,499.04 ft. Mud Properties: wt 9.6, vis 46, solids 8%, wl 8.6, gels 4/10, PV 8, YP 14, pH 10.0, oil 0%.

May 23, 1991, (12), Depth 4,708 ft: Footage Last 24 Hrs: 142 ft

Drilling at 4,708 ft. Directional Data: md 4,566 ft, hole angle 12°, azimuth N103°E, tvd 4,559.68 ft; md 4,629 ft, hole angle 11.75°, azimuth N103°E, tvd 4,621.33 ft. Mud Properties: wt 9.5, vis 51, solids 8%, wl 8.4, gels 4/10, PV 8, YP 10, pH 10.0, oil 0%.

May 24, 1991, (13), Depth 4,840 ft: Footage Last 24 Hrs: 132 ft

Drilling at 4,840 ft. Directional Data: md 4,721 ft, hole angle 11.75°, azimuth N103°E, tvd 4,711.41 ft; md 4,814 ft, hole angle 11.75°, azimuth N103°E, tvd 4,802.42 ft. Mud Properties: wt 9.4, vis 52, solids 7%, wl 8.4, gels 5/15, PV 12, YP 16, pH 9.5, oil 0%.

May 25, 1991, (14), Depth 4,986 ft: Footage Last 24 Hrs: 146 ft

Drilling at 4,986 ft. Directional Data: md 4,905 ft, hole angle 11.75°, azimuth N103°E, tvd 4,981.55 ft. Mud Properties: wt 9.5, vis 48, solids 8%, wl 8, gels 4/12, PV 9, YP 12, pH 9.5, oil 0%.

May 26, 1991, (15), Depth 5,092 ft: Footage Last 24 Hrs: 106 ft

Drilled to 4,994 ft and POOH to change BHA and bit. The following bottomhole assembly, BHA 5, and bit 5 were run in the hole to build angle to 15° and to drill to the first KOP projected at 6,650 ft.

Angle Build Assembly
(May 26, 1991)

Item	Description	OD	Length	Total
1.	Bit 5, ATJ22	8-3/4	1.00	1.00
2.	NB IBS	8-3/4	3.89	4.89
3.	NM Short DC	6-3/4	9.67	14.56
4.	3 Pt Reamer	8-5/8	5.59	20.15
5.	Monel DC	6-13/16	30.84	50.99
6.	IBS	8-5/16	4.96	55.95
7.	DC	6-1/2	31.25	87.20
8.	IBS	8-3/4	4.72	91.92
9.	11 DC's	6-1/2	335.78	427.70
10.	XO	6-1/4	2.07	429.77

BHA Effective Weight: 33,000 lbs.

Directional Data: md 4,967 ft, hole angle 11.5°, azimuth N103°E, tvd 4,952.28 ft. Mud Properties: wt 9.4, vis 58, solids 8%, wl 8, gels 8/17, PV 20, YP 24, pH 10.0, oil 0%.

May 27, 1991, (16), Depth 5,265 ft: Footage Last 24 Hrs: 173 ft

Drilling at 5,265 ft. Directional Data: md 5,049 ft, hole angle 11.5°, azimuth N103°E, tvd 5,032.64 ft; md 5,113 ft, hole angle 11.5°, azimuth N103°E, tvd 5,095 35 ft; md 5,175 ft, hole angle 11.5°, azimuth N103°E, tvd 5,156.11 ft. Mud Properties: wt 9.5, vis 53, solids 8%, wl 8.2, gels 4/12, PV 15, YP 10, pH 9.5, oil 0%.

May 28, 1991, (17), Depth 5,424 ft: Footage Last 24 Hrs: 159 ft

Drilling at 5,424 ft. Directional Data: md 5,270 ft, hole angle 11.75°, azimuth N104°E, tvd 5,249.16 ft; md 5,362 ft, hole angle 11.75°+, azimuth N104°E, tvd 5,339.23. Mud Properties: wt 9.7, vis 55, solids 10%, wl 6.8, gels 6/10, PV 10, YP 12, pH 10.0, oil 2%.

May 29, 1991, (18), Depth 5,600 ft: Footage Last 24 Hrs: 176 ft

Drilling at 5,600 ft. Directional Data: md 5,457 ft, hole angle 12°, azimuth N105°E, tvd 5,432.20 ft; md 5,551 ft, hole angle 12°, azimuth N107°E, tvd 5,524.14 ft. Mud Properties: wt 9.6, vis 46, solids 10%, wl 6.6, gels 4/10, PV 9, YP 9, pH 9.5, oil 2%.

May 30, 1991, (19), Depth 5,702 ft: Footage Last 24 Hrs: 102 ft

Drilled to 5,612 ft, circulated the hole, POOH, laid down BHA 5. Picked up BHA 6 with bit 6 and 18 joints of 5-in., 49.3 lb/ft HWDP. TIH, washed and reamed 40 ft to bottom. Drilling break at 5,641 ft with gas increasing from 8 units to 1,050 units. Put well through the gas buster. Drilling through the gas buster with 900 units gas and a 10 to 15 ft flare. Increasing mud weight

to 10 ppg. The following bottomhole assembly, BHA 6, and bit 6 were run in the hole to build angle and drill to the first KOP projected at 6,650 ft.

Angle Build Assembly
(May 30, 1991)

Item	Description	OD	Length	Total
1.	Bit 6, F3HL	8-3/4	1.00	1.00
2.	NB IBS	8-3/4	3.91	4.91
3.	Monel DC	6-13/16	30.84	35.75
4.	Monel DC	6-11/16	31.02	66.77
5.	IBS	8-3/4	5.71	72.48
6.	DC	6-1/4	31.25	103.73
7.	IBS	8-3/4	4.72	108.45
8.	11 DC's	6-1/4	335.78	444.23
9.	XO	6-1/4	2.07	446.30
10.	HWDP (18 JTS)	5	535.21	981.51

BHA Effective Weight: 34,500 lbs

Directional Data: none. Mud Properties: wt 9.7, vis 46, solids 10%, wl 6.6, gels 4/10, PV 10, YP 10, pH 9.5, oil 4%.

May 31, 1991, (20), Depth 5,894 ft: Footage Last 24 Hrs: 192 ft

Drilling at 5,894 ft. Directional Data: md 5,678 ft, hole angle 12.25°, azimuth N108°E, tvd 5,648.31; md 5,771 ft, hole angle 12.75°, azimuth N109°E, tvd 5,739.10 ft. Mud Properties: wt 10, vis 48, solids 11%, wl 6.8, gels 2/10, PV 14, YP 8, pH 9.5, oil 6%.

June 1, 1991, (21), Depth: 6,071 ft Footage Last 24 Hrs: 177 ft

Drilling at 6,071 ft. Directional Data: md 5,865 ft, hole angle 13.5°, azimuth N109°E, tvd 5,830.65 ft; md 5,959 ft, hole angle 14.5°, azimuth N109°E, tvd 5,921.86 ft. Mud Properties: wt 10.0, vis 50, solids 10%, wl 6.6, gels 4/8, PV 10, YP 12, pH 9.5, oil 6%.

June 2, 1991, (22), Depth: 6,200 ft Footage Last 24 Hrs: 129 ft

Drilling at 6,200 ft. Directional Data: md 6,051 ft, hole angle 15.5°, azimuth N109°E, tvd 6,010.72 ft; md 6,145 ft, hole angle 16.25°, azimuth N110°E, tvd 6,101.13 ft. Mud Properties: wt 10.1, vis 52, solids 10%, wl 7.2, gels 8/16, PV 10, YP 15, pH 9.5, oil 8%.

June 3, 1991, (23), Depth: 6,280 ft; Footage Last 24 Hrs: 80 ft

Drilling at 6,280 ft. Drilled to 6,215 ft and POOH for bit change. RIH with bid 6, a Hughes ATJ22. The following bottomhole assembly, BHA No. 7, was run in the hole at 6,215 ft.

Angle Hold Assembly
(June 3, 1991)

Item	Description	OD	Length	Total
1.	Bit 6, ATJ22	8-3/4	1.00	1.00
2.	Roller Reamer	8-3/4	6.39	7.39
3.	Short NMDC	6-3/4	9.67	17.06
4.	IBS	8-3/4	5.71	22.77
5.	Monel DC	6-13/16	30.84	53.61
6.	IBS	8-5/16	4.96	58.57
7.	DC	6-1/4	31.25	89.82
8.	IBS	8-3/4	4.72	94.54
9.	11 DC's	6-1/4	335.78	430.32
10.	XO	6-1/4	2.07	432.39
11.	HWDP (18 JTS)	5	535.21	967.60

BHA Effective Weight: lbs.

Directional Data: None. Mud Properties: wt 10.1, vis 52, solids 10%, wl 6.8, gels 6/10, PV 10, YP 12, pH 9.5, oil 7%.

June 4, 1991, (24), Depth: 6,470 ft; Footage Last 24 Hrs: 190 ft

Drilling at 6,470 ft. Drilled 20-3/4 hrs, weld on gas buster flow line. Directional Data: md 6,270 ft, hole angle 16.75°, azimuth N107°E, tvd 6,220.99 ft; md 6,361 ft, hole angle 16.25°, azimuth N108°E, tvd 6,308.24 ft. Mud Properties: wt 10.2, vis 47, solids 11%, wl 7, gels 3/6, PV 6, YP 8, pH 9.5, oil 6%.

June 5, 1991, (25), Depth: 6,550 ft; Footage Last 24 Hrs: 80 ft

Drilling at 6,550 ft. POOH at 6,550 ft, the first KOP, for BHA change. RU lay down machine. Laid down 44 joints of 5-in. drillpipe and 12 drill collars. Picked up 1,200 ft of HWDP. The following bottomhole assembly, BHA 8, was run in the hole with bit 8 to build hole angle and turn the hole azimuth left.

Angle Build Assembly
(June 5, 1991)

Item	Description	OD	Length	Total
1.	Bit 8, F3HL	8-3/4	1.00	1.00
2.	Mach I, AKO Motor	6-3/4	21.57	22.57
3.	Float Sub	6-3/4	2.00	24.57
4.	IBS	8-5/16	4.96	29.53
5.	Short NMDC	6-3/4	9.67	39.20
6.	NM XO	6-11/16	1.05	40.25
7.	MWD	6-3/4	17.98	58.23
8.	NM XO	6-3/4	1.87	60.10
9.	Monel DC	6-13/16	30.84	90.94
10.	XO	6-1/4	2.07	93.01
11.	HWDP (5 JTS)	5	149.79	242.80
12.	Drilling Jars	6-1/4	30.13	272.93
13.	HWDP (66 JTS)	5	1,980.70	2,253.63

BHA Effective Weight: 86,900 lbs

Directional Data: md 6,485 ft, hole angle 15.75°, azimuth N109°E, tvd 6,427.43 ft. Mud Properties: wt 10.2, vis 51, solids 11%, wl 8, gels 4/10, PV 12, YP 13, pH 9.5, oil 6%.

June 6, 1991, (26), Depth: 6,720 ft; Footage Last 24 Hrs: 170 ft

Drilling at 6,720 ft. Finished TIH, picking up 5-in. HWDP, RD lay down machine. TIH to 4,560 ft and conducted a successful test of the Accu-Trac MWD tool. Finished running in hole, oriented tool and initiated hole kickoff at 6,550 ft. Direction data: md 6,523 ft, hole angle 15.4°, azimuth N114.1°E, tvd 6,464.04 ft; md 6,554 ft, hole angle 15.8°, azimuth N112.3°E, tvd 6,493.90 ft; md 6,585 ft, hole angle 17.7°, azimuth N106.2°E, tvd 6,523.58 ft; md 6,616 ft, hole angle 21.2°, azimuth N100.7°E, tvd 6,552.81 ft; md 6,648 ft, hole angle 24.7°, azimuth N95.5°E, tvd 6,582.27 ft. Mud Properties: wt 10.1, vis 47, solids 11%, wl 8, gels 4/10, PV 8, YP 12, pH 9.5, oil 6%.

June 7, 1991, (27), Depth: 6,857 ft; Footage Last 24 Hrs: 137 ft

Drilled to 6,857 ft. Circulated hole and pumped pill at 6,857 ft prior to POOH with MWD to make a hole reaming run. Directional Data: md 6,678 ft, hole angle 28.5°, azimuth N91.0°E, tvd 6,609.09 ft; md 6,708 ft, hole angle 32.5°, azimuth N86.8°E, tvd 6,634.93 ft; md 6,739 ft, hole angle 35.9°, azimuth N82.6°E, tvd 6,660.57 ft; md 6,772 ft, hole angle 38.6°, azimuth N78.0°E, tvd 6,686.83 ft; md 6,803 ft, hole angle 41.2°, azimuth N72.8°E, tvd 6,710.61 ft. Mud Properties: wt 10.2, vis 53, solids 11%, wl 8, gels 5/12, PV 11, YP 12, pH 9.5, oil 5%.

June 8, 1991, (28), Depth: 6,857 ft; Footage Last 24 Hrs: 0 ft

POOH with MWD and Mach I AKO motor. Stand tools back in the derrick. RIH with 8-3/4-in. bullnosed opener. Washed and reamed from 6,550 to 6,570 ft. Circulated gas out of hole. Washed and reamed from 6,570 to 6,857 ft. Washed and reamed 387 ft total. Circulated and conditioned mud, ran check survey, POOH and laid down the hole opened. The following bottomhole assembly, BHA 9, was run in the hole with a bullnosed reamer to ream the first build interval from 6,550 to 6,857 ft.

Reamer Assembly
(June 9, 1991)

Item	Description	OD	Length	Total
1.	Bullnose Reamer	4-3/4	1.47	1.47
2.	Fixed Hole Opener	8-3/4	4.00	5.47
3.	Bit Sub	6-1/4	2.54	8.01
4.	Knobby Monel DC	6-5/8	29.60	37.61
5.	XO	6-3/4	2.07	39.68
6.	HWDP (5 JTS)	5	149.79	189.47
7.	Drilling Jars (Dotco)	6-1/4	30.13	219.60
8.	HWDP (66 JTS)	5	1,980.70	2,200.30

Directional Data: None. Mud Properties: wt 10.1, vis 51, solids 10%, wl 6.6, gel 6/14, PV 10, YP 17, pH 9.5, oil 8%.

June 9, 1991, (29), Depth: 6,972 ft; Footage Last 24 Hrs: 115 ft

The following bottomhole assembly, BHA 10, was run in the hole at 6,857 ft to complete the first build and turn the hole azimuth to N9.5°E.

Angle Build Assembly
(June 9, 1991)

Item	Description	OD	Length	Total
1.	Bit 9, F3HL	8-3/4	1.00	1.00
2.	Mach I AKO Motor	6-3/4	21.57	22.57
3.	Float Sub	6-3/4	2.00	24.57
4.	IBS	8-1/2	4.00	28.57
5.	Short NMDC	6-3/4	9.67	38.24
6.	NM XO	6-11/16	1.05	39.29
7.	MWD	6-3/4	17.98	57.27
8.	NM XO	6-3/4	1.87	59.14
9.	Knobby Monel	6-5/8	29.60	88.74
10.	XO	6-1/4	2.07	90.81
11.	HWDP (5 JTS)	5	149.79	240.60
12.	Drilling Jars	6-1/4	30.13	270.73
13.	HWDP (66 JTS)	5	1,980.70	2,251.43

BHA Effective Weight: 86,900 lbs

Directional Data: md 6,833 ft, hole angle 44.3°, azimuth N67.6°E, tvd 6,732.64 ft; md 6,864 ft, hole angle 46.4°, azimuth N63.8°E, tvd 6,754.43 ft; md 6,894 ft, hole angle 47.6°, azimuth N59.3°E. Mud Properties: wt 10.3, vis 54, solids 12%, wl 6.8, gels 6/18, PV 10, YP 20, pH 9.5, oil 8%.

June 10, 1991, (30), Depth: 7,101 ft; Footage Last 24 Hrs: 129 ft

Drilling at 7,101 ft at report time. Directional Data: md 6,924 ft, hole angle 49.0°, azimuth N55.3°E, tvd 6,794.84 ft; md 6,956 ft, hole angle 50.1°, azimuth N51.6°E, tvd 6,815.60 ft; md 6,987 ft, hole angle 50.9°, azimuth N47.9°E, tvd 6,835.32 ft, md 7,018 ft, hole angle 51.6°,

azimuth N43.3°E, tvd 6,854.72 ft, md 7,049 ft, hole angle 52.5°, azimuth N39.1°E, tvd 6,873.79 ft. Mud Properties: wt 10.3, vis 53, solids 12%, wl 6.8, gels 10/18, PV 20, YP 22, pH 9.5, oil 6.5%.

June 11, 1991, (31), Depth: 7,180 ft; Footage Last 24 Hrs: 79 ft

Working tight spot at 7,100 ft at report time. Drilled 14 hours and then POOH for bit change. RIH with bit 10, a Smith F3HL, and encountered a bridge at 7,100 ft. Bridge is, in effect, a ledge on which the lead stabilizer on the motor was hanging up. Directional Data: md 7,081 ft, hole angle 53°, azimuth N35°E, tvd 6,893.16 ft; md 7,112 ft, hole angle 52.8°, azimuth N31°E, tvd 6,911.64 ft. Mud Properties: wt 10.3, vis 56, solids 12%, wl 6.6, gels 10/24, PV 13, YP 24, pH 9.5, oil 6%.

June 12, 1991, (32), Depth: 7,180 ft; Footage Last 24 Hrs: 0 ft

Washing and reaming at 7,100 ft at report time. Washed and reamed directional assembly to 7,167 ft. Had trouble getting to bottom. (Acted like the bit was turning on the directional assembly). POOH, tight right on bottom. Laid down 11 joints drillpipe. Checked mud, OK. Checked dump valve on the Mach 1 motor and found the dump valve was washed out. Stood directional assembly back in the derrick. Picked up 8-3/4-in. fixed hole opener, TIH to 6,835 ft, circulated out gas, and washed and reamed to 7,100 ft. The following bottomhole assembly, BHA 11, was run to wash and ream the first build to 7,180 ft.

Hole Reaming Assembly
(June 12, 1991)

Item	Description	OD	Length	Total
1.	Bull Nose	4-3/4	1.4	1.47
2.	Fixed Hole Opener	8-3/4	4.00	5.47
3.	Bit Sub	6-1/4	2.54	8.01
4.	XO	6-3/4	2.07	10.08
5.	HWDP (6 JTS)	5	180.22	190.30
6.	Drilling Jars (DOTCO)	6-1/4	30.13	220.43
7.	HWDP (65 JTS)	5	1,950.27	2,170.70

BHA Effective Weight: 86,000 lbs.

Directional Data: None. Mud Properties: wt 10.4, vis 49, solids 14%, wl 6.6, gels 10/16, PV 12, YP 18, pH 9.5, oil 6%.

June 13, 1991, (33), Depth: 7,258 ft; Footage Last 24 Hrs: 78 ft

Drilling at 7,258 ft at report time. Finished washing and reaming to bottom. Circulate hole, POOH, and lay down hole opener. Picked up bit 10,a Smith F3HL, BHA and RIH to 4,580 ft, tested MWD, and continued on to 7,180 ft. The following bottomhole assembly, BHA 12, was run to turn hole to left and drill to the EOC at 7,308 ft.

Angle Build Assembly
(June 12, 1991)

Item	Description	OD	Length	Total
1.	Bit 10, Smith F3HL	8-3/4	1.00	1.00
2.	Mach I AKO Motor(7°/100 ft)	6-3/4	21.57	22.57
3.	Float Sub	6-3/4	2.00	24.57
4.	IBS	8-3/4	4.00	28.57
5.	Short Monel DC	6-3/4	9.67	38.24
6.	Monel XO	6-11/16	1.05	39.29
7.	MWD	6-3/4	17.98	57.27
8.	Monel XO	6-3/4	1.87	59.14
9.	Knobby Monel	6-5/8	29.60	88.74
10.	XO	6-1/4	2.07	90.81
11.	HWDP (6 JTS)	5	180.22	271.03
12.	Drilling Jars (DOTCO)	6-1/4	30.13	301.16
13.	HWDP (65 JTS)	5	1,950.27	2,251.43

BHA Effective Weight: 86,000 lbs

Directional Data: md 7,144 ft, hole angle 54.5°, azimuth N26.8°E, tvd 6,930.38 ft; md 7,175 ft, hole angle 55.4°, azimuth N22.5°E, tvd 6,948.18 ft; md 7,206 ft, hole angle 55.9°, azimuth N18.9°E, tvd 6,965.68 ft. Mud Properties: wt 10.4, vis 58, solids 14%, wl 7.8, gels 12/20, PV 13, YP 22, pH 9.5, oil 6%.

June 14, 1991, (34), Depth: 7,309 ft; Footage Last 24 Hrs: 51 ft

Drilled with mud motor to the EOC at 7,309 ft. Circulated well, POOH and laid down BHA 12. The following bottomhole assembly, BHA 13, was picked up and TIH to drill the tangent.

Angle Hold Assembly
(June 14, 1991)

Item	Description	OD	Length	Total
1.	Bit 11, Hughes ATJ22	8-3/4	1.00	1.00
2.	NB IBS	8-3/4	4.12	5.12
3.	Short Monel DC	6-3/4	9.67	14.79
4.	NM IBS	8-1/2	5.61	20.40
5.	NM XO	6-11/16	1.05	21.45
6.	MWD	6-3/4	17.98	39.43
7.	NM XO	6-3/4	1.87	41.30
8.	Knobby Monel	6-5/8	29.60	70.90
9.	IBS	8-1/2	4.00	74.90
10.	XO	6-1/4	2.07	76.97
11.	HWDP (6 JTS)	5	180.22	257.19
12.	Drilling Jars (DOTCO)	6-1/4	30.13	287.32
13.	HWDP (65 JTS)	5	1,950.27	2,237.50

BHA Effective Weight: 86,000 lbs

TIH to 6,708 ft Worked on getting through dogleg with kelly. Circulated hole POOH with BHA 13. Directional Data: md 7,237 ft, hole angle 56°, azimuth N15.2°E, tvd 6,983.04 ft; md 7,257 ft, hole angle 56°, azimuth N13.3°E, tvd 6,994.22 ft. Mud Properties: wt 10.2, vis 46, solids 12%, wl 7.6, gels 8/16, PV 12, YP 20, pH 9.5, oil 6%.

June 15, 1991, (35), Depth: 7,309 ft; Footage Last 24 Hrs: 0 ft

Laying down fish at report time. Finished POOH with BHA 13. Lost 8-3/4-in. bit, and a near bit stabilizer. Length of fish 5.12 ft. Estimated top of fish at 6,708 ft. Picked up 8-1/8-in. x 7-in. overshot with bumper sub and jars. TIH, wash over fish, POOH with fish, no fish recovered. Overshot full of shale. Cleaned out overshot and TIH. Washed from 6,712 to 6,785 ft washed over fish. POOH slowly and recovered fish. Directional Data: None. Mud Properties: wt 11.1, vis 56, solids 17%, wl 7.9, gels 10/18, PV 14, YP 18, pH 9.5, oil 5%.

June 16, 1991, (36), Depth: 7,309 ft; Footage Last 24 Hrs: 0 ft.

Trip out of hole from 6,825 ft at report time. The following bottomhole assembly, BHA 14, was run to ream the high side of the first build prior to drilling the tangent hole.

Reaming Assembly
(June 16, 1991)

Item	Description	OD	Length	Total
2.	Bit Sub	6-1/4	2.53	3.53
3.	XO	6-1/4	2.07	5.60
4.	HWDP (1 JT)	5	30.18	35.78
5.	HWDP (1 JT)	5	29.49	65.27
6.	String Mill	6-1/2	4.54	69.81
7.	HWDP (6 JTS)	5	180.22	250.03
8.	Drilling Jars (DOTCO)	6-1/4	30.13	280.16
9.	HWDP (63 JTS)	5	1,890.60	2,170.76

BHA Effective Weight: 86,000 lbs

Started washing and reaming from 6,637 to 6,835 ft. Washed and reamed from 6,805 to 6,835 ft twice without problem. The third time tagged up at 6,815 ft. Washed and reamed from 6,815 to 6,825 ft very slow. At 6,825 ft, the bit would not ream or drill. The string would just set and spin with 8k to 15 k WOB. Directional Data: None. Mud Properties: wt 11.1, vis 51, solids 14%, wl 7.6, gels 8/14, PV 14, YP 16, pH 9.5, oil 5%.

June 17, 1991, (37), Depth: 7,309 ft; Footage Last 24 Hrs: 0 ft.

POOH with BHA 14. The following bottomhole assembly, BHA 15, was run to find and track the old hole to 7,309 ft MD.

Cleanout Bottomhole Assembly
(June 17, 1991)

Item	Description	OD	Length	Total
1.	Bit 11, Hughes ATJ22	8-3/4	1.00	1.00
2.	Mach I AKO Motor	6-3/4	21.57	22.57
3.	Float Sub	6-3/4	2.00	24.57
4.	IBS	8-1/2	4.00	28.57
5.	Short Monel DC	6-3/4	9.40	37.97
6.	NMXO	6-11/16	1.05	39.02
7.	MWD	6-3/4	17.98	57.00
8.	NMXO	6-1/4	1.87	58.87
9.	Knobby Monel DC	6-5/8	29.60	88.47
10.	XO	6-1/4	2.07	90.54
11.	HWDP (8 JTS)	5	239.89	330.43
12.	Drilling Jars (DOTCO)	6-1/4	30.13	360.56
13.	HWDP (63 JTS)	5	1,890.60	2,251.16

BHA Effective Weight: 86,000 lbs

The hole was washed and reamed with the mud motor from 6,820 to 6,823 ft. At this point, the bit fell 8 to 6,831 ft. The hole washed tight from 6,833 to 6,839 ft with cavings coming in on the bit. The mud weight was increased to 11.8 PPG and alleviated the caving. The bit will slide into the old hole with 25k WOB and no pump pressure on the Mach I motor. At 6,845 ft the bit acted like it was drilling new hole. Drilled possible new hole from 6,845 to 6,857 ft. Just prior to midnight on June 17th, the decision was made to pull the BHA and prepare to set a cement plug to sidetrack the hole. Directional Data: None. Mud Properties: wt 11.7, vis 56, solids 15%, wl 7.4, gels 18/26, PV 20, YP 24, pH 9.5, oil 6%.

June 18, 1991, (37) Depth: 6,450 ft; Footage Last 24 Hrs: 0 ft.

Finished pulling BHA. TIH with drillpipe open ended. Picked up drillpipe off rack, and ran in hole open ended to 6,856 ft Circulated well, rigged up Halliburton, pumped 28 BBLS water and 180 cu ft (32 BBLS) Class H cement with 0.3% CFR-2, followed by 10 BBLS water and 101 BBLS mud. Circulate well clean, pump pill, and POOH with open ended drill pipe. The following bottomhole assembly, BHA 16, was run in the hole to circulate out contaminated mud and dress off the top of the cement plug prior to attempting the second kickoff at 6,485 ft.

Cleanout Assembly
(June 19, 1991)

Item	Description	OD	Length	Total
1.	Bit RR1, AO1	8-3/4	1.00	1.00
2.	NB Roller Reamer	8-3/4	4.60	5.60
3.	Monel DC	6-13/16	30.84	36.44
4.	NM IBS	8-3/4	5.71	42.15
5.	Knobby Monel DC	6-5/8	29.60	71.75
6.	NM IBS	8-3/4	4.72	76.47
7.	XO	6-1/4	2.07	78.54
8.	HWDP (71 JTS)	5	2,130.49	2,209.03

BHA Effective Weight: 86,000 lbs

Directional Data: None. Mud Properties: wt 11.9, vis 54, solids 18%, wl 7.6, gels 15/24, PV 20, YP 24, pH 9.5, oil 8%.

June 19, 1991, (39), Depth: 6,450 ft; Footage Last 24 Hrs: 0 ft.

Tripped in hole slowly to 6,558 ft. Circulated out 12 BBLS cement and worked bit down hole, circulating out green cement all the way to 6,580 ft. POOH with BHA 16. TIH with open ended 5-in. drillpipe to 6,580 ft. Cemented with Dowell using 55 cu ft (9.6 BBLS) - 48 sx Class G cement. Pumped 9.6 BBLS cement followed by 10 BBLS water and 102 BBLS mud. POOH to 6,335 ft (estimated cement top at 6,450 ft), and circulated the well clean. POOH with open ended drillpipe. TIH to 4,036 ft with BHA 16. Circulating well while WOC. Directional Data: None. Mud Properties: wt 11.5, vis 47, solids 14%, wl 8.8, gels 3/6, PV 10, YP 8, pH 10.0, oil 8%.

June 20, 1991, (40), Depth: 6,475 ft; Footage Last 24 Hrs: 25 ft.

Tripping in hole at 4,580 ft at report time. Tripped in hole to the top of the cement plug at 6,450 ft and circulated out cement contaminated mud at 6,450 ft. Circulated out 15 ft of green cement to 6,464 ft with no rotation. WOC until 6:00 pm. Set 40k on cement top at 6,464 ft with full pump pressure. Drilled cement down to 6,475 ft at 1 ft/min. Pumped pill, POOH, and laid down BHA 16, the cleanout bottomhole assembly. The following bottomhole assembly, BHA 17, was run in the hole to the top of the cement plug at 6,475 ft sidetrack the hole and build angle.

Sidetrack Bottomhole Assembly
(June 20, 1991)

Item	Description	OD	Length	Total
1.	Bit 12, Hughes ATJ22	8-3/4	1.00	1.00
2.	Mach I AKO Motor	6-3/4	21.54	22.54
3.	Float Sub	6-3/4	2.00	24.54
4.	IBS	8-1/2	4.00	28.54
5.	Short NMDC	6-3/4	9.40	37.94
6.	NMXO	6-11/16	1.05	38.99
7.	MWD	6-11/16	17.98	56.97
8.	NMXO	6-3/4	1.87	58.84
9.	Knobby Monel DC	6-5/8	29.60	88.44
10.	XO	6-1/4	2.07	90.51
11.	HWDP (6 JTS)	5	180.22	270.73
12.	Drilling Jars (DOTCO)	6-1/8	31.50	302.23
13.	HWDP (65 JTS)	5	1,950.27	2,252.50

BHA Effective Weight: 86,000 lbs

Directional Data: None. Mud Properties: wt 12, vis 51, solids 14%, wl 8, gels 6/14, PV 18, YP 12, pH 10.0, oil 6%.

June 21, 1991, (41), Depth: 6,535 ft; Footage Last 24 Hrs: 60 ft.

Finished tripping in hole with BHA 17, o ienting the tool, and time drilled from 6,475 to 6,520 ft to initiate the sidetrack. Drilled from 6,475 to 6,520 ft at 2 to 3 min/ft. Drilled from 6,493 to 6,520 ft with 15k to 22k WOB. At 4:30 a.m., the MWD tool would not pulse up surveys. The MWD surface computer package was changed out but the problem persisted. Pumped pill and started to POOH at 6 a.m. June 22, 1991. Directional Data: None. Mud Properties: wt 11.8, vis 48, solids 14%, wl 8, gels 6/10, PV 12, YP 16, pH 10.0, oil 6%.

June 22, 1991, (42), Depth: 6,535 ft; Footage Last 24 Hrs: 0 ft.

Finished POOH with steering tools. Changed out to the backup MWD and tested it at the surface. It would not work either. Called out the retrievable MWD from Casper, Wyoming. Worked on repairing MWD from 9 a.m. to 4 p.m. At 3 p.m., tripped in hole open ended with drillpipe and circulated at 2,100 ft while waiting on retrievable tool from Casper. In the mean time, Eastman found the problem with their tool. POOH with drillpipe. The following bottomhole assembly, BHA 18, was run in the well to change build rate and drill the remainder of the first build.

Angle Build Assembly
(June 22, 1991)

Item	Description	OD	Length	Total
1.	Bit 12, Hughes ATJ22	8-3/4	1.00	1.00
2.	Mach I AKO Motor	6-3/4	21.54	22.54
3.	Float Sub	6-3/4	2.00	24.54
4.	IBS	8-1/2	4.00	28.54
5.	Short NMDC	6-3/4	9.40	37.94
6.	NMXO	6-11/16	1.05	38.99
7.	MWD	6-3/4	19.04	58.03
8.	NMXO	6-3/4	1.87	5 .90
9.	Knobby Monel DC	5	29.60	89.50
10.	XO	6-1/4	2.07	91.57
11.	HWDP (6 JTS)	5	180.22	271.79
12.	Drilling Jars (DOTCO)	6-1/8	31.50	303.29
13.	HWDP (65 JTS)	5	1,950.27	2,253.56

BHA Effective Weight: 86,000 lbs

Tripped in the hole to 4,630 ft and successfully shallow tested the newly repaired MWD. Tripped in hole and tagged a bridge at 4,633 ft. Washed and reamed to 4,674 ft where a second shale bridge was encountered. POOH with BHA 18. Picked up bit and stabilizer and tripped in hole to wash and ream hole to the top of the first build at 6,475 ft. Directional Data: None. Mud Properties: wt 11.3, vis 47, solids 12%, wl 8.6, gels 3/7, PV 14, YP 10, pH 10, oil 5%.

June 23, 1991, (43), Depth: 6,535 ft; Footage Last 24 Hrs: 0 ft.

The last 360 ft the shale was swelling and moving. Brought the pH to 9.5 and the mud weight to 12.3 ppg. Washed and reamed from 4,993 to 6028 ft one connection at a time. (Unable to trip in hole with stands). At 6,028 ft TIH to 6,364 ft. Washed and reamed from 6,364 to 6,496 ft. Directional Data: None. Mud Properties: wt 12, vis 54, solids 14%, wl 7.6, gels 8/14, PV 14, YP 16, pH 10, oil 6%.

June 24, 1991, (44), Depth 6,575 ft; Footage Last 24 Hrs: 40 ft

Washed and reamed from 6,496 to 6,527 ft, circulated hole, conditioned mud, pumped pill and POOH. Laid down BHA 19, and picked up BHA 20. TIH and tagged ledge at 5,660 ft. Washed and reamed off ledge and circulated down to 5,675 ft. TIH to 6,502 ft, oriented tool, and washed down to 6,535 ft. The following bottomhole assembly, BHA 20, was run to 6,535 ft to drill the first build. The setting on the AKO motor was set at 0.9° to minimize the tendency of the hole to dog leg and to drill the first build.

Angle Build Assembly
(June 23, 1991)

Item	Description	OD	Length	Total
1.	Bit 14, Hughes ATJ22	8-3/4	1.00	1.00
2.	Mach 1 AKO Motor	6-3/4	21.54	22.54
3.	Float Sub	6-3/4	2.00	24.54
4.	IBS	8-1/2	4.00	28.54
5.	Short NMDC	6-3/4	9.40	37.94
6.	NMXO	6-11/16	1.05	38.99
7.	MWD#2	6-11/16	19.04	58.03
8.	NMXO	6-3/4	1.87	59.90
9.	Knobby Monel	5	29.60	89.50
10.	XO	6-1/4	2.07	91.57
11.	HWDP (6 JTS)	5	180.22	271.79
12.	Drilling Jars (DOTCO)	6-1/8	31.50	303.29
13.	HWDP (65 JTS)	5	1950.27	2253.56

BHA Effective Weight: 86,000 lbs

A survey at 6,524 ft indicated the hole angle to be 16.3° and the hole azimuth to be N110°E. This calculates to be a 1.58°/100 ft dogleg severity. The AKO setting of 0.9° is too low. Circulate hole, pump pill, and POOH to change AKO setting to 1.3° at report time. Directional Data: md 6,524 ft, hole angle 16.3°, azimuth N110°E, tvd 6,464.92 ft. Mud Properties: wt 12.5, vis 54, solids 15%, wl 7.2, gels 7/15, PV 14, YP 18, pH 9.5, oil 7%.

June 25, 2991, (45), Depth 6,642 ft; Footage Last 24 Hrs: 67 ft.

Drilling at 6,642 ft at report time. The following bottomhole assembly, BHA 21, was run in the hole to 6,575 ft to kick well off with new AKO setting of 1.3°.

Angle Build Assembly
(June 25, 1991)

Item	Description	OD	Length	Total
1.	Bit 15, Smith F2L	8-3/4	1.00	1.00
2.	Mach I AKO Motor	6-3/4	21.54	22.54
3.	Float Sub	6-3/4	2.00	24.54
4.	IBS	8-1/2	4.00	28.54
5.	Short NMDC	6-3/4	9.40	37.94
6.	NMXO	6-11/16	1.05	38.99
7.	MWD #2	6-11/16	19.04	58.03
8.	NMXO	6-3/4	1.87	59.90
9.	Knobby Monel DC	5	29.60	89.50
10.	XO	6-1/4	2.07	91.57
11.	HWDP (6 JTS)	5	180.22	271.79
12.	Drilling jars (DOTCO)	6-1/8	31.50	303.29
13.	HWDP (65 JTS)	5	1950.77	2254.06

BHA Effective Weight: 86,000 lbs

TIH with 1.3° setting on AKO motor. Shallow tested the MWD successfully at 4,675 ft. Drilled to 6,606 ft and ran survey. POOH and reset AKO setting to 1.1° to decrease build rate and avoid drilling into old wellbore. Ran back in the hole with BHA 22. (BHA 22 was the same as BHA 21 with the exception that the AKO setting was reduced to 1.1). Shallow tested the MWD successfully at 4,700 ft. TIH to 6,565 ft (start of AKO 1.3° setting hole) and washed and reamed to bottom. Directional Data: md 6,555 ft, hole angle 16.7°, azimuth N107.3°E, tvd 6,494.64 ft; md 6,586 ft, hole angle 17.4°, azimuth N102°E, tvd 6,524.28 ft. Mud Properties: wt 12.4, vis 58, solids 15%, wl 6.6, gels 8/20, PV 10, YP 20, pH 9.0, oil 8%.

June 26, 1991, (46), Depth 6,782 ft; Footage Last 24 Hrs: 140 ft.

Drilling with steering tools at 6,782 ft at report time. Directional Data: md 6,616 ft, hole angle 18.3°, azimuth N94.4°E, tvd 6,652.83 ft; md 6,648 ft, hole angle 19.7°, azimuth N87.7°E, tvd 6,583.09 ft; md 6,679 ft, hole angle 21.2°, azimuth N83.5°E, tvd 6,612.14 ft; md 6,708 ft, hole angle 22.5°, azimuth N80.1°E, tvd 6,639.05 ft. Mud Properties: wt 12.5, vis 61, solids 15%, wl 6.2, gels 8/15, PV 12, YP 18, pH 9.0, oil 8%.

June 27, 1991, (47), Depth 6,840 ft; Footage Last 24 Hrs: 58 ft.

Drilling with steering tools at 6,840 ft at report time. POOH at 6,821 ft with BHA 22. The AKO setting of 1.1° was not building fast enough. Changed out Mach I AKO Motor, set AKO to 1.3°, and installed new dump valve and battery in MWD tool. TIH with BHA 23 to 4,600 ft and successfully shallow tested the MWD tool. Washed and reamed 30 ft to bottom at 6,821 ft. (BHA 23 was the same as BHA 22 with the exception that the AKO setting was increased to 1.3° to increase the build and turn rate). Lithology is 20% sandstone, 80% shale. Directional Data: md 6,739 ft, hole angle 23.5°, azimuth N77.2°E, tvd 6,667.95 ft; md 6,770 ft, hole angle 24.3°, azimuth N73.9°E, tvd 6,695.93 ft. Mud Properties: wt 12.4, vis 61, solids 16%, wl 6.2, gels 12/26, PV 16, YP 19, pH 9.5, oil 8%.

June 28, 1991, (48), Depth 6,964 ft; Footage Last 24 Hrs: 124 ft

Drilling with steering tools at 6,964 ft at report time. Directional Data: md 6,802 ft, hole angle 25.3°, azimuth N70.3°E, tvd 6,724.98 ft; md 6,833 ft, hole angle 26.4°, azimuth N66.5°E, tvd 6,752.88 ft; md 6,864 ft, hole angle 28.1°, azimuth N61.7°E, tvd 6,780.43 ft; md 6,896 ft, hole angle 29.9°, azimuth N52.7°E, tvd 6,808.42 ft. Mud Properties: wt 12.5, vis 52, solids 15%, wl 6.4, gels 10/20, PV 14, YP 16, pH 9.5, oil 8%.

June 29, 1991, (49), Depth 7,048 ft; Footage Last 24 Hrs: 84 ft.

Drilling with steering tools at 7,048 ft at report time. Pumped pill and POOH with BHA 23 at 6,987 ft to change AKO setting from 1.3° to 1.15° and changed out bit 16. (The bottomhole assembly was building angle too fast). Picked up bit 17, TIH with BHA 24 to 4,600 ft and successfully tested the MWD. (BHA 24 is the same as BHA 23 with the exception that the AKO setting is 1.15°). Turned the tool face to 180° and washed and reamed the last 30 ft to bottom. Directional Data: md 6,927 ft, hole angle 32.4°, azimuth N53.2°E, tvd 6,834.95 ft; md 6,958 ft, hole angle 35.1°, azimuth N49.8°E, tvd 6,860.72 ft; md 6,989 ft, hole angle 37.2°, azimuth N46.4°E, tvd 6,885.75 ft. Mud Properties: wt 12.5, vis 54, solids 15%, wl 6, gels 8/20, PV 14, YP 18, pH 9.5, oil 7%.

June 30, 1991, (50), Depth 7,196 ft; Footage Last 24 Hrs: 148 ft.

Drilling with steering tools at 7,196 ft at report time. Lithology: 50% sandstone, 40% shale, 10% coal. Gas show at 7,112 ft of 1,160u. Directional Data: md 7,020 ft, hole angle 38.9°, azimuth N40.6°E, tvd 6,910.16 ft; md 7,052 ft, hole angle 40.6°, azimuth N40.6°E, tvd 6,934.77 ft; md 7,083 ft, hole angle 42.3°, azimuth N37.4°E, tvd 6,957.99 ft; md 7,114 ft, hole angle 43.4°, azimuth N34.6°E, tvd 6,980.73 ft; md 7,145 ft, hole angle 44.8°, azimuth N31.8°E, tvd 7,002.99 ft. Mud Properties: wt 12.5, vis 57, solids 15%, wl 6, gels 8/16, PV 12, YP 18, pH 9, oil 8%.

July 1, 1991, (51), Depth 7,261 ft; Footage Last 24 Hrs: 65 ft.

Drilling with steering tools at 7,261 ft at report time. Lithology 80% shale, 10% sandstone, 10% coal. Drilled to 7,233 ft and POOH to change out bit 17. Bit 18, a Hughes ATJ22, was run in the hole on BHA 25. BHA 25 is presented below:

Angle Build Assembly
(July 1, 1991)

Item	Description	OD	Length	Total
1.	Bit 18, Hughes ATJ22	8-3/4	1.00	1.00
2.	Mach 1 AKO Motor	6-3/4	21.54	22.54
3.	Float Sub	6-3/4	2.00	24.54
4.	IBS	8-1/2	4.00	28.54
5.	Short NMDC	6-3/4	9.40	37.94
6.	NMXO	6-11/16	1.05	38.99
7.	MWD #2	6-11/16	19.04	58.03
8.	NMXO	6-3/4	1.87	59.90
9.	Knobby Monel	5	29.60	89.50
10.	XO	6-1/4	2.07	91.57
11.	HWDP (6 JTS)	5	180.22	271.79
12.	Drilling Jars (DOTCO)	6-1/8	31.50	303.29
13.	HWDP (65 JTS)	5	1950.27	2253.56

BHA Effective Weight: 86,000 lbs

Changed out the dump valve in the MWD tool. TIH and successfully tested the MWD at 4,600 ft, and continued on to bottom. Washed last 30 ft to bottom and continue drilling the remainder of the first build. Directional Data: md 7,177 ft, hole angle 46.4°, azimuth N29.3°E, tvd 7,025.38 ft; md 7,208 ft, hole angle 48.1°, azimuth N26.5°E, tvd 7,046.42 ft. Mud Properties: wt 12.5, vis 61, solids 15%, wl 6, gels 12/22, PV 16, YP 22, pH 9.0, oil 8%.

July 2, 1991, (52), Depth 7,358 ft; Footage Last 24 Hrs: 97 ft.

Circulating and conditioning mud at 7,358 ft at report time. Brought mud weight from 12.5 ppg to 13.2 ppg to stabilize coals that were sloughing into the hole. Some chunks of coal were as large as a baseball and were from the same interval that was pressure cored (7,371 ft md, 7,090 ft tvd) in 1990. Cleaned hole up. Unable to circulate at 320 gpm at greater than 3,000 psi standpipe pressure. POOH with and laid down the Mach I AKO motor (AKO 1.15°). The bit was plugged with pieces of the stator from the mud motor. Laid down bit 18 due to a loose cone (running at 240 rpm). Picked up bit 19, a Hughes ATJ22L, a Mach I AKO motor (AKO 0.5°) and TIH to 4,600 ft to shallow test the MWD. Lithology at 7,340 to 7,350 ft is 50% shale,

50% coal. Directional Data: md 7,240 ft, hole angle 49.9° azimuth N23.5°, tvd 7,067.41 ft; md 7,271 ft, hole angle 51.3° azimuth N21.0°, tvd 7,087.09 ft. Mud Properties: wt 12.5, vis 60, solids 15%, wl 6, gels 10/14, PV 14, YP 18, pH 9.5, oil 8%.

July 3, 1991, (53), Depth 7,440 ft; Footage Last 24 Hrs: 82 ft.

Drilling with steering tools at 7,440 ft at report time. TIH to 4,600 ft to test MWD tool. Tool would not send pulse to surface. POOH, laid down MWD 2, picked up MWD 3, RIH to 4,600 ft and successfully shallow tested MWD. Tripped in hole to 7,280 ft and washed and reamed 78 to 7,358 ft. Lithology 70% sandstone, 20% shale, and 10% coal at 7,420 to 7,430 ft. The following bottomhole assembly, BHA 23, was run in the hole at 7,358 ft to complete the first build and begin drilling the tangent.

Angle Build Assembly
(July 3, 1991)

Item	Description	OD	Length	Total
1.	Bit 19, Hughes ATJ22L	8-3/4	1.00	1.00
2.	Mach I AKO Motor	6-3/4	21.55	22.55
3.	Float Sub	6-3/4	2.00	24.55
4.	IBS	8-1/2	4.00	28.55
5.	Short NMDC	6-3/4	9.40	37.95
6.	NMXO	6-11/16	1.05	39.00
7.	MWD#3	6-11/16	17.56	56.56
8.	NMXO	6-3/4	1.87	58.43
9.	Knobby Monel DC	5	29.60	88.03
10.	XO	6-1/4	2.07	90.10
11.	HWDP (6 JTS)	5	180.22	270.32
12.	Drilling Jars (DOTCO)	6-1/8	31.50	301.82
13.	HWDP (65 JTS)	5	1950.27	2252.09

BHA Effective Weight: 86,000 lbs

Directional Data: md 7,302 ft, hole angle 52.9°, azimuth N17.7°E, tvd 7,106 13 ft; md 7,332 ft, hole angle 55.3°, azimuth N16.1°E, tvd 7,123.72 ft; md 7,363 ft, hole angle 57.1°, azimuth N14.6°E, tvd 7,140.96 ft. Mud Properties: wt 13.2, vis 54, solids 18%, wl 6.6, gels 10/22, PV 15, YP 20, pH 9.5, oil 7%.

July 4, 1991, (54), Depth 7,566 ft; Footage Last 24 Hrs: 126 ft.

POOH at 1,600 ft to change out bit 19, and BHA 23. Rotary drilled from 7,476 to 7,508 ft with 0.5° AKO setting. Rotary torque 5,000 ft-lbf. Drag up: 26k; Drag down: 20k, string weight in air: 165,000 lb, torque: 3 rounds. Drilled and slid bottomhole assembly from 7,508 to 7,566 ft. Pumped pill at 7,566 ft in preparation to starting out of hole. Lithology at 7,550 to 7,560 ft: 60% coal, 30% shale, 10% sandstone. Background gas 700u, trip gas 1,040u. Directional Data: md 7,394 ft, hole angle 58°, azimuth N13.2°E, tvd 7,157.60 ft; md 7,425 ft, hole angle 58.1°, azimuth N12.2°E, tvd 7,174.00 ft; md 7,457 ft, hole angle 58.0°, azimuth N10.9°E, tvd 7,190.94 ft; md 7,488 ft, hole angle 57.8°, azimuth N10.1°E, tvd 7,204.41 ft. Mud Properties: wt 13.4, vis 53, solids 18%, wl 6.2, gels 12/18, PV 12, YP 16, pH 9.5, oil 6%.

July 5, 1991, (55), Depth 7,616 ft; Footage Last 24 Hrs: 50 ft.

Rotary drilling at 7,616 ft at report time. POOH at 7,566 ft and laid down the Mach 1 AKO motor and change out bit 19. (Bit 19, a Hughes ATJ22L, had two loose cones after drilling at 290 rpm below a Mach 1 motor for 31.75 hrs). Bit 20, a Smith F3HL was run on the following bottomhole assembly, BHA 27, to drill the tangent and build angle.

Build Slightly Angle Build Assembly
(July 5, 1991)

Item	Description	OD	Length	Total
1.	Bit 20, Smith F3HL	8-3/4	1.00	1.00
2.	NB Roller Reamer	8-3/4	6.39	7.39
3.	NMXO	6-11/16	1.05	8.44
4.	MWD#3	6-11/16	17.56	26.00
5.	NMXO	6-3/4	1.87	27.87
6.	Short NMDC	6-3/4	9.40	37.27
7.	NMIBS	8-3/4	5.42	42.69
8.	Knobby DC	5	29.60	72.29
9.	XO	6-1/4	2.07	74.36
10.	HWDP (6 JTS)	5	180.22	254.58
11.	Drilling Jars (DOTCO)	6-1/8	31.50	286.08
12.	HWDP (65 JTS)	5	1950.27	2236.35

BHA Effective Weight: 86,000 lbs

Circulated out gas that had migrated to the surface. Tripped in hole with the rotary assembly above and tagged up at 7,268 ft. Circulated high viscosity mud out of hole. Washed without rotating from 7,268 to 7,524 ft (256 ft). Reamed out of gauge hole from 7,524 to 7,566 ft (42 ft). At 7,616 ft, rotary torque 4,000 to 6,000 ft-lbf (3-1/4 rounds); Drag up: 35k, Drag down: 25k; Lithology: 80% shale, 10% sandstone, 10% coal; Background gas 220u. Directional Data: md 7,564 ft, hole angle 57.3°, azimuth N9.7°E, tvd 7,248.19 ft; md 7,595 ft, hole angle 57.3°, azimuth N9.5°E, tvd 7,264.94 ft. Mud Properties: wt 13.9, vis 64, solids 22%, wl 6.2, gels 14/20, PV 34, YP 22, pH 9.5, oil 6%.

July 6, 1991, (56), Depth 7,754 ft; Footage Last 24 Hrs: 138 ft.

Rotary drilling at 7,754 ft at report time. Drilled 138 ft in 22.5 hrs at an average penetration rate of 6.14 ft/hr. Lithology: 80% shale, 20% sandstone. Coal #4 at 7,644 to 7,656 ft measured depth. String weight: 165,000 lbs; Drag up: 30k; Drag down 35k; Torque: 7,000 ft-lbf (3-1/4 rounds). Directional Data: md 7,626 ft, hole angle 57.2°, azimuth N9.7°E, tvd 7,281.71 ft; md 7,658 ft, hole angle 57.3°, azimuth N9.8°E, tvd 7,299.02 ft; md 7,689 ft, hole angle 57.0°, azimuth N9.9°E, tvd 7,315.83 ft; md 7,720 ft, hole angle 57.1°, azimuth N10.1°E, tvd 7,332.69 ft. Mud Properties: wt 14.2, vis 50, solids 25%, wl 6.4, gels 8/20, PV 12, YP 14, pH 9.0, oil 8%.

July 7, 1991, (57), Depth 7,920 ft; Footage Last 24 Hrs: 166 ft.

Rotary drilling at 7,920 ft at report time. Drilled 166 ft in 22.75 hrs at an average penetration rate of 7.30 ft/hr. Lithology : Coal #3 at 7,775 to 7,788 ft md. Coal #2 at 7,910 ft. Projected Rollins top at 8,110 ft md. Directional Data: md 7,752 ft, hole angle 57.1°, azimuth N9.8°E, tvd 7,350.08 ft; md 7,783 ft, hole angle 56.9°, azimuth N9.8°E, tvd 7,366.95 ft; md 7,815 ft, hole

angle 57.2°, azimuth N10.0°E, tvd 7,384.36 ft; md 7,846 ft, hole angle 57.2°, azimuth N10.0°E, tvd 7,401.16 ft; md 7,877 ft, hole angle 57.2°, azimuth N9.9°E, tvd 7,417.95 ft. Mud Properties: wt 14.2, vis 54, solids 26%, wl 6.4, gels 10/24, PV 12, YP 14, pH 9.5, oil 7%.

July 8, 1991, (58), Depth 8,088 ft; Footage Last 24 Hrs: 168 ft.

Short tripping to 6,450 ft prior to coming out of the hole for logs. Drilled 168 ft in 17.75 hours at an average penetration rate of 9.46 ft/hr. Lithology at 8,080 to 8,088 ft: 50% sandstone, 30% shale, 20% coal. Coal #2 at 7,910 to 7,930 ft md. Coal #1 at 8,024 to 8,045 ft md. String weight 166,000 lbs. Drag up: 200k to 225k. Drag down: 125k to 150k. Torque 3-1/4 rounds. Directional Data: md 7,910 ft, hole angle 56.9°, azimuth N9.9°E, tvd 7,435.90 ft; md 7,941 ft, hole angle 56.9°, azimuth N10.4°E, tvd 7,452.83 ft; md 7,973 ft, hole angle 56.9°, azimuth N10.2°E, tvd 7,470.30 ft; md 8,004 ft, hole angle 56.9°, azimuth N10.2°E, tvd 7,487.23 ft; md 8,035 ft, hole angle 56.8°, azimuth N10.4°E, tvd 7,504.18 ft; md 8,067 ft, hole angle 56.6°, azimuth N10.8°E, tvd 7,521.75 ft. Mud Properties: wt 14.2, vis 64, solids 26%, wl 6.4, gels 8/26, PV 20, YP 24, pH 9.5, oil 8%.

July 9, 1991, (59), Depth 8,088 ft; Footage Last 24 hrs: 0 ft.

Finished short trip. No fill. Circulated bottoms up, POOH for logs. Rigged up loggers and TIH for Phasor DIL log to 7,300 ft. Tool wouldn't slide in the hole. POOH with Phasor DIL. RIH with Phasor DIL, LDT/CNL with Gamma Ray and Caliper. The tool wouldn't go past 7,000 ft. Logged out of hole with the Phasor DIL only. The LDT tool was not functioning properly. TIH with the FMS to 4,300 ft. The tool was floating badly in the vertical hole due to the mud thickening with time due to heat and calcium contamination from carbonaceous shales. POOH with FMS and rigged down loggers. The decision was made to continue drilling and log the paludal Mesaverde at a later date through casing. The following bottomhole assembly, BHA 28, was run to build hole angle slowly and drill the remainder of the tangent section.

Slow Angle Build Assembly
(July 10, 1991)

Item	Description	OD	Length	Total
1.	Bit 21, Smith F3HL	8-3/4	1.00	1.00
2.	Near Bit Stabilizer	8-3/4	4.16	5.16
3.	NMXO	6-11/16	1.05	6.21
4.	MWD #3	6-11/16	17.56	23.77
5.	NMXO	6-3/4	1.87	25.64
6.	Monel DC	6-11/16	31.02	56.66
7.	NBIBS	8-3/4	5.42	62.08
8.	Short NMDC	6-3/4	9.40	71.48
9.	XO	6-1/4	2.07	73.55
10.	HWDP (6 JTS)	5	180.22	253.77
11.	Drilling Jars (DOTCO)	6-1/8	31.50	285.27
12.	HWDP (65 JTS)	5	1950.27	2235.54

BHA Effective Weight: 86,000 lbs

Directional Data: None. Mud Properties: wt 14, vis 66, solids 25%, wl 6.2, gels 12/20, PV 18, YP 18, pH 9.0, oil 8%.

July 10, 1991, (60), Depth 8,143 ft; Footage Last 24 Hrs: 55 ft.

Rotary drilling at 8,143 ft at report time. Circulated out high viscosity mud. TIH and tagged at 6,496 ft. Washed and reamed from 6,496 to 6,680 ft (184 ft). TIH from 6,680 to 7,152 ft. Washed and reamed from 7,152 to 7,496 ft (344 ft). TIH from 7,496 to 7,952 ft. Washed and reamed from 7,952 to 8,088 ft. The top of the Rollins formation was drilled at 8,120 ft with no fluid loss in the top 20 ft. Lithology at 8,120 ft: 80% sandstone, 10% shale, and 10% coal. Directional Data: md 8,098 ft, hole angle 56.9°, azimuth N10.5°E, tvd 7,538.75 ft; md 8,129 ft, hole angle 57.3°, azimuth N10.3°E, tvd 7,555.59 ft. Mud Properties: wt 13.6, vis 53, solids 25%, wl 7.6, gels 8/20, PV 14, YP 24, pH 9.0, oil 8%.

July 11, 1991, (61), Depth 8,245 ft; Footage Last 24 Hrs: 102 ft.

Rotary drilling at 8,245 ft at report time. Worked through tight section at 8,178 ft. Drilling through the gas buster. Lithology at 8,182 ft: 80% sandstone, 20% shale. Background gas 760u, connection gas 1,040u, peak gas 1,060u. String weight: 180,000 lbs. Drag up: 260k. Drag down: 125k. Directional Data: md 8,159 ft, hole angle 57.8°, azimuth N10.5°E, tvd 7,571.69 ft; md 8,189 ft, hole angle 58.4°, azimuth N10.2°E, tvd 7,587.54 ft; md 8,221 ft, hole angle 59.1°, azimuth N9.9°E, tvd 7,604.14 ft. Mud Properties: wt 13.6, vis 56, wl 6.0, solids 24%, gels 6/15, PV 12, YP 16, pH 9.0, oil 7%.

July 12, 1991, (62), Depth 8,318 ft; Footage Last 24 Hrs: 73 ft.

Rotary drilling in Mancos Shale at report time. The sample top for the Mancos Shale is 8,286 ft. Drilled 73 ft in 22.5 hrs for an average penetration rate of 3.24 ft/hr. Lithology: 100% shale. Background gas 120u. Connection gas 960u. Circulating temperature is 150°F. At 8,284 ft and a hole angle of 60.4°, the projected depth for the second KOP is 8,714 ft. Directional Data: md 8,252 ft, hole angle 59.8°, azimuth N9.7°E, tvd 7,619.90 ft; md 8,284 ft, hole angle 60.4°, azimuth N9.7°E, tvd 7,635.85 ft. Mud Properties: wt 13.9, vis 60, solids 25%, wl 6.0, gels 11/25, PV 12, YP 24, pH 9.0, oil 9%.

July 13, 1991, (63), Depth 8,405 ft; Footage Last 24 Hrs: 87 ft.

Rotary drilling in the Mancos Shale at 8,405 ft at report time. Drilled 87 ft in 23 hrs for an average penetration rate of 3.78 ft/hr. Lithology: 100% shale. Background gas 180u, Connection gas 960u. Worked all connections 3 to 4 times to clean up newly drilled interval. Directional Data: md 8,315 ft, hole angle 60.9°, azimuth N9.5°E, tvd 7,651.04 ft; md 8,347 ft, hole angle 61.6°, azimuth N9.2°E, tvd 7,666.43 ft; md 8,379 ft, hole angle 62.2°, azimuth N9.4°E, tvd 7,681.51 ft. Mud Properties: wt 14.1, vis 59, solids 27%, wl 6.4, gels 12/25, PV 18, YP 20, pH 9.0, oil 8%.

July 14, 1991, (64), Depth 8,422 ft; Footage Last 24 Hrs: 17 ft.

Jarring on fish at 7,356 ft at report time. Lost swivel packing while drilling at 8,422 ft. POOH to 8,137 ft tight. Installed new swivel packing while working drillpipe. Kelly up and circulated out singles to 7,972 ft working tight spots with bit at 7,972 ft and stabilizer at 7,910 ft. Came free and POOH to 7,356 ft (top stabilizer at 7,293 ft) where the BHA stuck fast. Working and jarring on drillpipe. Spotted 7 BBLS diesel on bottom with 2 BBLS outside, and displaced 0.39 BBLS every 15 minutes. Have full returns but cannot move up or down, and cannot rotate. (Caving from the first major coal encountered at 7,280 to 7,284 ft). Directional Data: None. Mud Properties: wt 14.2, vis 59, solids 27%, wl 6.4, gels 10/14, PV 16, YP 20, pH 9.0, oil 6%.

July 15, 1991, (65), Depth 8,422 ft; Footage Last 24 Hrs: 0 ft.

Circulating at reduced rate at 5,411 ft to circulate out thick mud. Worked stuck pipe after spotting diesel, but could not rotate or reciprocate. RU Dialog, ran free point and found IBS at 7,294 ft 100% stuck. Backed off with string shot at 7,283 ft. Circulated hole clean, POOH. The following items remain in the hole to be recovered.

Fish In Hole
(July 15, 1991)

Item	Description	OD	Length	Total
1.	Bit 21, Smith F3HL	8-3/4	1.00	1.00
2.	NBIBS	8-3/4	4.16	5.36
3.	NMXO	6-11/16	1.05	6.41
4.	MWD #3	6-11/16	17.56	23.77
5.	NMXO	6-3/4	1.87	25.64
6.	Monel DC	6-11/16	31.02	56.66
7.	NMIBS	8-3/4	5.42	62.08
8.	Short NMDC	6-3/4	9.40	71.48
9.	XO	6-1/4	2.07	73.55

TIH with fishing tools to the fish at 7,273 ft. Unable to circulate at 7,273 ft because of thick mud. POOH to 6,343 ft. Still unable to circulate without losing mud. POOH to 5,411 ft. Circulate at 84 gpm to displace thick mud from hole without losing mud downhole. Directional Data: None. Mud Properties: wt 14.6, vis 63, solids 26%, wl 6.4, gels 13/20, PV 23, YP 14, pH 9.0, oil 6%.

July 16, 1991, (66), Depth 8,422 ft; Footage Last 24 Hrs: 0 ft.

Magnafluxing HWDP at report time. POOH to 4,481 ft, broke circulation, and circulated out thick mud. TIH 15 stands to 6,811 ft and circulated out thick mud. TIH an additional 5 stands to 7,277 ft and circulated out thick mud. Screwed into fish at 7,283 ft, worked stuck pipe while circulating, jarred down two times and pipe came free. Washed and reamed from 7,290 to 7,331 ft. Pulled up to where IBS was at 7,283 ft and jarred IBS out of shale key seat at 7,283 ft. POOH to where NBIBS was at 7,283 ft and jarred it through the key seat area. Laid down 3 joints of drill pipe. Washed and reamed hole with drilling assembly from 7,254 to 7,390 ft. The coal at 7,257 ft along a suspected fault is the source of the caving materials that caused the stuck pipe. Circulated hole, POOH with fish to HWDP, Magnaflux HWDP. Directional Data: None. Mud Properties: wt 14.2, vis 49, solids 26%, wl 6.2, gels 4/12, PV 12, YP 15, pH 9.0, oil 5%.

July 17, 1991, (67), Depth 8,422 ft; Footage Last 24 Hrs: 0 ft.

Drilling at 8,422 ft at report time. Finished magnafluxing the HWDP and BHA. Laid down the fishing tools. Recovered all 73.55 ft of fish. PU BHA, new stabilizers. Laid down MWD #3 and picked up MWD #2. The following bottomhole assembly, BHA 30, was run in the hole to 8,422 ft to complete drilling the tangent interval.

Angle Hold Assembly
(July 18, 1991)

Item	Description	OD	Length	Total
1.	Bit 22, Hughes ATJ33L	8-3/4	1.00	1.00
2.	NBIBS	8-3/4	3.92	4.92
3.	NMXO	6-11/16	1.05	5.97
4.	MWD #2	6-11/16	19.04	25.01
5.	NMXO	6-3/4	1.87	26.88
6.	Monel DC	6-11/16	31.02	57.90
7.	NMIBS	8-3/4	5.62	63.52
8.	Short NMDC	6-3/4	9.40	72.92
9.	DC	6-1/16	29.78	102.70
10.	XO	6-1/2	2.46	105.16
11.	HWDP (6 JTS)	5	180.22	285.38
12.	Drilling Jars (DOTCO)	6-1/4	30.53	315.91
13.	HWDP (68 JTS)	5	2050.65	2366.56

BHA Effective Weight: 86,000 lbs

TIH to 4,100 ft, circulated hole and tripped on in to 6,370 ft. (Left drill pipe screen in drillpipe while circulating at 4,100 ft). POOH, recovered screen, TIH to 7,206 ft and circulated well clean. Washed and reamed from 7,206 to 7,435 ft. Back reamed from 7,283 to 7,270 ft through the key seat interval. TIH from 7,435 to 7,828 ft. Picked up drill pipe off the racks. Tagged ledge at 7,828 ft. Washed and reamed from 7,828 to 7,993 ft. TIH from 7,993 to 8,121 ft (Rollins @ 8,121 ft). Washed and reamed from 8,121 to 8,422 ft. Mud circulated from hole during washing and reaming operations was in good condition. No fluid loss was noted while tripping in the hole. Directional Data: None. Mud Properties: wt 14.2, vis 63, solids 27%, wl 6.2, gels 4/14, PV 30, YP 25, pH 9.0, oil 5%.

July 18, 1991, (68), Depth 8,525 ft; Footage Last 24 Hrs: 103 ft.

Rotary drilling at 8,525 ft in the Mancos Shale at report time. Drilled 103 ft in 22..5 hours at an average penetration rate of 4.58 ft/hr. Lithology at 8,525 ft is 100% shale. Background gas is 150u to 200u. Connection gas is 700u. Directional Data: md 8,414, hole angle 62.6°, azimuth N9.1°E, tvd 7,697.72 ft; md 8,445 ft, hole angle 62.4°, azimuth N9.2°E, tvd 7,712.04 ft; md 8,476 ft, hole angle 61.9°, azimuth N8.9°E, tvd 7,726.52 ft; md 8,508 ft, hole angle 61.4°, azimuth N9.5°E, tvd 7,741.71 ft. Mud Properties: wt 14.3, vis 54, solids 27%, wl 6.4, gels 5/14, PV 40, YP 20, pH 9.0, oil 5%.

July 19, 1991, (69), Depth 8,588 ft; Footage Last 24 Hrs: 63 ft.

Pulling out of hole with free point tool at report time. Worked tight connections from 8,588 to 8,818 ft. Survey at 8,570 ft indicated the hole angle was dropping. It was decided to lay down the angle hold assembly and pick up an angle build assembly and work our way gradually into the second build. While TOH, a tight spot was encountered at 8,122 ft at the top of the Rollins. With the bit at 7,705 ft and the top IBS at 7,645 ft, the drillpipe became stuck in a key seat in the shale above Coal #4. RU Dialog and TIH with free point tool. The drillpipe is free above the IBS at 7,645 ft. Lithology at 8,588 ft is 100% shale. Mancos Tongue at 8,484 ft. Background gas is 75u to 150 u. Directional Data: md 8,538 ft, hole angle 61.0°, azimuth N9.5°E, tvd 7,756.16 ft; md 8,570 ft, hole angle 60.4°, azimuth N9.7°E, tvd 7,771.82 ft. Mud Properties: wt 14.2, vis 60, solids 25%, wl 6.0, gels 4/12, PV 35, YP 20, pH 9.5, oil 8%.

July 20, 1991, (70), Depth 8,588 ft; Footage Last 24 Hrs: 0 ft.

Pulling out of hole with fish at report time. POOH with free point tool. TIH with string shot. Backed off at cross over sub above IBS. Top of fish at 7,602 ft; length of fish 102.70 ft; bottom of fish at 7,705 ft. Backed off and circulated well clean. POOH and picked up fishing tools. The following bottomhole assembly, BHA 31, was run to recover the fish at 7,705 ft.

Fishing Bottomhole Assembly
(July 20, 1991)

Item	Description	OD	Length	Total
1.	Screw-In Cut Lip Sub	6-1/2	1.64	1.64
2.	Bumper Sub	6	8.91	10.55
3.	Z-Jars (Down Striking)	6	6.83	17.38
4.	XO	6-1/8	1.00	18.38
5.	Steel DC	6-3/16	30.74	49.12
6.	XO	6-1/4	2.02	51.14
7.	HWDP (74 JTS)	5	2230.87	2282.01

BHA Effective Weight: 88,000 lbs

TIH to 4,100 ft and circulate well. TIH to 7,590 ft and circulate well. Screwed into fish at 7,602 ft. Circulate while jarring on fish. Jarred fish up 10 ft to 7,592 ft, bit at 7,695 ft. RU Dialog, ran free point, backed off drill collar below screw in sub. Top of fish at 7,622 ft; length of fish 72.92 ft; bottom of fish at 7,695 ft. Circulate and POOH. Directional Data: None. Mud Properties: wt 14.1, vis 54, solids 25%, wl 6.0, gels 4/10, PV 34, YP 16, pH 9.5, oil 8%.

July 21, 1991, (71), Depth 8,588 ft; Footage Last 24 Hrs: 0 ft.

Back reaming out of hole at 7,654 ft at report time. POOH with single drill collar. Top of fish at 7,622 ft. Laid down drill collar and bumper sub. Pick up new bumper sub and other fishing tools. TIH and circulate well at 7,595 ft. TIH and screw into fish at 7,629 ft. Jarred on fish for 55 minutes before fish came free. Washed and reamed from 7,702 to 7,774 ft. Reamed out area at 7,702 ft,with top stabilizer, where bottom IBS was located. Picked up and gained 8 ft, back reamed fish out of hole from 7,664 to 7,654 ft (10 ft). Directional Data: None. Mud Properties: wt 14.3, vis 50, solids 26%, wl 6.0, gels 4/8, PV 27, YP 18, pH 9.5, oil 8%.

July 22, 1991, (72), Depth 8,588 ft; Footage Last 24 Hrs: 0 ft.

Circulating for logs at 8,588 ft at report time. Back reamed fish out of hole to 7,650 ft. Fish came free after back reaming 14-1/2 ft. POOH, laid down fishing tools and fish. Recovered all of fish. The following bottomhole assembly, BHA 32, was run to 8,588 ft to clean out and condition the hole prior to running drill pipe conveyed logs.

Cleanout Bottomhole Assembly
(July 22, 1991)

Item	Description	OD	Length	Total
1.	Bit 22RR, Hughes ATJ33L	8-3/4	1.00	1.00
2.	Bit Sub	6-1/4	2.54	3.54
3.	DC	6-1/2	31.25	34.79
4.	DC	6-1/16	30.74	65.53
5.	XO	6-1/4	2.02	67.55
6.	HWDP (68 JTS)	5	2040.68	2108.23
7.	Drilling Jars (DOTCO)	6-1/4	30.46	2138.69
8.	HWDP (6 JTS)	5	190.19	2328.88

BHA Effective Weight: 87,000 lb

TIH to 7,544 ft and tagged a bridge at the top of a 5 ft coal. Washed and reamed from 7,544 to 7,581 ft. TIH to 8,100 ft and broke circulation. TIH to 8,477 ft, washed and reamed hole to 8,588 ft, circulated and conditioned mud. POOH and tagged ledges with bit at 7,568 ft, 7541 ft, and 7,527 ft. Rotated through ledges and POOH to 6,700 ft. TIH to 8,530 ft and washed and reamed back to bottom. Circulate hole for logs. Directional Data: None. Mud Properties: wt 14.2, vis 51, solids 26%, wl 6.0, gels 4/10, PV 32, YP 20, pH 9.5, oil 6%.

July 23, 1991, (73), Depth 8,588 ft; Footage Last 24 Hrs: 0 ft.

Tripping in hole with bit to cleanout for casing at report time. Circulate and condition mud at 8,588 ft. POOH to log. Installed Schlumberger's docking head and logging tools on the bottom of the drillpipe. TIH to 6,477 ft and installed side door sub and TIH with Schlumberger cable. TIH with drillpipe and logging tools to 8,230 ft. Logged while POOH with drillpipe to 6,582 ft. Ran the Phasor Dual Induction/SFL, Litho-Density/CNL, Gamma Ray and Caliper logs. POOH with logging tools and rigged down loggers. TIH with BHA to 4,100 ft and circulated hole. Directional Data: None. Mud Properties: wt 14.7, vis 53, solids 26%, wl 6.0, gels 4/8, PV 30, YP 18, pH 9.5, oil 6%.

July 24, 1991, (74), Depth: 8,588 ft; Footage Last 24 Hrs: 0 ft.

Preparing to run casing at report time. TIH to 8,509 ft, circulate and condition mud, POOH to 6,155 ft, cut drilling line. TIH to 8,588 ft, circulate and condition mud, and POOH to 6,200 ft. Rig up lay down machine, lay down drillpipe, and lay down HWDP. Rig up casing crew and prepare to run 7-in. casing. Directional Data: None. Mud Properties: wt 14.8, vis 64, solids 28%, wl 6.0, gels 5/15, PV 28, YP 22, pH 9.5, oil 6%.

July 25, 1991, (75), Depth 8,588 ft; Footage Last 24 Hrs: 0 ft.

Waiting 8 hrs on first stage cement to set at report time. Ran Davis Lynch differential fill float shoe, 1 joint 7-in., 29 lb/ft N80 LT&C casing, Davis Lynch differential fill float collar, 50 joints of 7-in., 29 lb/ft N80 LT&C casing, and Davis Lynch hydraulically actuated stage tool. TIH to 6,440 ft and circulated hole. TIH to 8,083 ft using casing weight to run pipe in hole. From 8,083 to 8,578 ft, the casing was forced into the well by pulling 300k strain on the pipe and then dropping the blocks. The casing was landed at 8,578 ft, float collar at 8,527 ft and stage tool at 6,361 ft. Circulate well, rig up Dowell and prepare to cement first stage as follows: Pumped 20

BBLS Chemical Wash 101 followed by 60 BBLS Mud Push XLD, 320 sx Class G 50/50 Poz containing 2% D20, 0.8% D112, 35% D66, 0.1% D13, Yield 1.56 cu ft/sk, Density 14.5 lb/gal. This in turn was followed by 65 sx (96 cu ft) Class G cement containing 35% D66, 0.75% D59, 0.2% D121, 0.3% D65, and 0.2% D79. Displaced plug with 324 BBLS mud. Plug down at 2 a.m. July 26, 1991. Opened hydraulic stage tool and circulated hole. Directional Data: None. Mud Properties: wt 14.6, vis 53, solids 28%, wl 5.6, gels 4/12, PV 35, YP 20, pH 9.5, oil 9%.

July 26, 1991, (76), Depth 8,588 ft; Footage Last 24 Hrs: 0 ft.

Nippling up BOP's at report time. Circulate and condition mud while waiting on first stage cement to set. The second stage was cemented as presented herein: 20 BBLS Chemwash 101 followed by 60 BBLS Mud Push XLD which in turn was followed by 412 cu ft - 265 sx 50/50 pozmix containing 0.2% D20, 0.8% D44, 0.8% D112, 35% D66 and 0.1% D13. Yield 1.55 cu ft/sk. Density 14.5 lb/gal. Displaced cement with 249 EBLS mud (12.5 BBLS over displacement). Closed stage tool with 2,600 psi. Checked stage tool to be certain it closed. Plug down at 1:40 pm. Nipple down BOP's. Set casing slips with 200,000 lb on slips. String weight 190,000 lbs. Cut off casing, install 7-in. wear bushing and nipple up BOP's. Bleed gas off the annulus between the 7-in. and 9-5/8-in. casing. Directional Data: None. Mud Properties: None.

July 27, 1991, (77), Depth: 8,588 ft; Footage Last 24 hrs: 0 ft.

Tripping in hole with drillpipe at 5,400 ft at report time.
Nipple up BOP's and 3-1/2-in. handling tools. Change out 5-in. kelly for 3-1/2-in. kelly. Rig up lay down machine, pick up BHA, and TIH with 3-1/2-in. HWDP and 3-1/2-in. drillpipe. Directional Data: None. Mud Properties: None.

July 28, 1991, (78), Depth: 8,588 ft; Footage Last 24 Hrs: 0 ft.

Tripping in hole with 6-in. bit at report time. Finished TIH with Bit 23, a Hughes J3, picking up the 3-1/2-in. drillpipe. Tagged the differential fill float collar at 8,531 ft. Picked up the kelly and drilled the float collar to 8,532 ft. Drilled hard cement to 8,579 ft. Circulated the well clean, POOH. Pressure tested BOP's 300 psi/5000 psi, manifold to 300 psi/5000 psi, and the hydril to 300 psi/5,000 psi. Pick up BHA. Pressure test casing to 2,000 psi. TIH with 6-in. bit. Directional Data: None. Mud Properties: wt 13.7, vis 45, solids 26%, wl 6.6, gels 3/7, PV 22, YP 12, pH 10.0, oil 4%.

July 29, 1991, (79), Depth 8,642 ft; Footage Last 24 Hrs: 54 ft.

Drilling at 8,642 ft at report time. Finished picking up the following bottomhole assembly, BHA 34, to build angle and turn to the left.

Angle Build Bottomhole Assembly
(July 29, 1991)

Item	Description	OD	Length	Total
1.	Bit 24, Smith F3	6	0.75	0.75
2.	NBIBS	6	4.99	5.74
3.	NMDC	4-13/16	28.60	34.34
4.	Flow Sub	4-11/16	2.50	36.84
5.	CSDP	4-3/4	29.95	66.79
6.	IBS	6	4.70	71.49
7.	HWDP(9 JTS)	3-1/2	276.09	347.58
8.	Drilling Jars (DOTCO)	4-3/4	28.80	376.38
9.	HWDP (60 JTS)	3-1/2	1844.38	2220.76

BHA Effective Weight: 60,000 lbs

Successfully tested 7-in. casing to 2,000 psi for 10 min. Uncrossed drilling line on draw works drum. TIH with 3-1/2-in. drillpipe, installing rubbers every other joint. Tagged stage tool at 6,363 ft with 6-in. bit. Picked up kelly and worked through stage tool area. TIH installing drillpipe rubbers, circulate and condition mud while rigging up rotating rubber. Drill through casing shoe at 4:45 pm. Metal wear 8 to 10 cc per hour. Lithology at 8,642 ft is 90% shale, 10% siltstone. Trace of bentonite from 8,635 to 8,640 ft. Background gas 4-6 units. Directional Data: None. Mud Properties: wt 13.6, vis 47, solids 25%, wl 6.4, gels 3/7, PV 30, YP 18, pH 10.0, oil 7%.

July 30, 1991, (80), Depth 8,680 ft; Footage Last 24 Hrs: 38 ft.

Drilling with steering tools at 8,680 ft at report time. Hole angle is dropping. POOH, pick up 0.52 DTU motor with MWD and TIH. The following bottomhole assembly, BHA 35, was run to build hole angle to 86 degrees and turn the hole to the left.

Angle Build Assembly
(July 30, 1991)

Item	Description	OD	Length	Total
1.	Bit 25, Smith F3	6	0.75	0.75
2.	DTU AB Motor 0.52	4-3/4	18.45	19.20
3.	XO	4-11/16	1.38	20.58
4.	Mule Shoe	4-11/16	2.52	23.10
5.	NMDC	4-13/16	28.60	51.70
6.	Flow Sub	4-11/16	2.50	54.20
7.	CSDP	4-3/4	29.95	84.15
8.	HWDP (9 JTS)	3-1/2	276.09	360.24
9.	Drilling Jars DOTCO	4-3/4	28.90	389.04
10.	HWDP (60 JTS)	3-1/2	1844.38	2233.42

BHA Effective weight: 60,000 lbs

The tool face was oriented to the high side and drilling commenced at 8,642 ft. Metal wear 3 cc/hr. Lithology at 8,680 ft is 90% shale, 10% siltstone. Background gas is 10u to 12u.

Directional Data: md 8,638 ft, hole angle 61.1°, azimuth N10.9°E, tvd 7,805.05 ft. Mud Properties: wt 13.4, vis 52, solids 25%, wl 6.2, gels 4/10, PV 34, YP 21, pH 9.5, oil 7%.

July 31, 1991, (81), Depth 8,717 ft; Footage Last 24 Hrs: 37 ft.

Working to circulate partially plugged drillpipe at 8,675 ft. Bit 25 was drilling at rates below 3 ft/hr over the last 17 ft. Mixed pill and POOH. RIH with bit 26, a 6-in. Smith F37. Installed a 12 ft short monel drill collar below the muleshoe sub. Oriented the tool face to the high side. TIH to 8,675 ft. Unable to circulate the well. The bit or the top of the MWD is partially plugged. Able to pump only 18 gpm at 3,100 psi. Lithology at 8,717 ft is 95% shale, 5% siltstone. Casing is causing interference on azimuth readings. Directional Data: md 8,670 ft, hole angle 61.7°, azimuth N9.5°E, tvd 7,820.36 ft. Mud Properties: wt 13.6, vis 50, solids 26%, wl 6.0, gels 4/10, PV 34, YP 22, pH 9.5, oil 11%.

August 1, 1991, (82), Depth 8,746 ft; Footage Last 24 Hrs 29 ft.

Drilling with mud motor at 8,746 ft at report time. Tried unsuccessfully to circulate down drillpipe. POOH and found the retrievable MWD had moved up hole 90 ft above the muleshoe and wedged in a tool joint in the 3-1/2-in. HWDP. Laid down the joint of 3/12-in. HWDP with the retrievable MWD still inside, picked up a new MWD tool, oriented the tool. The following bottomhole assembly, BHA 36, was run in the hole to build hole angle to 86 degrees.

Angle Build Bottomhole Assembly
(August 1, 1991)

Item	Description	OD	Length	Total
1.	Bit 26, Smith F37	6	0.75	0.75
2.	DTU AB Motor 0.52	4-3/4	18.45	19.20
3.	XO	4-11/16	1.38	20.58
4.	Short NMDC	4-13/16	12.88	33.46
5.	Mule Shoe Sub	4-11/16	2.52	35.98
6.	NMDC	4-13/16	28.60	64.58
7.	Flow Sub	4-11/16	2.50	67.08
8.	Knobby DC	4-3/4	29.95	97.03
9.	HWDP (8 JTS)	3-1/2	245.19	342.22
10.	Drilling Jars (DOTCO)	4-3/4	28.90	376.02
11.	HWDP (61 JTS)	3-1/2	1875.29	2246.31

BHA Effective Weight: 62,000 lbs.

TIH to 8,717 ft, broke circulation at 2,300 ft and 5,100 ft, and washed and reamed last 40 ft to bottom. Lithology at 8,763 ft is 90% shale, 10% siltstone. Background gas 8 to 12u. Directional Data: md 8,702 ft, hole angle 62.5°, azimuth N9.5°E, tvd 7,835.34 ft. Mud Properties: wt 13.8, vis 49, solids 27%, wl 6.0, gels 3/7, PV 27, YP 18, pH 9.5, oil 10%.

August 2, 1991, (83), Depth 8,812 ft; Footage Last 24 Hrs; 66 ft.

Cutting drilling line at 8,812 ft at report time. Drilled to 8,798 ft. Circulated well clean, TIH with 1-11/16-in. GR-CNL with CCL tool. Logged well from 8,698 to 7,520 ft and found shale marker at 7,798 ft, 19 ft higher than projected. POOH, rigged down Schlumberger, and drilled 14 ft to 8,812 ft. Took survey, pumped pill, POOH and LD 0.52 degree DTU motor. Picked up bit 27, a Smith F37, a 12 degree AB motor, oriented the tool to the high side, and TIH to 2,400

ft. The following bottomhole assembly, BHA 37, was run in the hole to build hole angle at 12 deg/100 ft to a hole angle of 86 degrees at a depth of 8,812 ft.

Angle Build Bottomhole Assembly
(August 2, 1991)

Item	Description	OD	Length	Total
1.	Bit 27, Smith F37	6	0.75	0.75
2.	12 Deg AB Motor	4-3/4	26.12	26.87
3.	Short Monel DC	4-13/16	12.88	39.75
4.	Mule Shoe	4-11/16	2.52	42.27
5.	NMDC w/MWD	4-13/16	28.60	70.87
6.	Flow Sub	4-11/16	2.50	73.37
7.	Knobby DC	4-3/4	29.95	103.32
8.	HWDP (8 JTS)	3-1/2	245.19	348.51
9.	Drilling Jars (DOTCO)	4-3/4	28.80	377.31
10.	HWDP (61 JTS)	3-1/2	1875.29	2252.62

BHA Effective Weight: 62,000 lbs

Lithology at 8,812 ft is 100% shale. Background gas is 8u to 10u. Directional Data: md 8,732 ft, hole angle 63.7°, azimuth N9.5°E, tvd 7,848.91 ft; md 8,764 ft, hole angle 64.6°, azimuth N9.5°E, tvd 7,862.86 ft. Mud Properties: wt 13.8, vis 52, solids 27%, wl 6.2, gels 4/18, PV 29, YP 19, pH 9.5, oil 10%.

August 3, 1991, (84), Depth 8,892 ft; Footage Last 24 Hrs: 80 ft.

Drilling with 12 degree AB motor at 8,892 ft at report time. Finished cutting drilling line. Finished TIH to 8,796 ft, broke circulation, and washed and reamed hole to 8,812 ft. Oriented tool to the high side and continued drilling in the second build. The Cozzette top was encountered at a measured depth of 8,864 ft. Background gas is 10u to 12u. Lithology in the sample from 8,885 to 8,890 ft is 40% sandstone, 20% siltstone, and 40% shale. Directional Data: md 8,789 ft, hole angle 66.2°, azimuth N10.9°E, tvd 7,877.02 ft; md 8,830 ft, hole angle 68.2°, azimuth N10.9°E, tvd 7,889.42 ft. Mud Properties: wt 13.7, vis 47, solids 27%, wl 6.0, gels 3/7, PV 30, YP 20, pH 9.5, oil 9%.

August 4, 1991, (85), Depth 8,945 ft; Footage Last 24 Hrs: 53 ft.

Drilling at 8,945 ft with 12 degree AB motor at report time.
Mixed and pumped pill at 8,918 ft. POOH for bit change at 8,918 ft. Bit 28, a Smith F5, and the following bottomhole assembly, BHA 38, was run to 8,918 ft to build hole angle to 86°.

Angle Build Bottomhole Assembly
(August 4, 1991)

Item	Description	OD	Length	Total
1.	Bit 28, Smith F5	6	0.75	0.75
2.	12 Deg. AB Motor	4-3/4	26.12	26.87
3.	Short Monel DC	4-13/16	12.88	39.75
4.	Mule Shoe	4-11/16	2.52	42.27
5.	NMDC w/MWD	4-13/16	28.60	70.87
6.	Flow Sub	4-11/16	2.50	73.37
7.	Knobby DC	4-3/4	29.95	103.32
8.	HWDP (14 JTS)	3-1/2	429.36	532.68
9.	Drilling Jars (DOTCO)	4-3/4	28.80	561.48
10.	HWDP (2 JTS)	3-1/2	61.47	622.95
11.	Drillpipe (30 JTS)	3-1/2	945.50	1568.45
12.	HWDP (53 JTS)	3-1/2	1629.65	3198.10

BHA Effective Weight: 62,000 lbs

TIH with new bit and installed 3-1/2-in. drillpipe in the tangent. Washed and reamed the last 70 ft to bottom. Lithology at 8914 ft is 90% sand, 10% shale. Sand is tight with low porosity and contains pyro-bitumen. Revised Cozzette top is at 8,895 ft md. Background gas is 10u to 40u. Connection gas is 190u. Directional Data: md 8,860 ft, hole angle 71.3°, azimuth N10.9°E, tvd 7,899.80 ft; md 8,891 ft, hole angle 74.2°, azimuth N10.9°E, tvd 7,908.99 ft. Mud Properties: wt 13.7, vis 48, solids 27%, wl 6.0, gels 3/7, PV 30, YP 18, pH 9.5, oil 8%.

August 5, 1991, (86), Depth 9,006 ft; Footage Last 24 Hrs: 61 ft.

Surveying and mixing pill at 9,006 ft in preparation to POOH to lay down mud motor. Drilled to 8,952 ft, 7 ft. when the Lithium batteries in the MWD tool failed. POOH, changed out batteries in MWD, and changed out bit. Bit 29, a Smith F37, was run in the hole on BHA 38 and drilling resumed at 8,952 ft. The remainder of the second build was drilled to 9,006 ft md, 7,928 ft tvd, at an estimated hole angle of 86.1° degrees. At the end of the second build at 9,006 ft md, the bottomhole location is 1537.56 ft North and 1,081.78 ft East of the surface location. Lithology at 9,006 ft is 90% sand (with some hairline fractures), 10% shale, and a trace of coal. Background gas is 20u to 40u. Trip gas was 175u at 8,952 ft. Directional Data: md 8,923 ft, hole angle 77.5°, azimuth N10.9°E, tvd 7,916.81 ft; md 8,954 ft, hole angle 80.7°, azimuth N10.9°E, tvd 7,922.68 ft. Mud Properties: wt 14.0, vis 53, solids 28%, wl 6.0, gels 5/10, PV 36, YP 22, pH 9.5, oil 7%.

August 6, 1991, (87), Depth 9,030 ft; Footage Last 24 Hrs: 24 ft.

Drilling in the Cozzette at 9,030 ft at report time. Finished POOH top 7,600 ft. Broke connections on 3-1/2-in. kelly. POOH, changed out kelly and BHA. The following bottomhole assembly was run in the hole to drill the horizontal lateral using surface rotation.

Angle Hold Assembly
(August 6, 1991)

Item	Description	OD	Length	Total
1.	Bit 30, EC D331	6	0.65	0.65
2.	3 Pt. Roller Reamer	6	5.39	6.04
3.	Short Monel DC	4-13/16	12.88	18.92
4.	Mule Shoe	4-11/16	2.52	21.44
5.	Monel DC w/MWD	4-13/16	28.60	50.04
6.	Flow Sub	4-11/16	2.50	52.54
7.	IBS	6	4.07	56.61
8.	Knobby DC	4-3/4	29.95	86.56
9.	HWDP (26 JTS)	3-1/2	798.21	884.77
10.	Drilling Jars (DOTCO)	4-3/4	28.80	913.57
11.	HWDP (2 JTS)	3-1/2	61.47	975.04
12.	Drillpipe (21 JTS)	3-1/2	661.85	1636.89
13.	HWDP (41 JTS)	3-1/2	1260.80	2897.69

BHA Effective Weight: 62,000 lbs

TIH with bit 30, an Eastman Christensen D331 natural diamond bit, and BHA 39 to 8,859 ft. Washed and reamed from 8,859 to 9,006 ft and began drilling the Cozzette horizontal lateral using surface rotation. Lithology at 9,035 to 9,030 ft is 60% sandstone (containing some hairline fractures), 40% shale. Background gas is 20u. Trip gas is 210u. Directional Data: md 8,988 ft, hole angle 84.6° azimuth N10.9°E, tvd 7,927.02 ft. Mud Properties: wt 14.0, vis 49, solids 28%, wl 6.2, gels 3/7, PV 32, YP 19, pH 9.5, oil 7%.

August 7, 1991, (88), Depth 9,119 ft; Footage Last 24 Hrs: 89 ft.

POOH with bit to change BHA at 9,119 ft at report time. Lithology in the Cozzette at 9,119 ft is 40% sandstone, 60% shale. Background gas 80u at 9,106 ft and 40u at 9,113 ft. The bottomhole assembly is continuing to build angle above 86° and is being pulled to run an assembly that will drop angle and drill through the Cozzette pay. Directional Data: md 9,020 ft, hole angle 85.9° azimuth N10.9°E, tvd 7,929.67 ft; md 9,051 ft, hole angle 87.5°, azimuth N10.2°E, tvd 7,931.73 ft; md 9,083 ft, hole angle 87.5°, azimuth N10.9°E, tvd 7,933.41 ft. Mud Properties: wt 14.0, vis 51, solids 28%, wl 6.2, gels 4/8, PV 34, YP 20, pH 9.5, oil 6%.

August 8, 1991, (89), Depth 9,197 ft; Footage Last 24 Hrs: 78 ft.

Rotary drilling with motor and surface rotation in Cozzette at 9,197 ft at report time. Finished POOH, laid down BHA 39, picked up 0.52°. DTU motor with 5-13/16 IBS on top, oriented tool face and TIH to 9,119 ft. The following bottomhole assembly, BHA 40, was run to motor drill and drop angle slowly across the Cozzette from 88° to 84°, in an effort to pick up additional natural fractures in the lower portion of the Cozzette.

Angle Drop Bottomhole Assembly
(August 8, 1991)

Item	Description	OD	Length	Total
1.	Bit 30RR, EC D331	6	0.65	0.65
2.	DTU AB Motor 0.52	4-3/4	18.48	19.13
3.	XO	4-11/16	1.38	20.51
4.	IBS	5-13/16	4.03	24.54
5.	Short Monel DC	4-13/16	12.88	37.42
6.	Mule Shoe	4-11/16	2.52	39.94
7.	Monel DC w/MWD	4-13/16	28.60	68.54
8.	Flow Sub	4-11/16	2.50	71.04
9.	CSDP (4-3/4 x 3-1/2)	4-3/4	29.95	100.99
10.	HWDP (26 JTS)	3-1/2	798.21	899.20
11.	Drilling Jars (DOTCO)	4-3/4	28.80	928.00
12.	HWDP (2 JTS)	3-1/2	61.47	989.47
13.	Drillpipe (21 JTS)	3-1/2	661.85	1651.32
14.	HWDP (41 JTS)	3-1/2	1260.80	2912.12

BHA Effective Weight: 62,000 lbs

Washed and reamed the last 76 ft to bottom. Lithology at 9,196 ft is 40% sandstone and 60% shale. Connection gas increased from 240u at 9,165 ft to 390u at 9,196 ft. Gas shows are as follows: 190u at 9,138 ft, 360u at 9,178 ft, 120u at 9,186 ft, 220u at 9,197 ft. Directional Data: md 9,112 ft, hole angle 87.7°, azimuth N10.2°E, tvd 7,934.62 ft; md 9,144 ft, hole angle 87.5°, azimuth N10.2°E, tvd 7.935.96 ft. Mud Properties: wt 13.9, vis 48, solids 28%, wl 6.0, gels 3/7, PV 28, YP 18, pH 9.5, oil 8%.

August 9, 1991, (90), Depth 9,235 ft; Footage Last 24 Hrs: 38 ft.

Washing and reaming to bottom at 9,235 ft at report time. The 0.52° DTU AB motor was not dropping angle at the required rate. Mixed pill, POOH, laid down the DTU motor and picked up a new rotary angle drop assembly. The following angle drop bottomhole assembly, BHA 41, was run with bit 30RR, to rotary drill and drop hole angle across the Cozzette to 84° at 9,506 ft.

Angle Drop Bottomhole Assembly
(August 9, 1991)

Item	Description	OD	Length	Total
1.	Bit 30RR, EC D331	6	0.65	0.65
2.	Bit Sub	4-3/4	2.39	3.04
3.	Mule Shoe	4-11/16	2.52	5.56
4.	Monel DC w/MWD	4-13/16	28.60	34.16
5.	Flow Sub	4-11/16	2.50	36.66
6.	IBS	6	4.07	40.73
7.	CSDP	3-1/2	29.95	70.68
8.	HWDP (26 JTS)	3-1/2	798.21	868.89
9.	Drilling Jars (DOTCO)	4-3/4	28.80	897.69
10.	HWDP (2 JTS)	3-1/2	61.47	959.16
11.	Drillpipe (21 JTS)	3-1/2	661.85	1621.01
12.	HWDP (41 JTS)	3-1/2	1260.80	2881.81

BHA effective Weight: 62,000 lbs

Directional Data: md 9,175 ft, hole angle 87.7°, azimuth N9.5°E, tvd 7,937.26 ft. Mud Properties: wt 13.8, vis 52, solids 27%, wl 6.0, gels 4/10, PV 34, YP 21, pH 9.5, oil 8%.

August 10, 1991, (89), Depth 9,289 ft; Footage Last 24 Hrs: 54 ft.

Surveying at 8,289 ft in at report time in preparation to POOH for BHA change. BHA 41 failed to drop angle. Washed and reamed hole to 9,197 ft. Lost 380 psi pump pressure. Checked pumps OK. POOH 16 stands and found cracked box at 1574 ft. TIH to 9,160 ft and washed and reamed hole to 9,235 ft. Drilled to 9,289 ft. Survey indicated that BHA was building angle, not dropping angle. Mix pill and prepare to POOH for BHA change. Lithology at 9,289 ft is 90% quartz fracture filled sandstone, and 10 % shale. Gas shows in fractures: 9,240 ft 640u, Bg 210u; 9,243 ft 630u, Bg 220u; 9,271 ft 600u, Bg 25u; 9,289 ft 800u, Bg 40u. Directional Data: md 9,207 ft, hole angle 86.9°, azimuth N10.2°E, tvd 7,938.77 ft; md 9,238 ft, hole angle 86.7°, azimuth N10.2°E, tvd 7,940.50 ft; md 9,269 ft, hole angle 87.9° azimuth N10.2°E, tvd 7,941.96 ft. Mud Properties: wt 14.0, vis 56, solids 28%, wl 6.0, gels 5/12, PV 34, YP 24, pH 9.5, oil 8%.

August 11, 1991, (92), Depth 9,308 ft; Footage Last 24 Hrs: 19 ft.

Rigging up to kill well at 5,028 ft at report time. Circulate and mix pill in preparation to tripping for a bit change at 8,289 ft. Picked up new bottomhole assembly, BHA 42, for reaming hole. TIH to 2,000 ft, slipped and cut drilling line, and tripped on in hole to 9,199 ft. Washed and reamed hole to 9,289 ft.

Reaming Bottomhole Assembly
(August 11, 1991)

Item	Description	OD	Length	Total
1.	Bit 31, Smith F37	6	0.75	0.75
2.	3 Pt. Roller Reamer	6	5.39	6.14
3.	Mule Shoe	4-11/16	2.52	8.66
4.	Monel DC w/ MWD	4-13/16	28.60	37.26
5.	Flow Sub	4-11/16	2.50	39.76
6.	IBS	6	4.07	43.83
7.	Knobby DC	4-3/4	29.95	73.78
8.	HWDP (26 JTS)	3-1/2	798.21	871.99
9.	Drilling Jars (DOTCO)	4-3/4	28.80	900.79
10.	HWDP (2 JTS)	3-1/2	61.47	962.26
11.	Drillpipe (21 JTS)	3-1/2	661.85	1624.11
12.	HWDP (41 JTS)	3-1/2	1260.80	2884.91

BHA Effective Weight: 62,000 lbs

Drilled from 9,289 to 9,308 ft at an average penetration rate of 2.81 ft/hr due to running 10k to 15k WOB and 70 RPM in an effort to get the hole angle to drop. Bit 31 quit drilling at 9,308 ft. Circulated hole and spotted pill on bottom at 9,308 ft. Started trip out of hole. Took severe kick at 5,028 ft. Secured well. SIDPP was 2,100 psi. Rigged up to check annular pressure. The 4-in. choke manifold line ruptured and the gas caught fire. Secured well with lower pipe rams. The 2-in. schedule 160 kill line ruptured (probably hit with the 4-in. line when it broke loose) venting gas to the atmosphere, but did not catch fire. Shut-in the well with the SCR valve and

the 4-in. master valve. Lithology at 9,300 to 9,308 ft is 75% sandstone and 25% shale. Background gas at 9,308 ft was 40u to 70u. Connection gas at 9,294 ft is 700u. Trip gas at 9,308 ft is 710u. Directional Data: None. Mud Properties: wt 13.9, vis 52, solids 28%, wl 6.0, gels 5/10, PV 32, YP 22, pH 9.5, oil 7%.

August 12, 1991, (93), Depth 9,308 ft; Footage Last 24 Hrs: 0 ft.

Monitoring leaks and waiting on daylight at report time. Cut away old choke manifold line and reinstall new manifold line. Weld together and install 4-in. schedule 160 manifold line. Pressure tested manifold line and manifold valves to 300 psi for 5 minutes, and 5,000 psi for 15 minutes. Brought mud weight up from 14 ppg to 16 ppg and received five loads of bulk barite.

Note: The flange below the Hydrill and the flange below the double gate BOP each have a slight gas leak. These gas leaks were monitored all night and did not get worse. Received 130 joints of 3-1/2-in. S135 drillpipe from Homco International. Otis snubbing unit is in Craig, Colorado, and will be here at Noon, August 13, 1991. Operations to kill well will be started at 7:30 a.m. August 13, 1991 once the daylight crew arrives. Directional Data: None. Mud Properties: wt 16, vis 57, solids 32%, wl 6.0, gels 8/30, PV 47, YP 18, pH 10.0, oil 6%.

August 13, 1991, (94), Depth 9,308 ft; Footage Last 24 Hrs: 0 ft.

Venting well through choke line while building mud volume at report time. Waited on daylight and observed leaks on flange below Hydrill and double gate BOP. Had safety meeting and opened TIW valve. SIDPP was 4,300 psi. Opened HCR valve on the BOP stack. SICP was 3,750 psi. Rigged up Dowell and pumped 16 ppg mud down drillpipe at 1/4 bpm while venting annulus on choke. With 8 BBLS of the 29 BBL drillpipe volume pumped, drillpipe pressure increased to 4,500 psi at 1/10 bpm. We believe the retrievable MWD tool has backflowed uphole in the bottomhole assembly and bridged off in a tool joint in the 3-1/2-in. HWDP. Bled the well through the choke for 2-3/4 hrs. Pressure on the annulus bled to 2,650 psi. Pumped 250 BBLS of 16 ppg mud down the annulus at 1.1 bpm at 3,150 psi. (The 250 BBLS pumped puts 16 ppg mud at the casing shoe at 8,580 ft.) Final pumping pressure was 1,560 psi. In 60 minutes, the annulus pressure fell to 1,050 psi. Opened annulus to the pit. Pressure bled to 0 psi in 30 minutes, but there was still sufficient gas to sustain a 10 ft flare out of the 7-in. flow line. Released the drillpipe pressure to the pit. Drillpipe pressure bled to zero in several minutes. Pumped 10 BBLS of 16 ppg mud down the drillpipe and the drillpipe pressure increased to 3,700 psi. The drillpipe was still plugged with the MWD tool. Pumped 10 BBLS of 16 ppg mud down the annulus and the pressure increased to 1,550 psi. Shut well in for 60 minutes. The annulus pressure is stable at 1,560 psi. Released the pressure through the choke slowly. Pressure bled to 0 psi in 30 minutes. No fluid was recovered but gas flow was sufficient to sustain a 5 ft flare at 0 psi out of the 7-in. flow line. Pumped 20 BBLS 16 ppg mud down the drillpipe annulus before any pressure was seen. Shut down with 20 BBLS pumped with at 560 psi. Waited 2 hrs and annulus pressure had increased to 1,420 psi. Released annulus pressure and vented dry gas to the burn pit. Pressure on the annulus is 0 psi at 6 a.m.

Directional Data: None. Mud Properties: wt 16.1, vis 60, solids 32%, wl 6.0, gels 8/34, PV 55, YP 19, pH 10.0, oil 6%.

August 14, 1991, (95), Depth 9,308 ft; Footage Last 24 Hrs: 0 ft.

Circulating and bringing kill mud weight to 18.3 ppg at report time. Shut well in at 6:45 a.m. with 100 psi flowing pressure on the annulus. Monitored drillpipe and annular pressure.

Periodically pumped small mud volumes (10 BBLS) to replace gas bled off annulus. Could not pump down drillpipe. Drillpipe completely plugged off. Petrolog arrived at 5:30 p.m. to run sinker bars and impression block. Rigged up Petrolog sinker bars and grease head on 3-1/2-in. drill pipe. TIH with sinker bars to 2,140 ft. Mud was too thick to allow the sinker bars to drop. POOH, rigged down sinker bars and grease head, and released Petrolog. Rigged up Dowell and installed second TIW valve on the drill pipe. Vented annulus gas from 2,000 psi to 190 psi from 11 p.m. to 2:30 a.m. Shut well in at 2:30 a.m. and opened well at 6 a.m. with 1,500 psi on the annulus. Brought up mud weight from 16.3 ppg to 18.3 ppg. Added 6 lb/BBL (7%) of Bore Seal thermally degradable LCM to mud to retard mud loss to the fractures. Kill mud weight is 18.3 ppg, funnel viscosity 200 sec. Directional Data: None. Mud Properties: wt 16.1, vis 63, solids 36%, wl 6.2, gels 10/36, PV 67, YP 22, pH 10, oil 4%.

August 15, 1991, (96), Depth 9,308 ft; Footage Last 24 Hrs: 0 ft.

Circulating with drillpipe and bit at 6,967 ft at report time. Circulate and condition mud in pit. Bring mud weight up from 16.3 ppg to 18.7 ppg at 1 bpm. Shut down pumping mud into annulus: ISIP 139 psi. Closed bottom rams and opened drillpipe. Found 3,000 psi on drillpipe. Bled drillpipe to pit until dead. Pumped 30 BBLS down annulus and tried to reverse circulate gas out of drillpipe. Unable to reverse circulate through drillpipe. Volume of 18.7 ppg mud pumped was 250 BBLS. Checked pressures on drillpipe and annulus. Both at 0 psi. Removed both TIW valves, POOH, and stood back the HWDP. The MWD tool was not recovered in the mule shoe below the monel drill collars. The MWD tool is lodged in a tool joint somewhere in the HWDP standing in the derrick. Tripped in hole with Bit 32, a 6-in. Hughes J3, a bit sub with float, and 3-1/2-in. drill pipe to 4,791 ft and circulate well. Trip on in hole to 6,967 ft, circulate hole, and condition mud. BHA length is 3.14 ft. Background gas is 15u. Directional drillers and MWD released. Mud Properties: wt 17.1, vis 60, solids 37%, wl 6.5, gels 7/40, PV 67, YP 26, pH 9.0, oil 3%.

August 16, 1991, (97), Depth 9,308 ft; Footage Last 24 hrs: 0 ft.

Circulating and conditioning mud at 6,029 ft at report time. TIH to 8,580 ft and tried unsuccessfully to break circulation. Built mud volume and brought weight to 16.5 ppg. POOH to 7,806 ft and could not circulate. Tried unsuccessfully to circulate at 6,680 ft, and 5,750 ft. Successfully established circulation at 4,820 ft. Circulated two hours and then started in the hole two stands at a time, and circulating 10 to 15 minutes after each two stands. Background gas ranged from 200u to 1,000u after each connection. Mud Properties: wt 16.5, vis 65, solids 37, wl 6.0, gels 7/40, PV 60, YP 26, pH 9.0, oil 3%.

Note: The Eastman Christensen retrievable MWD tool was found lodged in a tool joint of 3-1/2-in. HWDP approximately 1,000 ft above the mule shoe in the bottomhole assembly. The bottom portion of the MWD tool will be removed from the joint of HWDP in Eastman Christensen's machine shop in Casper, Wyoming.

August 17, 1991, (98), Depth 9,308 ft; Footage Last 24 Hrs: 0 ft.

Tripping in hole at 2,500 ft at report time. Cleaned out gas buster while circulating at 6,029 ft. RIH stopping every four to five stands to establish circulation. At 8,563 ft (Csg shoe at 8,578 ft) the hole was circulated for 1-1/2 hours. Washed and reamed down 21 joints of drill pipe to 9,234 ft. Had problems with the string trying to stick in the last connection at 9,234 ft. Decided to stop 74 ft short of 9,308 ft total depth because of the sticking problem. Circulated and conditioned mud for 3 hrs. Mixed and pumped pill. POOH with cleanout bottomhole assembly.

The following rotary angle drop bottomhole assembly, BHA 43, was picked up with bit 33, an Eastman Christensen D331 natural diamond bit to drill from 9,308 to 9,508 ft projected TMD.

Angle Drop Bottomhole Assembly
(August 18, 1991)

Item	Description	OD	Length	Total
1.	Bit 33, EC D331	6	0.65	0.65
2.	NB Roller reamer	5-3/4	5.38	6.03
3.	Steel DC	4-5/8	29.82	35.85
4.	IBS	6	4.07	39.92
5.	CSDP	3-1/2	29.95	69.87
6.	HWDP (26 JTS)	3-1/2	798.21	868.08
7.	Hydraulic Jars	4-3/4	28.80	896.88
8.	HWDP (2 JTS)	3-1/2	61.47	958.35
9.	Drillpipe (27 JTS)	3-1/2	850.95	1809.30
10.	HWDP (41 JTS)	3-1/2	1260.80	3070.10

BHA Effective Weight: 69,000 lbs

Mud Properties: wt 16.4, vis 57, solids 31%, wl 8.0, gels 10/38, PV 60, YP 20, pH 9.0, oil 3%.

August 18, 1991, (99), Depth 9,381 ft; Footage Last 24 Hrs: 73 ft.

TIH with bottomhole assembly to 7,800 ft, circulate and condition mud. TIH to 8,743 ft and circulate out gas (600u). TIH to 9,214 ft, and wash and ream to 9,308 ft. Lost 75 BBLS slowly while drilling the first 50 ft from 9,308 to 9,358 ft. Dropped mud weight from 16.6 ppg to 16.4 ppg. Gas show at 9,376 ft going from 20u to 155u. Sample indicated quartz fracture fill at 9,310 to 9,320 ft, 9,330 to 9,340 ft, 9,340 to 9,350 ft, 9,360 to 9,370 ft. The sample at 9,370 ft indicated 85% sandstone and 15% shale. Mud Properties: wt 16.4, vis 61, solids 36%, wl 5.6, gels 6/18, PV 65, YP 30, pH 9.0, oil 5%.

August 19, 1991, (100), Depth 9,407 ft; Footage Last 24 Hrs: 26 ft.

Setting Baker Model D packer at 8,453 ft at report time. Drilled to 9,407 ft. Losing mud, mixed LCM and circulated hole. Lost 60 BBLS of mud. TD well at 9,407 ft. POOH to 8,521 ft, circulate and condition mud. POOH and laid down bottomhole assembly. Picked up Baker Model D packer assembly and tripped in hole with the packer assembly to 8,453 ft. Pumped down ball, and set packer at 8,453 ft. Directional Data: md 9,407 ft, hole angle 86.9°, azimuth N10.2°E, tvd 7,948.22 ft. Mud Properties: wt 16.4, vis 68, solids 37%, wl 6.4, gels 8/30, PV 81, YP 44, pH 8.5, oil 4%.

Note: The bottom of the wellbore at 9,407 ft TMD, 7948.22 ft TVD, is located 1982.38 ft North, and 1162.81 ft East, of the surface location.

August 20, 1991, (101), Depth 9,407 ft; Footage Last 24 Hrs: 0 ft.

Circulating at 7,600 ft at report time. Set packer at 8,453 ft. POOH with setting tool. TIH with seal assembly. Drifting 3-1/2-in. drillpipe with a 2.40-in. drift tool for "R" nipple. Laid

down 27 joints of 3-1/2-in. drillpipe that won't drift. At report time the seal assembly is at 7,600 ft. Mud Properties: wt 16.4, vis 59, solids 39%, wl 6.0, gels 8/25, PV 63, YP 22, pH 9.0, oil 4%.

August 21, 1991, (102), Depth 9,407 ft; Footage Last 24 Hrs: 0 ft.

Waiting on daylight to set "R" plug. Finished tripping in hole to 8,420 ft, circulated at 8,450 ft and conditioned mud. Stung into packer at 8,453 ft. Pressure tested annulus to 2,000 psi, OK. Waited on TIW valve (needed 2.31-in. ID). Installed TIW valve, pressure tested lines to 5,000 psi with Dowell. Pumped 52 BBLS 2% KCl down drillpipe, stung into packer at 8,453 ft, and pressured annulus to 500 psi. Opened drillpipe to reserve pit, pressure blew down from 3,400 psi to 100 psi. Recovered all KCl water in 50 minutes. Pressure increased to 1,400 psi while flowing mud to the pit. Well cleaned up and pressure stabilized at 2,500 psi on a 1/2 to 3/4-in. choke setting. Shut well in, rigged up Pomrenke wireline and opened well up with 4,340 psi SIDPP. TIH with gauge ring to 8,469 ft, OK. POOH. TIH with Baker "R" plug (Baker hand forgot the equalizing pin). Lost "R" 'plug in the hole. Shut well in at 10 p.m. Will fish "R" plug today. SIDPP at 8 a.m. August 22, 1991, following 10 hrs shut-in, was 4,370 psi. Mud Properties: wt 16.4, vis 58, solids 39%, wl 6.0, gels 7/20, PV 62, YP 20, pH 9.0, oil 4%.

August 22, 1991, (103), Depth 9,407 ft; Footage Last 24 Hrs: 0 ft.

Laying down 3-1/2-in. drillpipe at report time, 7 a.m. August 23, 1991. Waited on daylight to retrieve "R" plug. SIDPP was 4,470 psi at 8 a.m. August 22, 1991. TIH with wireline retrieving tool to 8,469 ft. POOH but did not recover plug. Reset retrieving tool and TIH with wireline retrieving tool to 8,469 ft. POOH and recovered "R" plug with wireline. Make up new "R" plug. TIH and set "R" plug (2.25-in. RZG-21) in "R" nipple at 8,469 ft. POOH and released pressure on drill pipe. It took 1 hour to blow down the drillpipe to atmospheric pressure. Rigged down wireline company and rigged up Dowell. Filled drillpipe with 53 BBLS of 16.5 ppg mud, unset seal assembly, and reverse circulated the well. POOH with seal assembly, picked up Mountain States retrievable bridge plug, TIH and set RBP at 8,358 ft. Pressure tested RBP to 2,000 psi, OK. Reverse circulated mud from wellbore with 310 BBLS 2% KCl. Started POOH laying down drillpipe.

August 23, 1991, (104), Depth 9,407 ft; Footage Last 24 Hrs: 0 ft.

Nippling down BOP's at report time. Finished laying down 3-1/2-in. drillpipe. TIH with 3-1/2-in. 25.5 lb/ft HWDP. POOH laying down HWDP. Break down kelly, rig down floor, lay down kelly. Started to nipple down the BOP's.

August 24, 1991, (105), Depth 9,407 ft; Footage Last 24 Hrs: 0 ft.

Finished nippling down the BOP's. Nippled up the casing head and tested to 5,000 psi (OK). Nippled up the tree and tested to 5,000 psi (OK). Finished cleaning out the mud pits. Rig released at 5 p.m. August 24, 1991.

Appendix 2

CASING AND CEMENTING REPORTS

CER CORPORATION

CASING AND CEMENTING REPORT

District Las Vegas, NV Lease Superior, SHCT Well No. 1 ST Date July 1991

Datum 5,407 GL Last casing: Size 9-5/8, set at 4,130 This casing: Size 7, set at 8,580

Driller's total depth 8,588 Electric log to - Hole size 8-3/4 in., with - in. rathole below -

Casing on hand at well: Number of joints 201 Amount, measured overall - Amount, less threads 8599.61

Log of casing string, each item being listed in same order as run into well

Pieces	Size — Item — Make — Description	Wt./Ft.	Grade	Threads	Cond'n.	Made-up Length
1	7" Guide Shoe - Davis Lynch - Down Jet	29	N80	8RD	A	2.58
1	7" Casing - CF&I - LT&C, R3	29	N80	8RD	A	45.70
1	7" Float Collar - Davis Lynch - Differential Fill	29	N80	8RD	A	2.26
50	7" Casing - CF&I - LT&C, R3	29	N80	8RD	A	2164.37
1	7" Hydraulic Stage Tool - Davis Lynch	29	N80	8RD	A	2.07
150	7" Casing - CF&I - LT&C, R3	29	N80	8RD	A&B	6382.10

Time required to run 10.5 hrs. Top of casing string 32 ft. above (~~below~~) datum. Total 8599.61

Casing left out of string: Number of full joints 1 Amount, measured overall - Amount, less threads 38.97

Centralizers: No. 62 Make Davis Lynch Depths placed 1 per joint through build, tangent

Scratchers: No. none Type - Spacing detail -

CEMENTING REPORT—Service company used Dowell-Schlumberger Number of pump trucks 2

Good circulation established? Yes Minutes circulated 120 Was casing bottomed up? Yes Bottom plug used? Yes

Cement mixed: Number of sacks 1st STG - 385
2nd STG - 265 Kind See Below Admixture See Below

Slurry weight (av.) 1st STG -16.0/14.5
2nd STG -14.5 Minutes required to: Mix 1st STG -26 min
2nd STG -18 Start top plug 1 Pump plug down 2 0 hr, 43 min
1 hr, 13 min

Was plug followed with measuring line? No Plug pumped to 1st STG-8529
2nd STG-6362 Pressures: Late pumping 1st STG-800
2nd STG-1000 Final 1st STG-2240
2nd STG-2350

Pressure bled off to 0 psi and held below - psi for - hrs. Did back pressure valve hold? Yes

REMARKS

1st STG: 65 SKS Class G + 0.75% D59, 0.2% D121, 35% D66, 0.3% D65, 0.2% D79

320 SKS Class G 50/50 POZ + 2% D20, 8% D44, 0.8% D112, 35% D66, 0.1% D13

2nd STG: 265 SKS Class G 50/50 POZ + 2% D20, 8% D44, 0.8% D112, 35% D66, 0.1% D13

Note: Pumped 20 bbls CW101 and 60 bbls mud push prior to each stage. 14.6 ppg mud used for displacement in both stages.

Recommended minimum WOC time 24 hrs. Signed Dave Hildreth and Rob Zeis

Temperature survey indicates top cement at _____ (SKETCH AND COMMENTS ON REVERSE SIDE) CER83-16

CER CORPORATION

Casing and Tubing Installation

TALLY SHEET

	1		2		3		4		5		6		7			
	FEET	100ths	FEET	100ths	FEET	100ths	FEET	100ths	FEET	100ths	FEET	100ths	FEET	100ths	FEET	100ths
1	45	70	42	55	46	00	42	13	43	37	44	11	41	00		
2	45	39	44	33	45	49	38	36	44	48	35	68	45	10		
3	40	48	45	23	46	01	38	04	43	08	42	61	37	23		
4	45	39	45	00	44	68	41	35	43	70	42	22	42	56		
5	45	56	44	20	44	96	45	53	34	82	45	00	35	70		
6	43	93	44	64	44	85	39	58	42	23	34	55	46	28		
7	44	51	45	01	45	47	40	47	36	58	44	16	41	12		
8	45	81	39	91	45	43	35	38	37	43	45	21	44	42		
9	41	05	43	10	45	16	37	93	39	36	44	88	43	77		
10	41	52	38	87	42	22	46	29	41	49	42	02	42	11		
TOTAL	439	34	432	84	450	27	405	06	406	54	420	44	419	29		
11	37	77	35	76	45	49	45	42	42	56	43	01	44	92		
12	45	02	45	54	45	36	45	85	44	30	42	80	44	76		
13	42	99	43	00	45	41	45	96	43	79	44	17	43	95		
14	43	00	41	01	44	66	45	98	42	80	42	08	42	96		
15	41	38	44	66	45	15	45	65	42	57	43	45	44	25		
16	44	44	43	80	45	07	43	26	35	97	44	35	42	54		
17	43	38	44	71	45	71	43	87	43	20	43	69	34	20		
18	45	82	44	28	40	52	45	64	43	07	38	68	42	80		
19	44	88	45	44	43	29	45	06	40	72	44	01	41	66		
20	44	50	41	28	45	61	45	20	44	20	41	83	43	28		
TOTAL	433	18	429	48	446	27	451	89	423	18	428	07	425	32		
21	40	24	43	73	45	23	38	66	43	58	43	35	38	97		
22	43	90	36	35	43	75	40	76	43	95	42	79				
23	43	53	40	14	36	73	45	71	41	01	42	03				
24	42	24	44	85	45	50	35	31	37	82	43	49				
25	44	73	45	91	45	76	45	36	39	08	41	30				
26	44	15	43	60	42	22	41	69	44	62	42	69				
27	43	94	45	73	44	63	44	23	36	83	41	31				
28	43	17	45	67	45	31	43	16	34	43	37	41				
29	42	01	45	25	36	91	39	98	42	70	44	61				
30	43	58	43	12	44	45	44	25	44	76	39	36				
TOTAL	431	49	434	35	430	49	419	11	408	78	418	34	38	97		
GRAND TOTAL	1304	01	1296	67	1327	03	1276	06	1238	50	1266	85	803	58		

Total 7" Casing	8592.70
Total Tools	+ 6.91
GL & KB	+ 32.00
1 Jt Out	- 38.97
Length of String	8592.64
Setting Depth	-8580.00
Cut Off	12.64 Up

DISTRICT Las Vegas, NV

FIELD Rulison

LEASE Superior

WELL NO. SHCT No. 1 (Sidetrack)

CASING SET AT (DEPTH) 8,580 ft

MT, MTT OR PO NO. -

DATE July 25, 1991

TALLIED BY Dave Hildreth, Rob Zeis

SUMMARY

(Use different columns for each pipe of different weight and grade)

Col.	O.D	Lbs/Foot	Grade	Class	Type of Thread	Cond.	Feet	100ths
1	7	29	N80	SMLS	LT&C 8RD	A	1304	01
2	7	29	N80	SMLS	LT&C 8RD	A	1296	67
3	7	29	N80	SMLS	LT&C 8RD	A	1327	03
4	7	29	N80	SMLS	LT&C 8RD	A	1276	06
5	7	29	N80	SMLS	LT&C 8RD	A	1238	50
6	7	29	N80	SMLS	LT&C 8RD	A	1266	85
7	7	29	N80	SMLS	LT&C 8RD	A&B	883	58
8								
						TOTAL	8592	70

CER83-21

Appendix 3

MUD LOG, MEASURED DEPTH

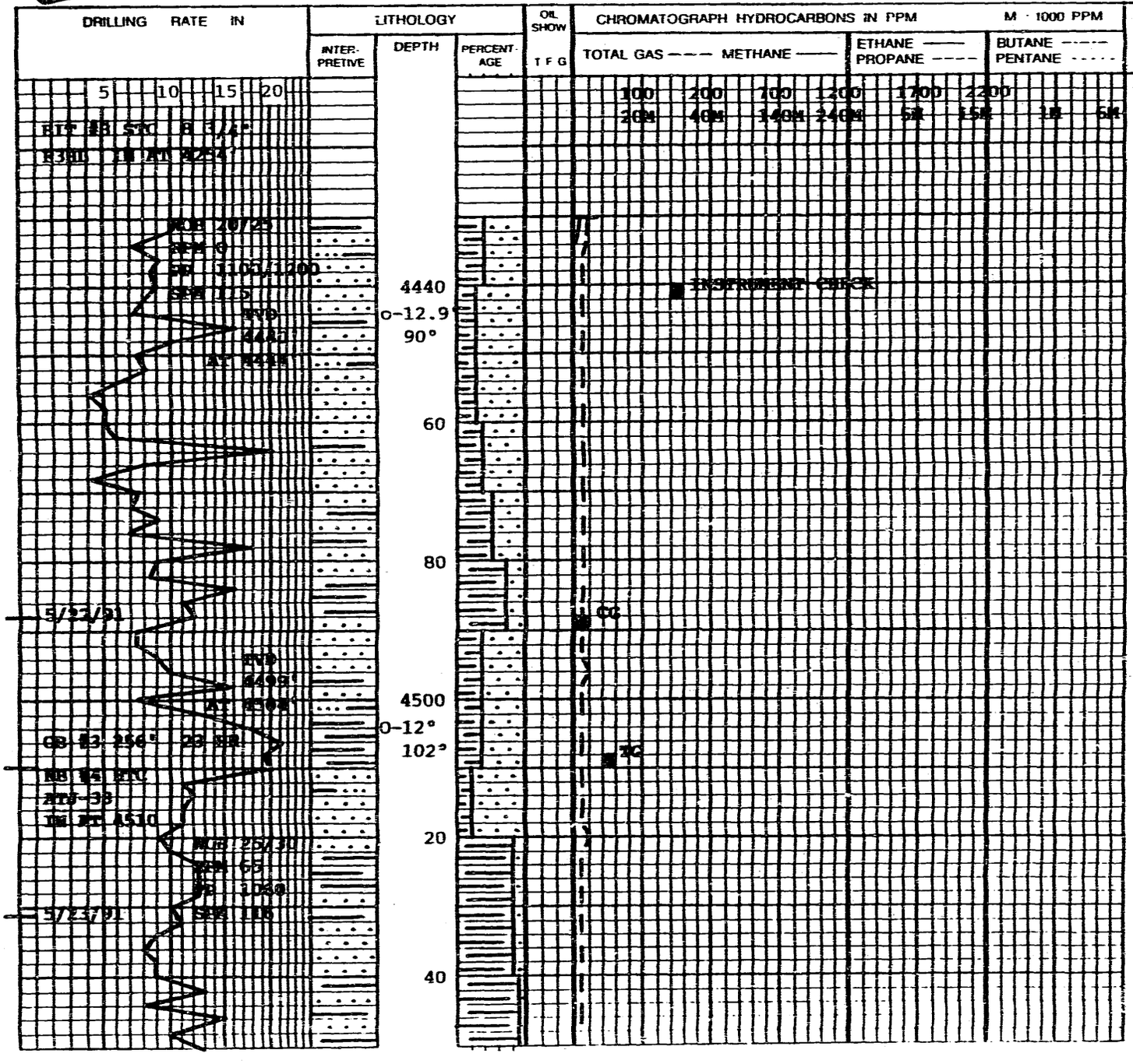
ROCKY MOUNTAIN GEO-ENGINEERING CO.

WELL SITE GEOLOGY MUD LOGGING

2450 INDUSTRIAL BLVD PHONE (303) 243-3044 GRAND JUNCTION, CO 81505

COMPANY
WELL NAME

COUNTY
STATE



REMARKS

WT	VIS	WL	CKE	PH

RMEC UNIT #29 ON LOCATION AND RIGGED UP 5/18/91

COMMENCED LOGGING 5/21/91

RIG CREW CATCHING 10' SPLS

SS wh s&p ltgy vf-mgr sbang-sbrd msrt mcmt calc sl arg mtx carb frag tr pyr NFSOC

SH lt-mgy gybrn gygn sbblky frm slty ip tr carb n-slcalc

SS s&p wh trnsl ltgy f-mgr sbang-sbrd m-wsrt m-pcmt sl-ncalc arg mtx ip carb frag tr glau NFSOC

9.6 46 8.6 2 10.0
Cl 600 Ca 40

SS s&p ltgy ltgn vf-mgr sbang-sbrd msrt m-pcmt slcalc arg/slty mtx carb frag tr glau NFSOC

SH m-ltgy gybrn gygn sbblky frm occ slty n-slcalc

SS ltgy wh vf-fgr sbang-sbrd wsrt m-pcmt calc arg mtx slty ip tr carb frag NFSOC

ROCKY MOUNTAIN GEO-ENGINEERING CO.
WELL SITE GEOLOGY — MUD LOGGING
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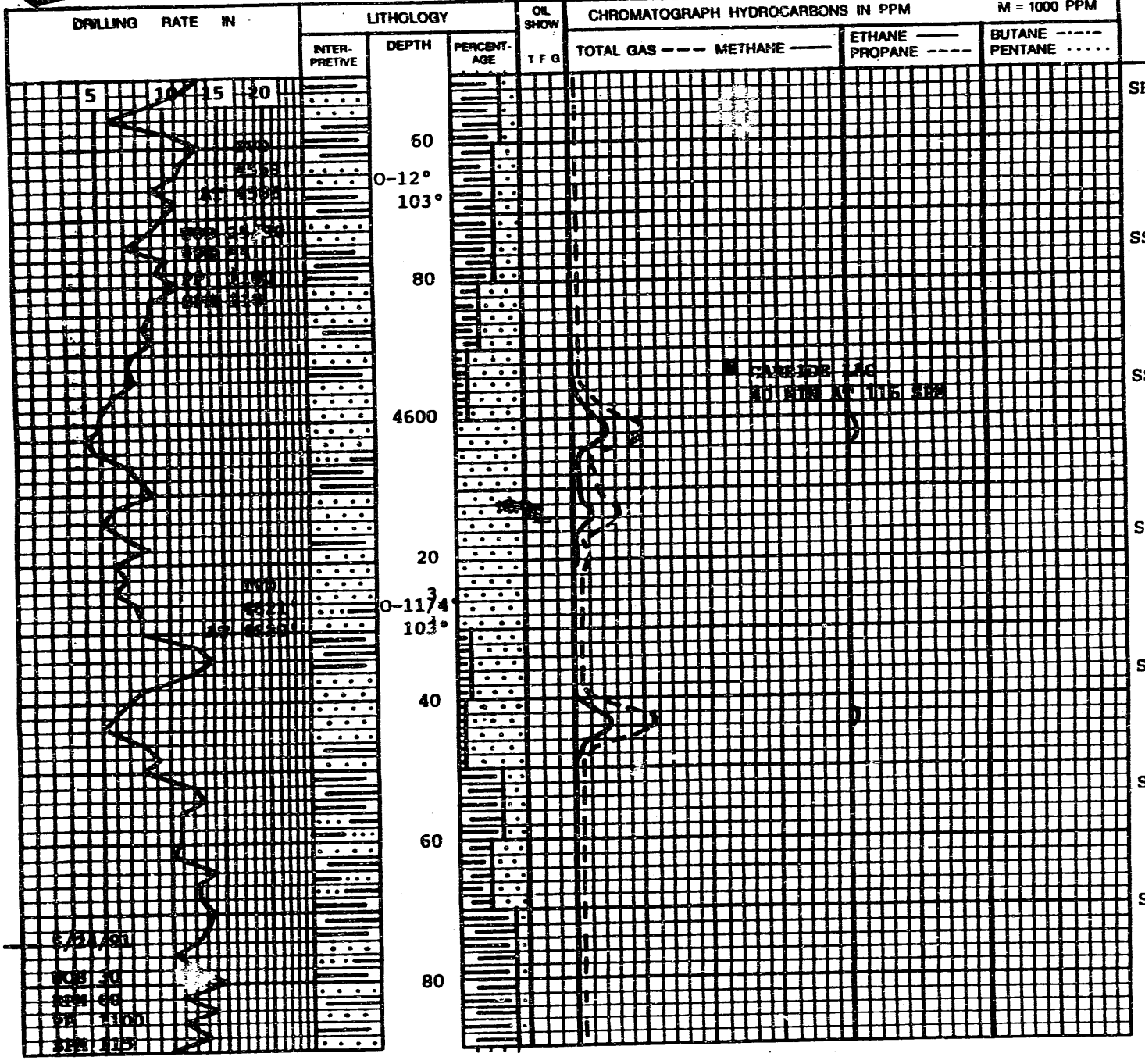
STATE



REMARKS

WT	VIS	WL	CKE	PH

SH mgy gygn sbblky-fiss frm occ slslty tr carb n-sl calc

9.5+ 51 8.4 2 9.5
Cl 600 Ca 40

SS ltgy s&p f-vfgr sbang-sbrd wsrt p-mcmt n-slcalc arg/slty mtx carb frag tr glau NFSOC

SS trnsl clr wh s&p f-mgr sbang-ang wsrt pcmt-uncons slcalc occ arg mtx carb frag tr glau NFSOC

SS wh s&p trnsl f-vfgr sbang ang wsrt p-mcmt slcalc ip occ arg mtx carb frag tr pyr NFSOC

SH m-dkgy gybrn sbblky-sbplty frm occ slslty tr carb n-vslcalc

SS lt-mgy trnsl vf-fgr sbang wsrt mcmt calc vslty arg loc grdg to sltst NFSOC

SH mgy gybrn gygn sbblky m-vfrm m-vslty occ sdy loc grdg to sltst sl-n calc

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WELL SITE GEOLOGY – MUD LOGGING
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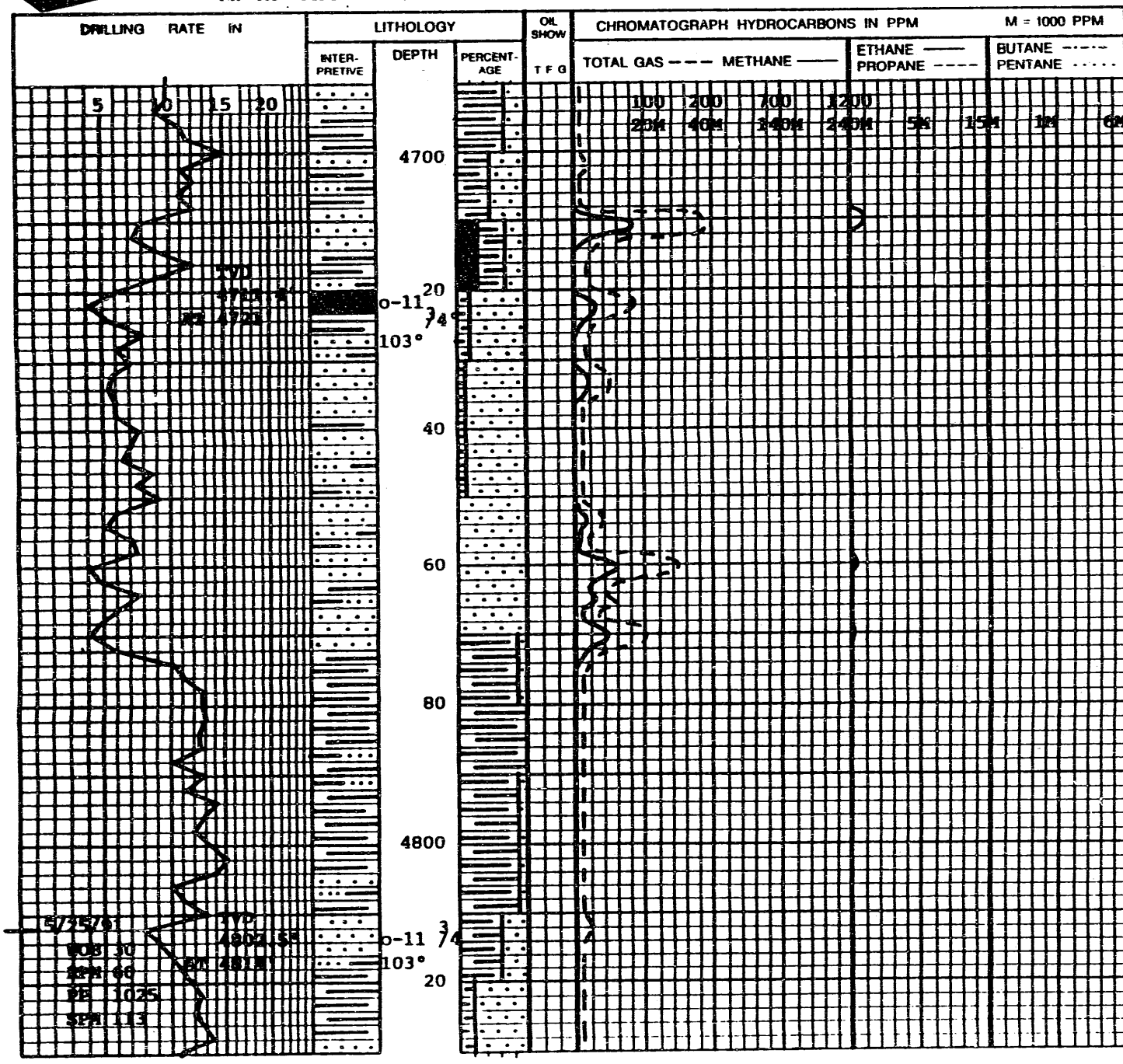

REMARKS

WT	VIS	WL	CKE	PH

SS wh ltgy s&p f-vfgr sbang wsrt m-pcmt calc arg/ slty mtx carb frag NFSOC

9.4 52 8.4 9.5
Cl 600 Ca 20

COAL blk dull blky frm brit ip shly

SS ltbrn wh trnsl f-mgr sbang wsrt m-pcmt calc arg mtx tr pyr NFSOC

SS wh trnsl occ s&p f-mgr sbrd-sbang wsrt mcmt n-vslcalc arg mtx occ carb frag NFSOC

SH m-dkgy gygn ltgy sbblky-blky m-vfrm occ slslty ncalc

SS ltgn ltgygn offwh vf-fgr sbang wsrt m-wcmt sil arg mtx slty ip occ mica NFSOC

SS ltgygn offwh vf-fgr sbang wsrt m-pcmt calc arg mtx abnt carb frag mica NFSOC

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WELL SITE GEOLOGY — MUD LOGGING

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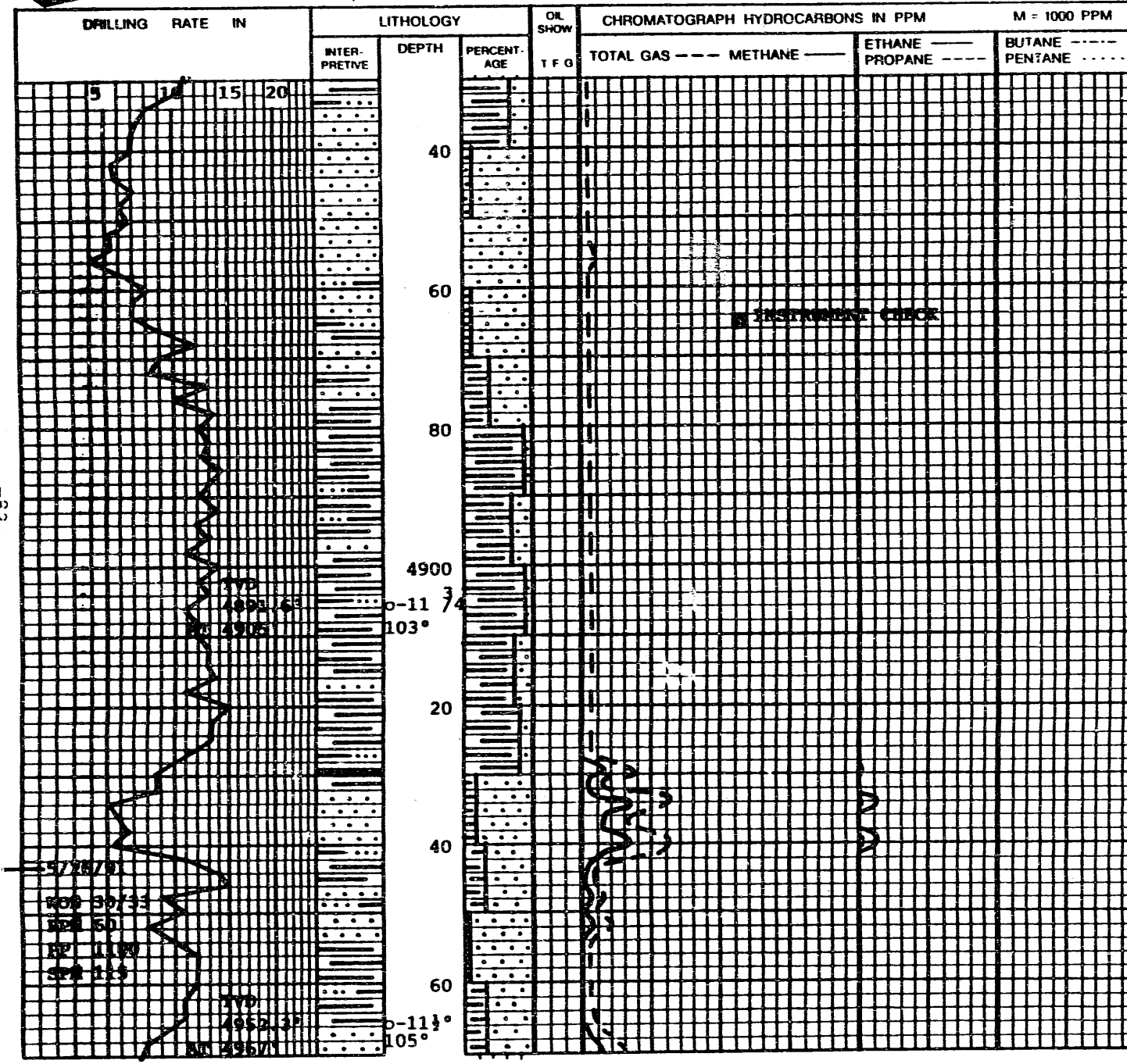

REMARKS

WT	VIS	WL	CKE	PH

SH lt-mgy gygn gybrn sbblky sbplty frm slslty ip ncalc

9.5 48 8.0 2 9.5
Cl 600 Ca 0

SS trnsl wh f-mgr sbang wsrt p-mcmt slcalc ip arg mtx ip occ carb frag occ mica NFSOC

SH dk-mgy gybrn sbblky-sbplty frm sl-mslty ip sl-ncalc

SS ltgy ltgygn vfgr sbang-sbrd wsrt w-mcmt slcalc ip varg mtx carb frag NFSOC

SH ltgy dkgybrn dkbrn sbblky blky frm-sft slty ip loc grdg to sltst carb ip tr coal sl-ncalc

SS offwh wh s&p ip fgr sbrd-sbang wsrt mcmt occ sl calc arg mtx carb frag tr pyr tr dul yel flor NSOC

SS trnsl wh offwh s&p f-vfgr sbang wsrt m-wcmt occ arg mtx carb frag tr pyr tr mica NFSOC

ROCKY MOUNTAIN GEO-ENGINEERING

WELL SITE GEOLOGY — MUD LOGGING

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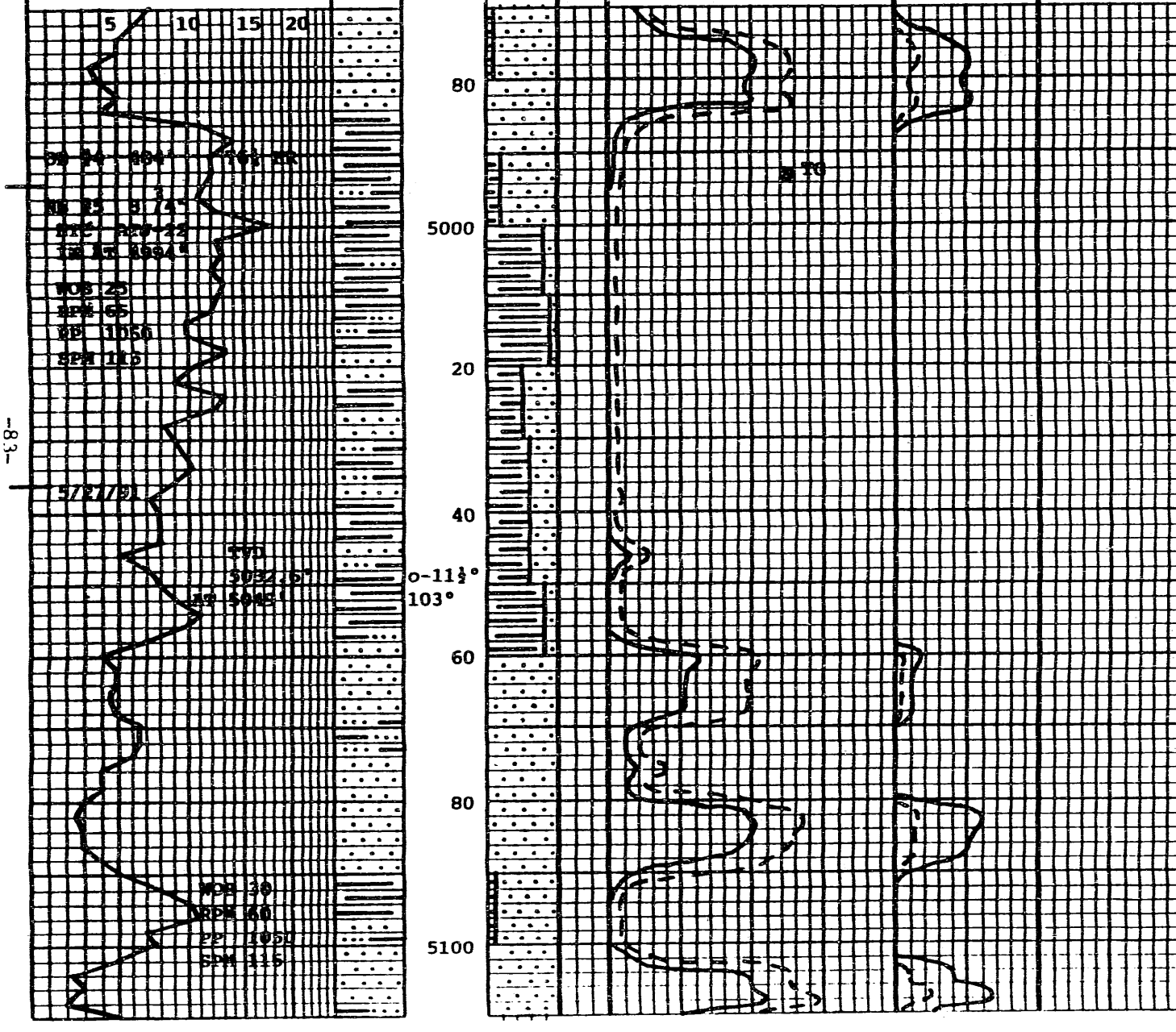

REMARKS

WT	VIS	WL	CKE	PH

SS trnsl offwh f-mgr sbang wsrt m-wcmt occ slarg mtx occ carb frag NFSOC

9.4+ 58 8.0 2 10.0
Cl 600 Ca 0

SH ltgy sbblky-blky frm slty ip tr mica ncalc

SS ltgygn ltgy vfgr sbang-sbrd wsrt mcmt sil arg/slty mtx tr carb frag nfsoc

SS trnsl ltgy s&p vf-fgr sbang wsrt m-pcmt calc arg mtx ip carb frag NFSOC

SH lt-mgy ltgygn gybrn sbblky frm sl-vslty ip loc grdg to sltst sdy ip ncalc

SS wh trnsl s&p f-mgr sbang wsrt m-pcmt sl-ncalc carb frag tr mica NFSOC

SS trnsl wh f-mgr sbang wsrt m-pcmt sl-ncalc occ carb frag tr mica NFSOC

9.5 53 8.2 2 9.5
Cl 600 Ca 0

SS trnsl wh f-vfgr sbang wsrt mcmt sil slty ip occ carb frag tr mica tr pyr NFSOC

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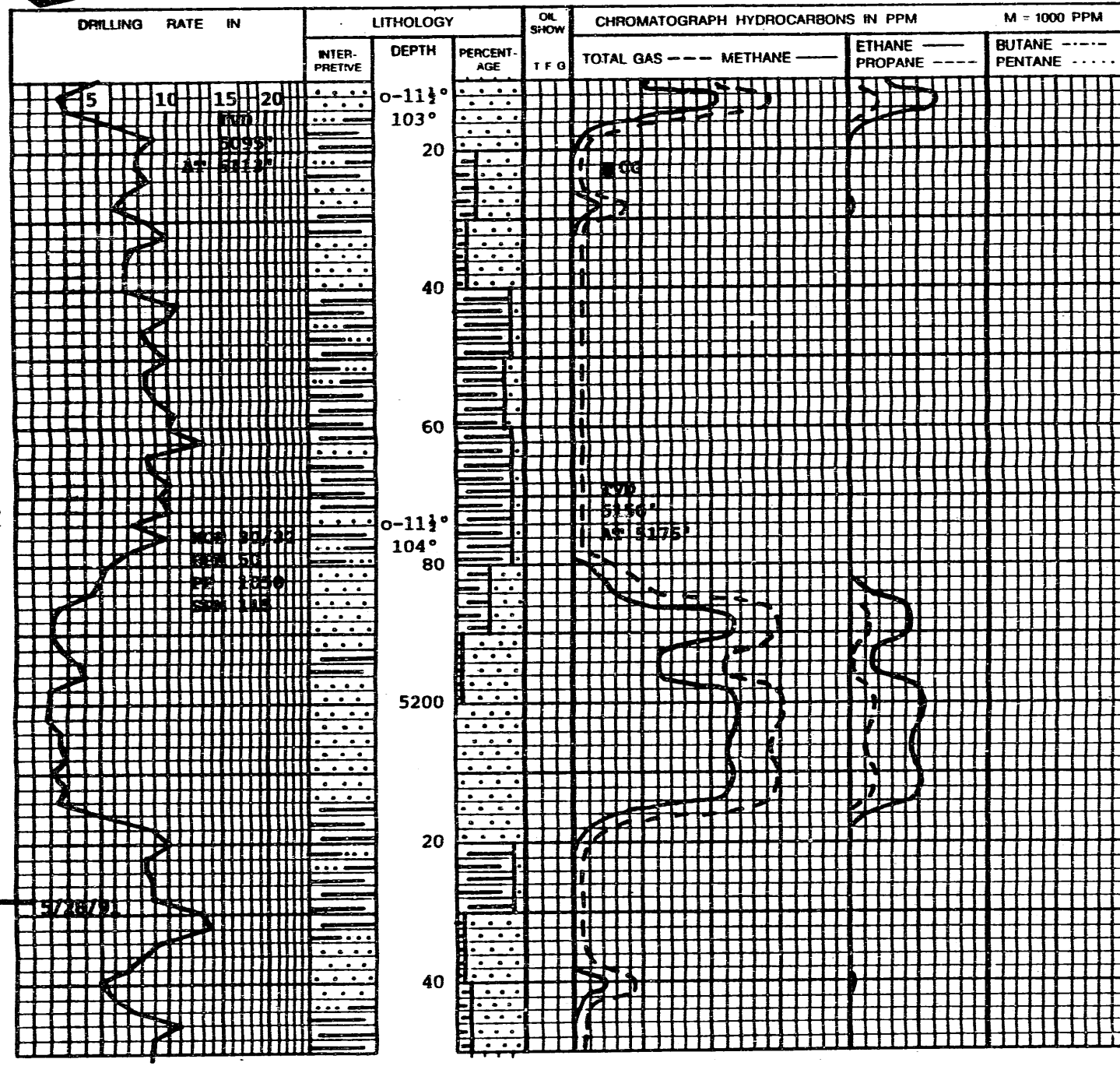


SH m-dkbrn ltgy sbblky sl-mfrm occ slty occ carb tr mica n-slcalc

SS wh trnsl f-vfgr sbang wsrt m-wcmt sil slty ip tr pyr NFSOC

SH mbrn gybrn mgy sbblky frm m-vslty loc grdg to sltst tr carb ncalc

ADDING DIESEL TO MUD

SH lt-mgy gybrn sbblky-sbplty m-slfrm slty ip tr carb frag ncalc

SS wh trnsl m-vfgr sbang-ang msrt p-mcmt occ sl calc occ mica NFSOC

SS wh trnsl m-fgr sbang wsrt p-mcmt occ slcalc incr mica tr glau NFSOC

SH gybrn ltgy blky-sbplty frm slslty ip ncalc

SS s&p wh f-vfgr sbang wsrt m-pcmt slcalc slarg mtx carb frag NFSOC

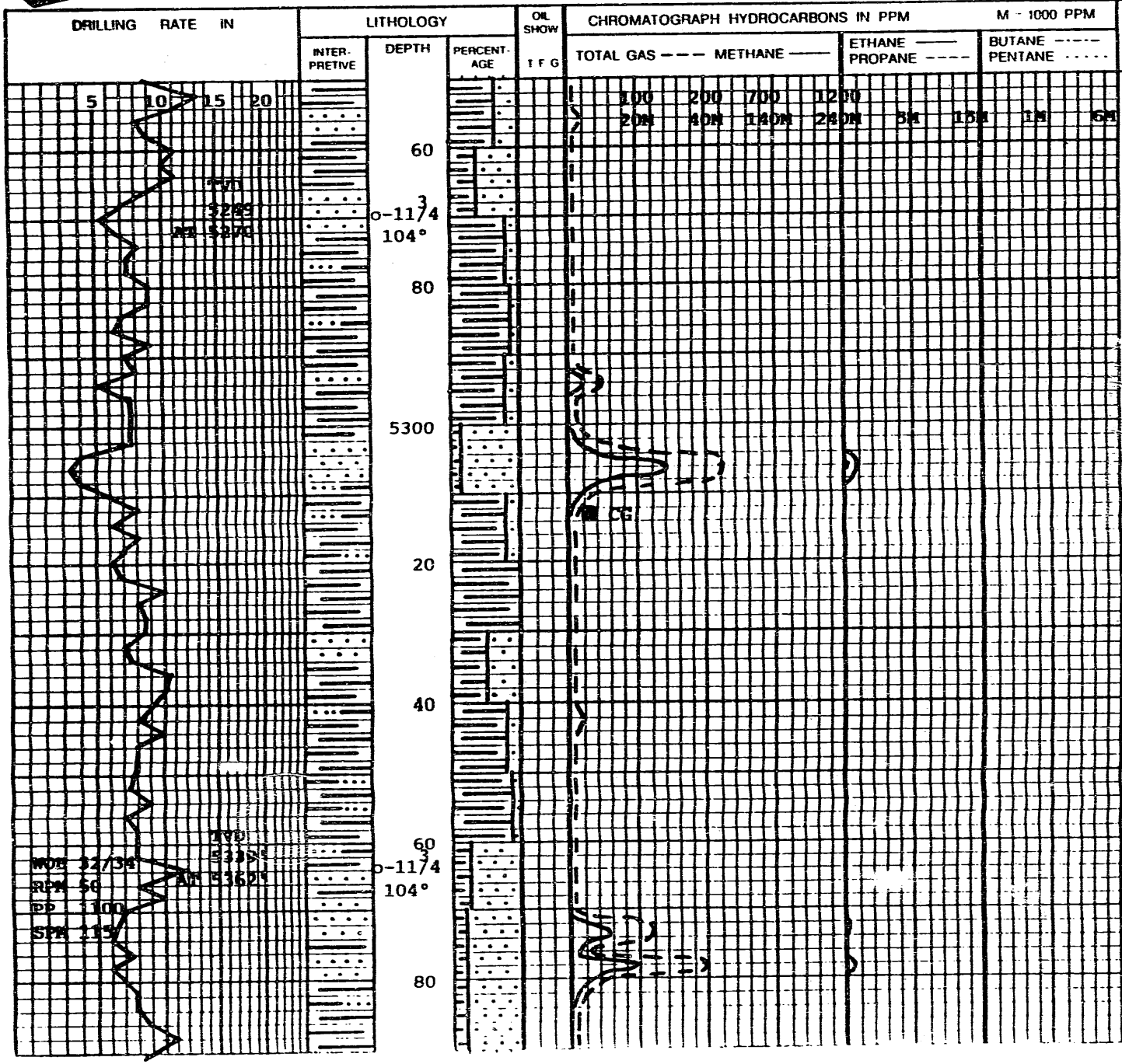
ROCKY MOUNTAIN GEO-ENGINEERING CO.

WELL SITE GEOLOGY - MUD LOGGING

2450 INDUSTRIAL BLVD PHONE (303) 243-3044 GRAND JUNCTION CO 81505

COMPANY
WELL NAME

COUNTY
STATE



REMARKS

WT	VIS	WL	CKE	PH
9.7	55	6.8	2	10.0

Cl 600 Ca 0

SH m-dkgy dkbrn blky-sbplty m-slfrm occ slty occ carb frag n-slcalc

SH dkgy dkbrn sbplty-sbblky m-slfrm occ carb n-slcalc

SS offwh vltbrn vf-fgr sbang-sbrd wsrt pcmt slcalc ip arg/slty mtx occ carb frag occ abnt carb frag NFSOC

SH m-dkgy gygn gybrn sbplty-sbblky slfrm-sft occ carb frag n-slcalc

SS wh s&p ltgy vf-fgr sbang sbrd wsrt pcmt slcalc ip arg mtx ip carb frag tr mica NFSOC

SH gybrn mbrn sbblky frm vslty ip loc grdg to sltst carb frag slcalc

SS s&p trnsl offwh f-vfgr sbang-sbrd wsrt m-pcmt calc carb frag NFSOC

ROCKY MOUNTAIN GEO-ENGINEERING CO.

WELL SITE GEOLOGY MUD LOGGING

2450 INDUSTRIAL BLVD PHONE (303) 243-3044 GRAND JUNCTION, CO 81505

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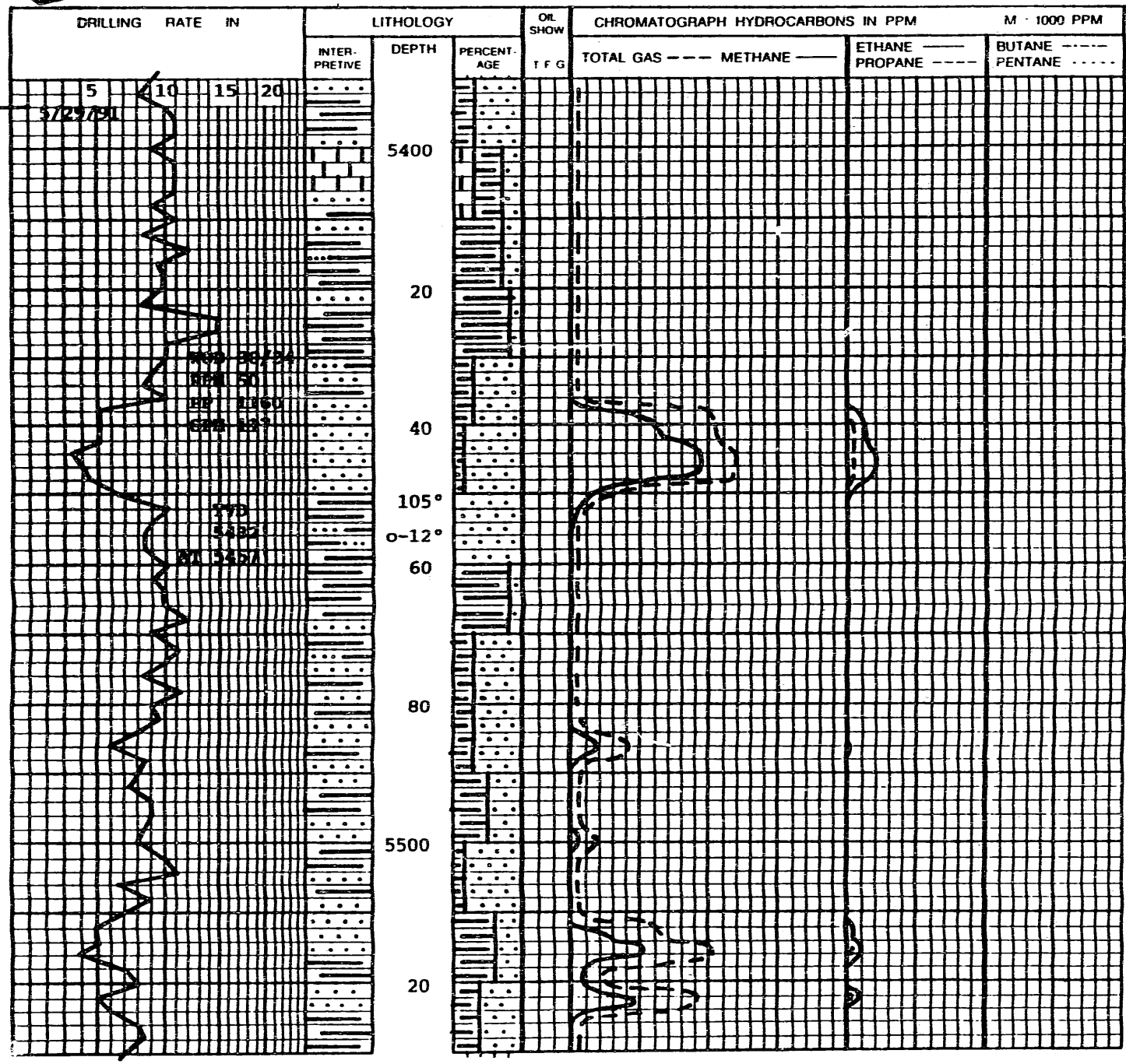

LS brn tn crpxln dns varg sdy ip tt NFSOC

SS lt-mbrn ltgy vf-mgr sbang msrt mcmt slcalc varg slty carb frag mica tr pyr NFSOC

9.6+ 46 6.6 2 9.5
Cl 600 Ca 0

SS vltbrn offwh vf-mgr sbang-ang msrt m-wcmt calc arg/slty ip occ carb frag tr mica tr brn stn NFOC

SH m-ltgy gybrn blky-sbplty m-vfrm occ slty tr carb frag ncalc

SS offwh ltbrn vf-mgr sbang sbrd msrt m-wcmt calc slty mtx ip occ carb frag tr mica NFSOC

SH m-dkgy gybrn blky-sbplty frm tr carb frag ncalc

SS ltbrn offwh f-vfgr sbang wsrt m-wcmt calc arg mtx carb frag occ abnt carb NFSOC

ROCKY MOUNTAIN GEO-ENGINEERING CO.

WELL SITE GEOLOGY — MUD LOGGING

2450 INDUSTRIAL BLVD PHONE (303) 243 3044 GRAND JUNCTION CO 81505

COMPANY
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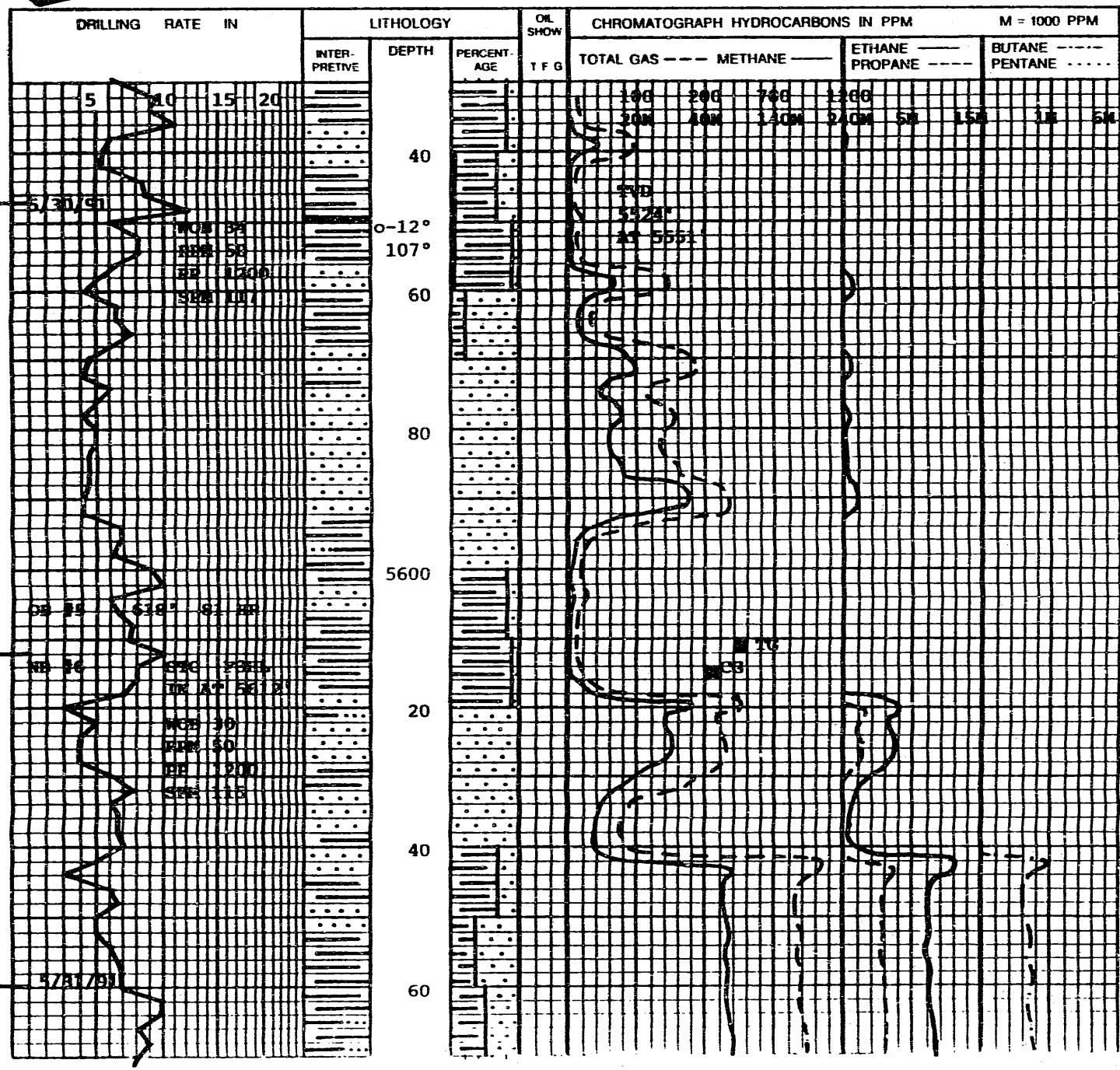


REMARKS

WT	VIS	WL	CKE	PH

SH m-dkbrn mgy sbblky-sbplty m-slfrm occ carb tr pyr n-slcalc

COAL blk dkbrn dull blky frm brit ip shly

SS trnsl clr wh m-fgr sbang sbrd wsrt mcmt calc sl arg ip occ carb frag tr glau tr pyr NFSOC

SS trnsl s&p wh m-fgr sbrd-sbang wsrt mcmt calc carb frag tr glau NFSOC

9.7 46 6.6 2 9.5
Cl 600 Ca 40

SH m-dkbrn gybrn blky-sbplty mfrm occ carb ncalc

SS trnsl wh s&p m-fgr occ cgr sbang-ang msrt m-p cmt calc carb frag NFSOC

MUD GOING THRU GAS BUSTER
MUD 9.7/9.4 IN/OUT

SS ltbrn ltgy vf-fgr sbang-sbrd wsrt mcmt slcalc ip vslty carb frag occ abnt NFSOC

SH gybrn mbrn mgy sbblky slfrm-sft vslty ip sdy ip occ carb ncalc

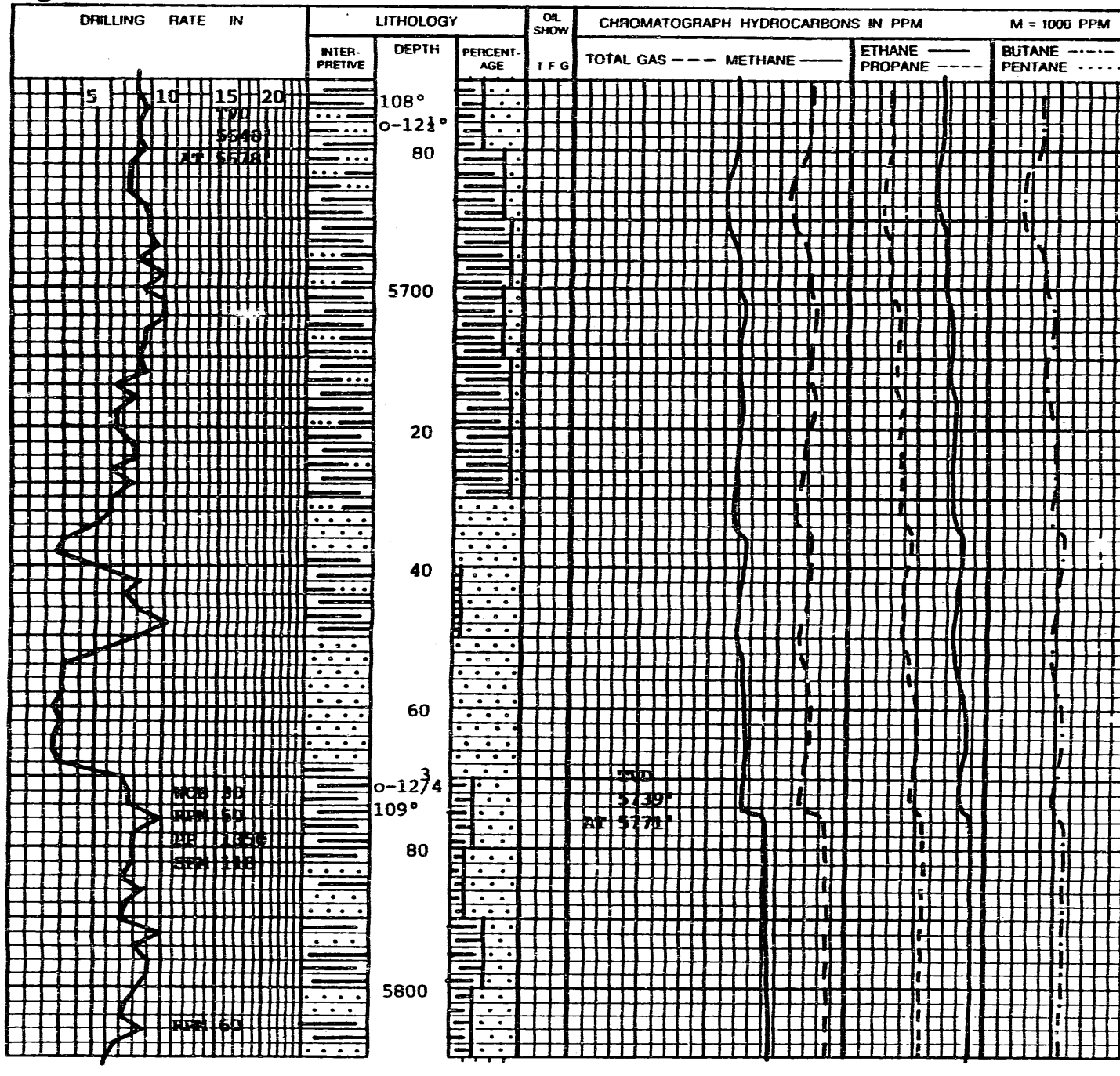
ROCKY MOUNTAIN GEO-ENGINEERING CO.

WELL SITE GEOLOGY MUD LOGGING

2450 INDUSTRIAL BLVD PHONE (303) 243-3044 GRAND JUNCTION, CO. 81505

COMPANY
WELL NAME

COUNTY
STATE



REMARKS

WT | VIS | WL | CKE | PH

SS ltgy ltbrn vf-fgr sbang wsrt mcmt occ slcalc arg/slty mtx carb frag tr pyr NFSOC

SS ltgy offwh vfgr sbang wsrt pcmt occ slcalc arg vslty carb frag NFSOC

10.0/9.5 48 6.8 2 9.5
Cl 600 Ca 40

SH mbrn gybrn mgy sbblky-blky frm slty ip loc grdg to sltst occ carb n-slcalc

SS ltbrn clr trnsl m-fgr sbang-sbrd wsrt m-pcmt calc slarg ip carb frag NFSOC

SS clr s&p wh m-fgr sbrd-sbang wsrt mcmt slcalc carb frag NFSOC

SS ltbrn offwh vf-mgr sbang sbrd msrt mcmt calc arg/slty mtx carb frag NFSOC

OFF GAS BUSTER 9.9/9.5

SH mbrn mgy blky-sbplty m-slfrm slty ip carb lam ip ncalc

SS offwh ltbrn m-vfgr sbdr-sbang msrt mcmt calc arg/slty ip carb frag tr glau NFSOC

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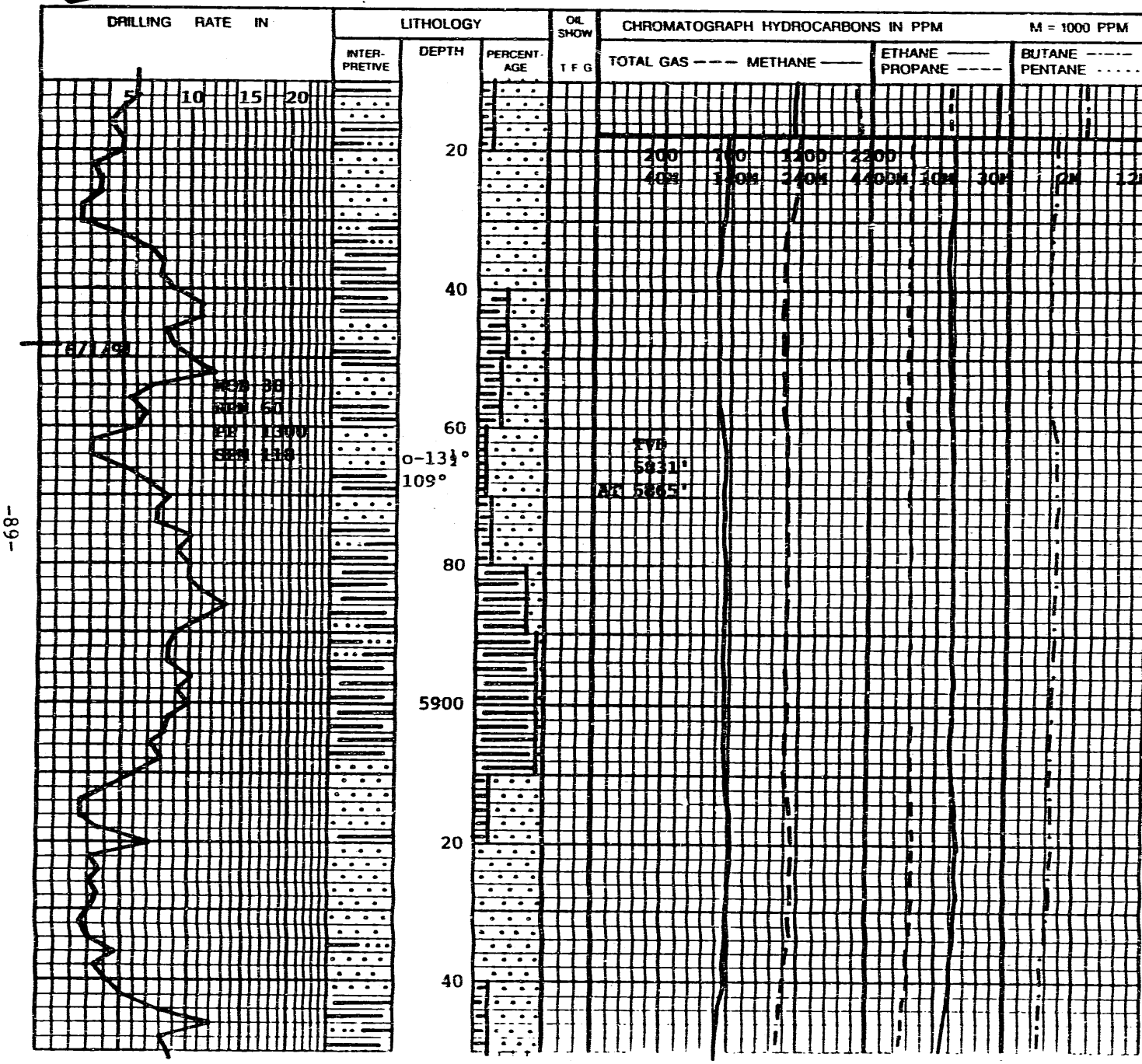

REMARKS

WT	VIS	WL	CKE	PH

NOTE: SCALE CHANGE

SS s&p trnsl wh f-cgr sbrd-sbang wser m-wcmt occ slcalc carb frag tr glau NFSOC

SH mbrn gybrn mgy sbblky-sbplty frm slty loc grdg to sltst occ carb sl-ncalc

SS ltgy s&p vf-mgr sbang-sbrd msrt m-pcmt slcalc ip slty mtx ip carb frag NFSOC

SH gybrn mgy sbblky-sbplty m-slfrm slty ip n-slcalc

10.0/9.6 50/56 6.6 2 9.5
Cl 600 Ca 40

SH m-dkbrn mgy sbblky-blky v-slfrm slty ip carb ip sl-ncalc

SS wh trnsl s&p m-vfgr sbang-sbrd msrt p-mcmt slcalc ip occ arg carb frag tr pyr NFSOC

SS wh trnsl c-fgr sbang-sbrd msrt mcmt occ carb frag tr glau tr pyr NFSOC

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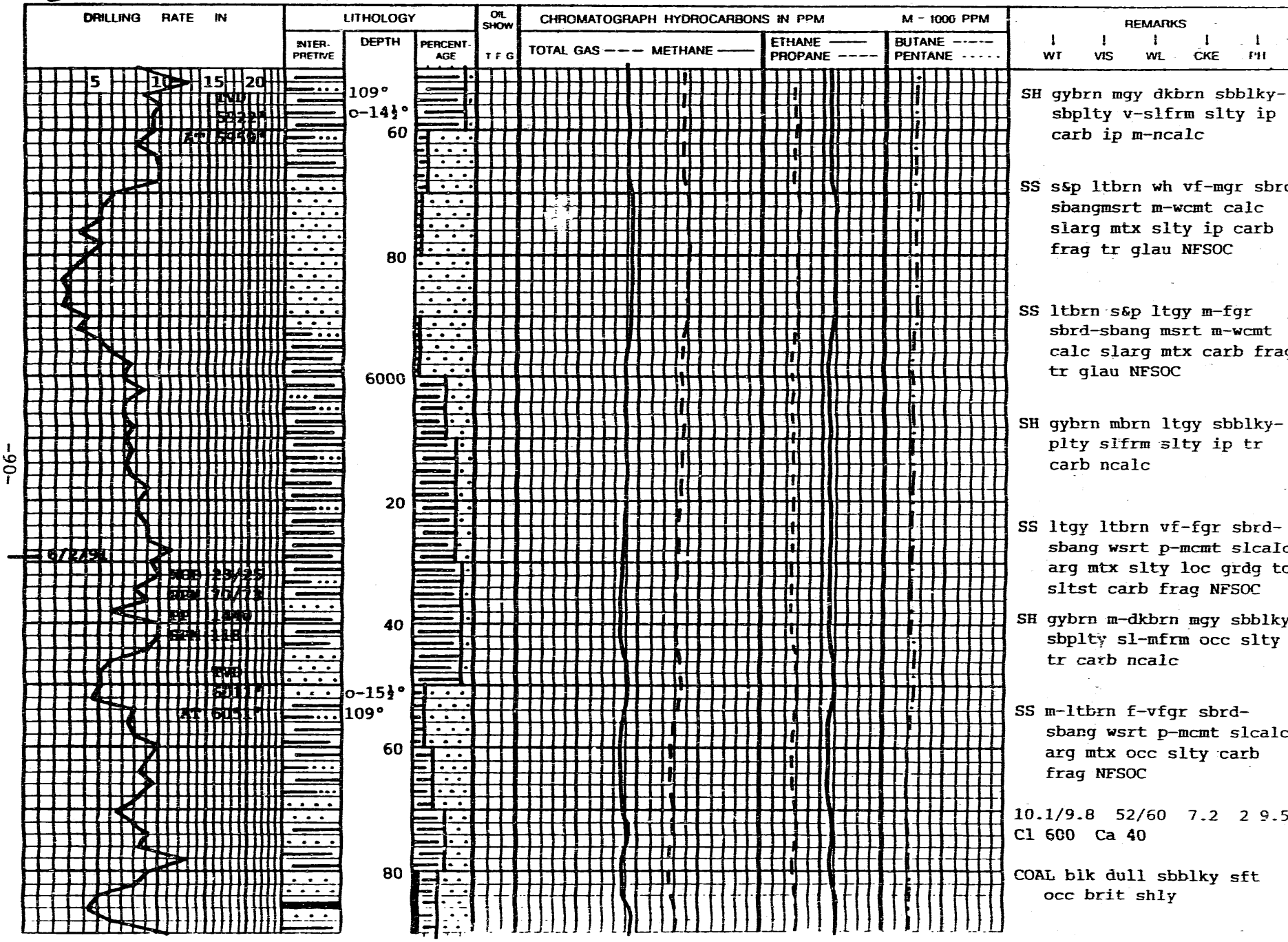

SH gybrn mgy dkbrn sbblky-sbplty v-slfrm slty ip carb ip m-ncalc

SS s&p ltbrn wh vf-mgr sbrd sbangmsrt m-wcmt calc slarg mtx slty ip carb frag tr glau NFSOC

SS ltbrn s&p ltgy m-fgr sbrd-sbang msrt m-wcmt calc slarg mtx carb frag tr glau NFSOC

SH gybrn mbrn ltgy sbblky-plty slfrm slty ip tr carb ncalc

SS ltgy ltbrn vf-fgr sbrd-sbang wsrt p-mcmt slcalc arg mtx slty loc grdg to sltst carb frag NFSOC

SH gybrn m-dkbrn mgy sbblky sbplty sl-mfrm occ slty tr carb ncalc

SS m-ltbrn f-vfgr sbrd-sbang wsrt p-mcmt slcalc arg mtx occ slty carb frag NFSOC

10.1/9.8 52/60 7.2 2 9.5
Cl 600 Ca 40

COAL blk dull sbblky sft occ brit shly

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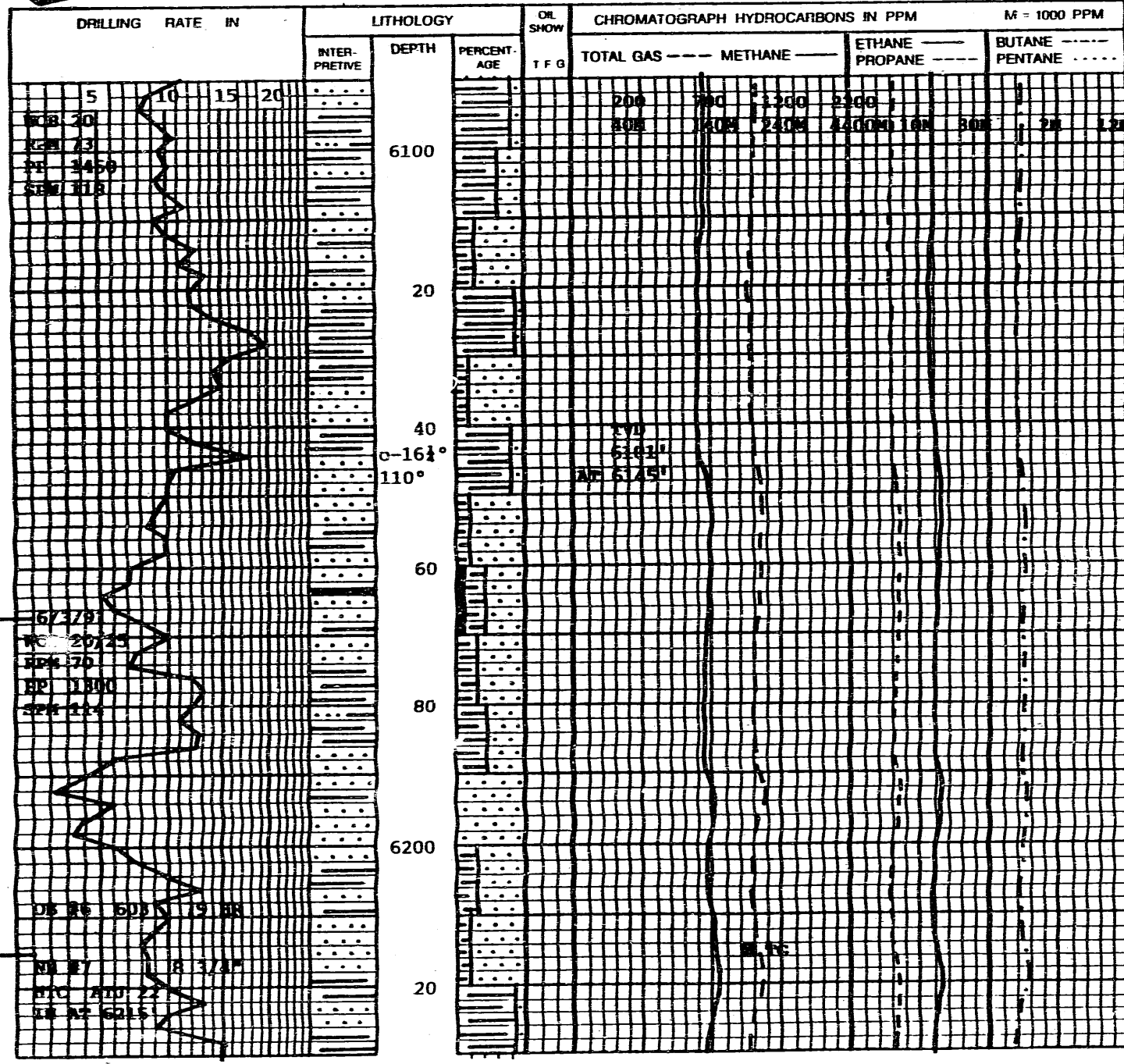

REMARKS

WT VIS WL CKE PH

SH mbrn mgy dkbrn sbblky-sbplty frm occ slty occ carb ncalc

SS trnsl ltgy f-vfgr sbard-sbang wsrt m-pcmt slcalc slarg carb frag NFSOC

SS wh offwh vf-fgr sbrd-wsrt m-pcmt slcalc slarg mtx tr carb frag NFSOC

SH m-dkbrn gybrn sbblky-sbplty mfrm occ sft occ carb ncalc

COAL blk dkbrn dull blky frm brit ip shly

SS wh ltbrn offwh vf-fgr occ mgr sbrd-sbang msrt mcmt slcalc arg/slty mtx ip NFSOC

SS wh occ s&p f-vfgr sbrd-sbang wsrt mcmt slcalc occ wh calc frag slarg ip occ carb frag tr glau

10.1/10.0 52/67 6.8 2 9.5
Cl 600 Ca 40

GOING THRU GAS BUSTER

SH dk-mbrn dkgy sbblky-blky frm occ slty ncalc

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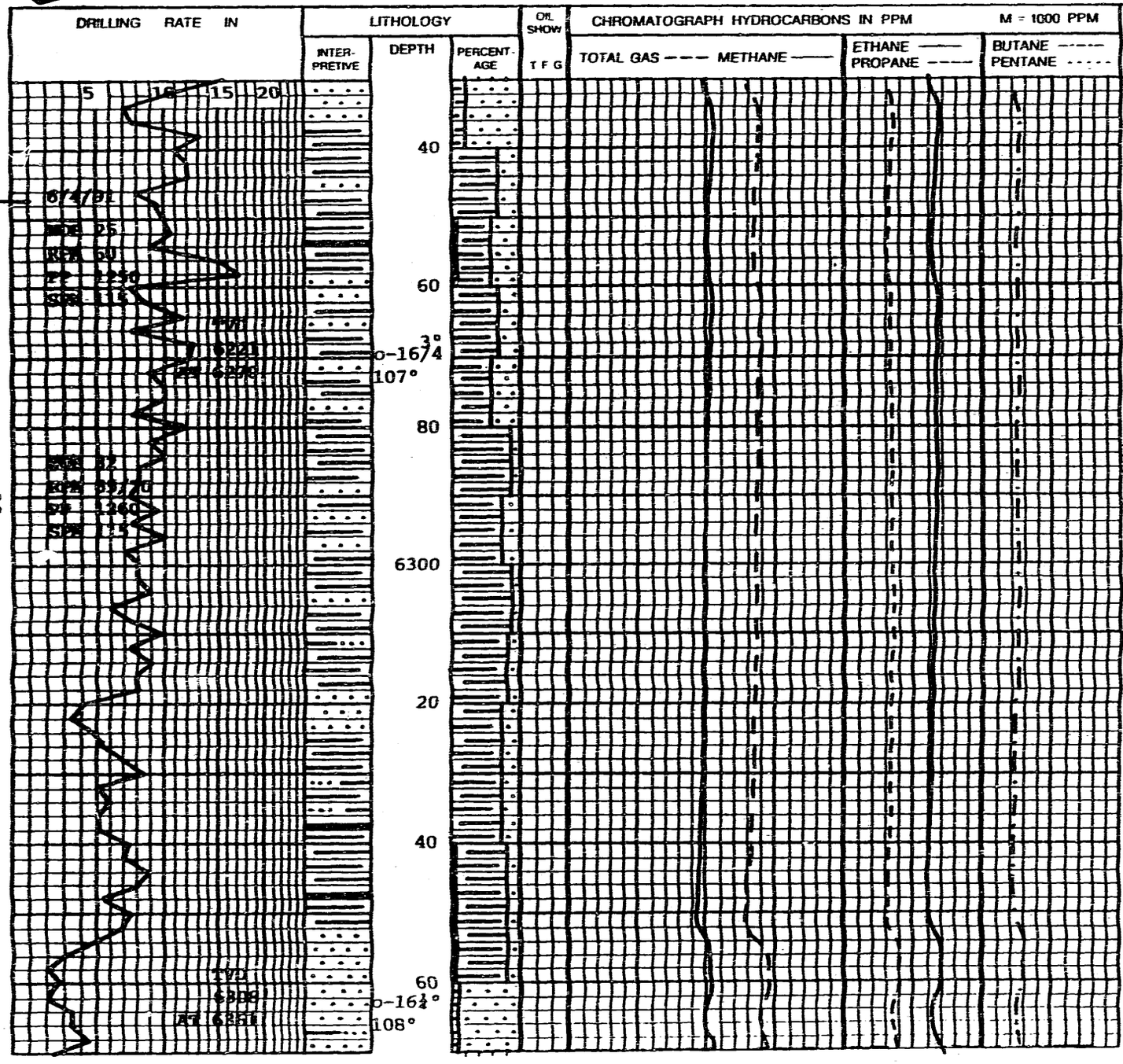

REMARKS

WT	VIS	WL	CKE	PH

SS wh offwh s&p vf-fgr sbrd sbang wsrt p-mcmt calc arg/slty mtx occ carb frag NFSOC

SH m-dkbrn gybrn sbblky-blky frm occ slty occ carb occ vslcalc

SS offwh ltbrn f-vfgr sbrd-sbang wsrt m-pcmt calc arg/slty mtx occ carb frag NFSOC

10.2/10.2 47/50 7.0 2 9.5
Cl 600 Ca 40

SH gybrn m-dkbrn sbplty-blky frm occ slslty ncalc

SS ltgy wh ltbrn vf-fgr sbrd wsrt p-mcmt occ vslcalc slarg slty ip NFSOC

SH m-dkbrn sbblky-sbplty frm occ slslty occ carb ncalc

COAL blk dull occ vit blky frm brit ip shly

SS ltbrn m-vfgr sbang-sbrd msrt mcmt slcalc occ slty carb frag tr glau NFSOC

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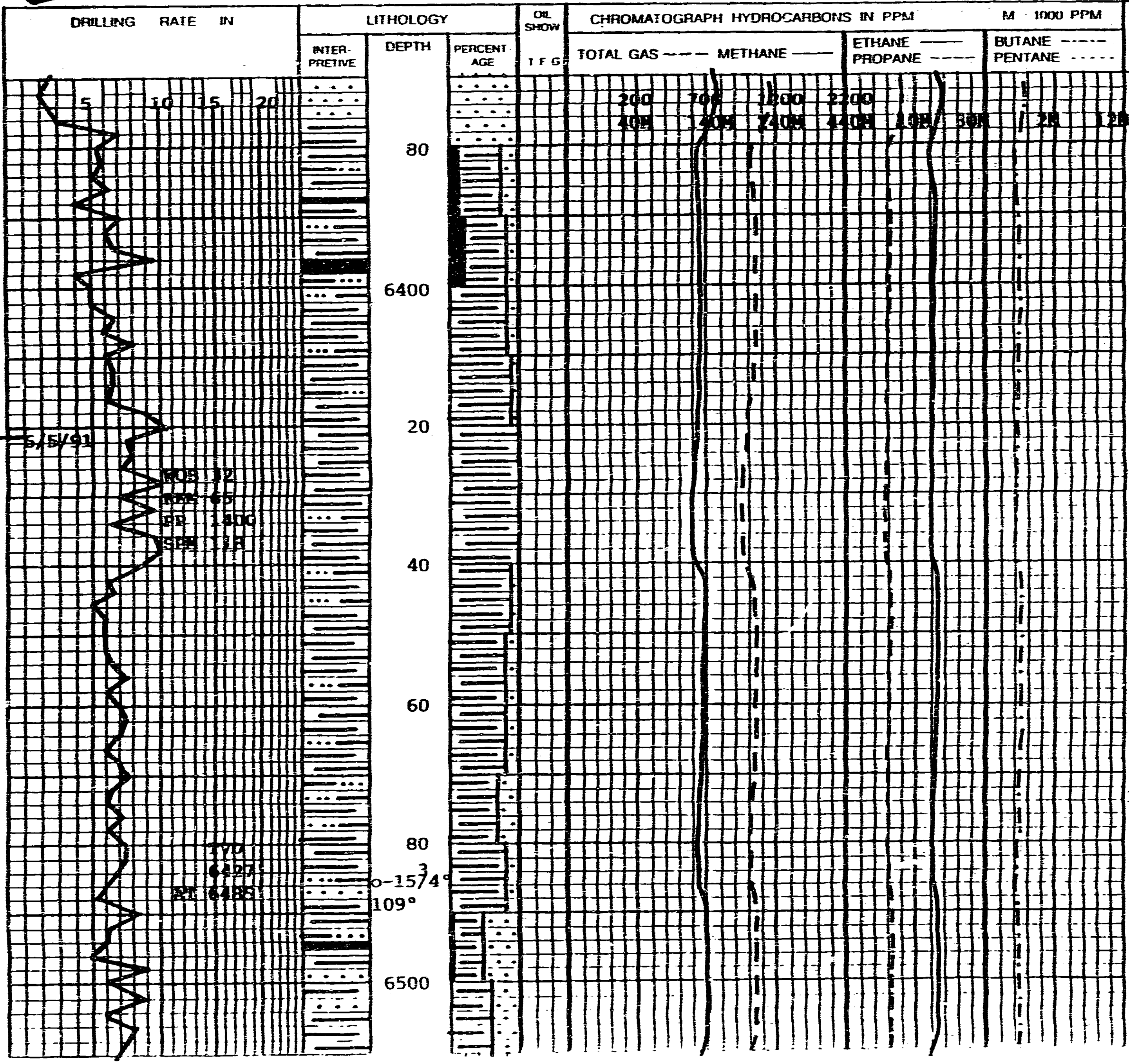

REMARKS

WT | VIS | WL | CKE | PH

SS wh s&p ltbrn m-fgr sbang sbrd wsrt m-pcmt slcalc carb frag tr glau NFSOC

COAL blk dull occ vit sbblky frm-sft occ brit shly ip

SH gybrn dk-mbrn sbblky-sbplty frm occ carb occ carb lam ncalc

SH dk-mbrn gybrn sbblky-splty frm slty ip occ carb occ carb lam ncalc

SS ltbrn ltgy vfgr sbrd wsrt pcmt slcalc arg/ slty mtx loc grdg to sltst NFSOC

SH lt-dkbrn gybrn sbblky-splty frm incr slty occ carb n-vslcalc

10.2/9.9 51/59 8.0 2 9.5
Cl 600 Ca 40

SH lt-mbrn tan gybrn sbblky sbplty frm vslty ip loc grdg to sltst n-vslcalc

SS offwh ltgy vf-fgr sbrd wsrt mcmt slcalc arg/ slty loc grdg to sltst occ carb NFSOC

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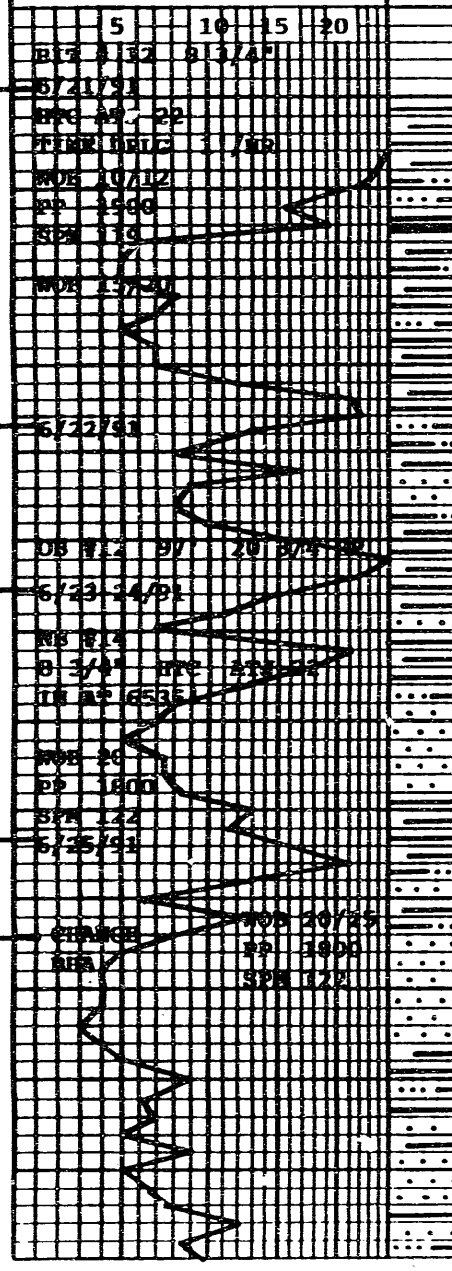

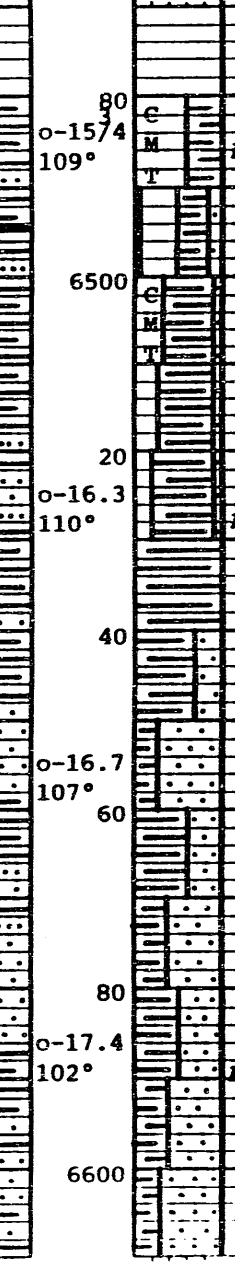

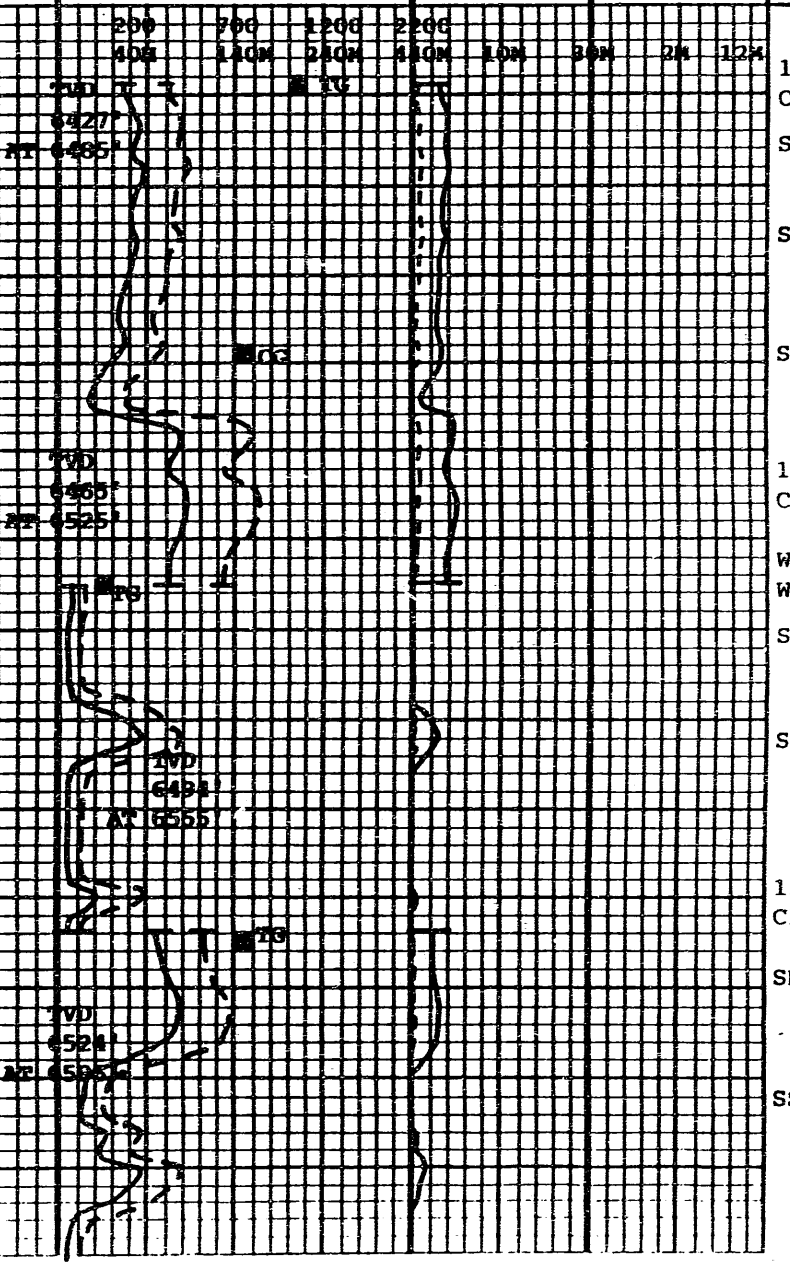

REMARKS

WT	VIS	WL	CKE	PH

11.8 48/54 8.0 2 10.0
Cl 1000 Ca 40

SH dk-mgy gybrn blky-sbplty frm occ slty ncalc

SS ltgy wh vf-fgr sbrd wsrt pcmt slcalc arg/slty mtx NFSOC

SH dkbrn dkgy sbblky-sbplty frm occ sl y occ carb ncalc

12.5/12.2 54 9.5 2 9.5
Cl 800 Ca 40

WASH & REAM TO BOTTOM W/BIT #13

SH dkbrn gybrn dkgy blky-sbplty frm occ carb ncalc

SS ltgy ltbrn f-vfgr occ mgr sbrd-sbang msrt p-m cmt slcalc slty ip occ carb frag NFSOC

12.4+ 58 6.6 2 9.0
Cl 800 Ca 40

SH dkbrn gybrn sbblky-sbplty frm occ slslty occ carb ncalc

SS ltbrn offwh vf-fgr sbang-sbrd wsrt m-pcmt slcalc arg/slty mtx ip occ carb frag NFSOC

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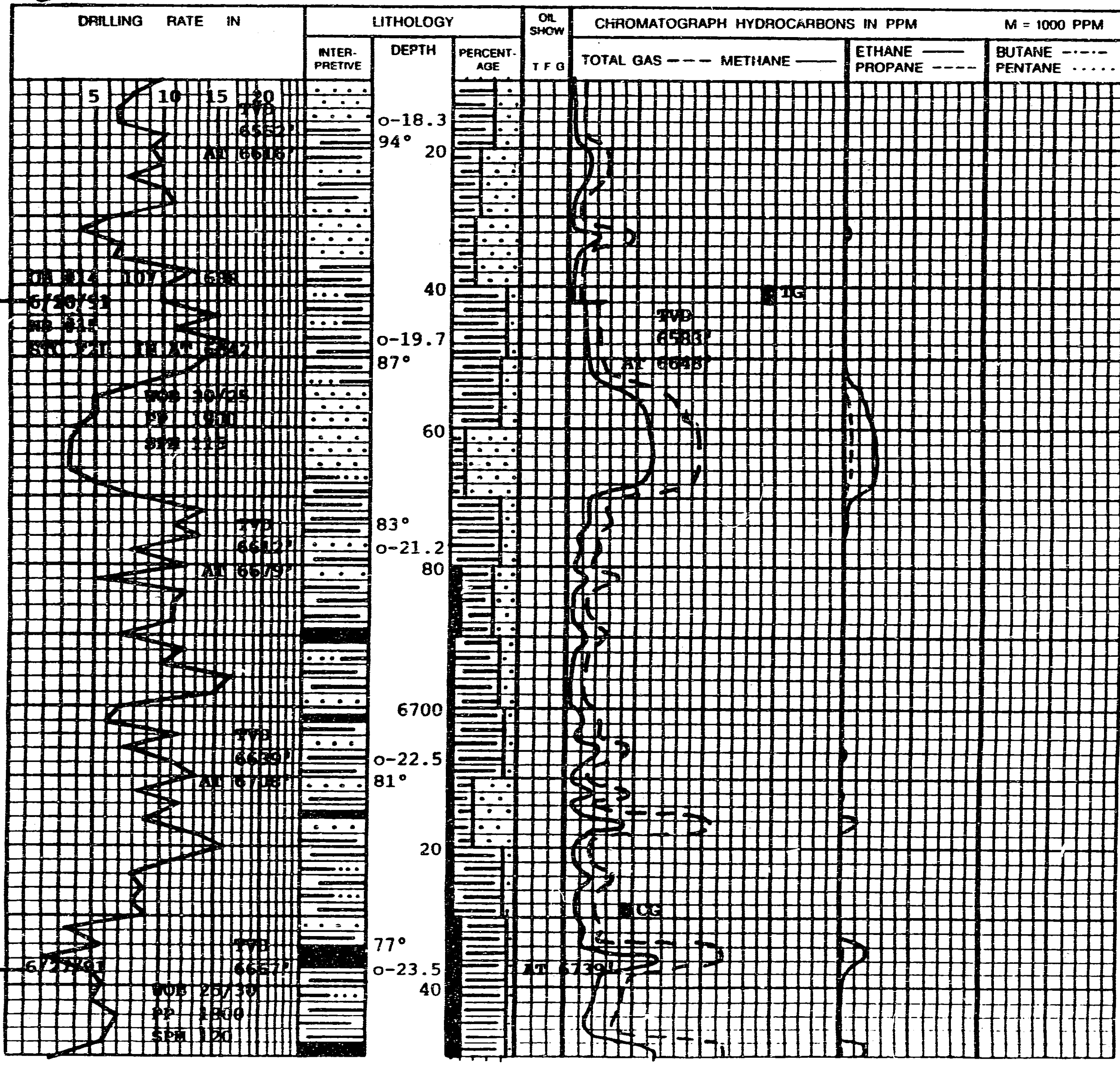

REMARKS

WT	VIS	WL	CKE	PH

SH gybrn mgy dkbrn sbblky-sbplty m-slfrm occ slty occ carb ncalc

SS ltbrn vf-mgr sbang-sbrd msrt m-pcmt calc slty ip occ carb frag NFSOC

12.5+ 61 6.2 2 9.0
Cl 800 Ca 40

SS ltgy s&p vf-fgr sbrd wsrt p-mcmt calc slty mtx carb frag NFSOC

SH gybrn m-dkbrn sbblky-plty sl-mfrm slty ip occ carb n-slcalc

COAL blk dull sbblky sft-frm shly ip

SH lt-dkbrn sbblky-sbplty sl-vfrm occ slty occ carb sl-ncalc

SS ltbrn vfgr sbrd wsrt m-pcmt calc vslty mtx occ carb frag NFSOC

COAL blk dull-vit blky frm-sft occ brit shly ip sooty ip

SH dkbrn blkbrn sbblky-sbplty m-slfrm occ slty carb n-slcalc

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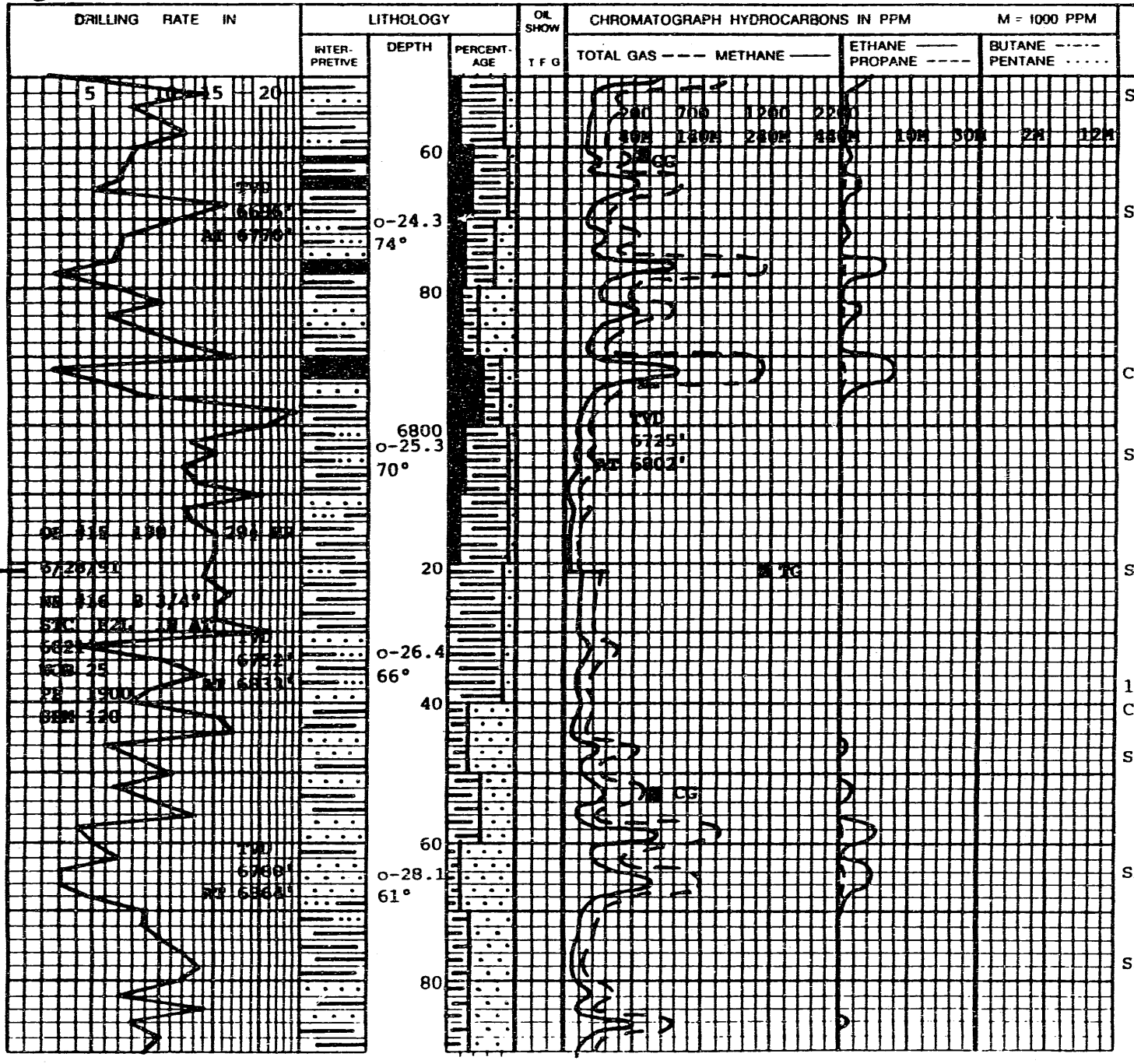

REMARKS

WT	VIS	WL	CKE	PH

SS ltbrn vfgr sbrd-sbang wsrt m-pcmt slcalc slty/ arg mtx loc grdg to sltst occ carb frag NFSOC

SS ltbrn vf-fgr sbrd-sbang wsrt mcmt slcalc slty mtx occ carb frag NFSOC

12.4+ 61 6.2 2 9.5
Cl 600 Ca 40

COAL blk dull-vit sbblky frm-sft brit ip sooty

SH lt-dkbrn sbplty-sbblky m-slfrm slty ip loc grdg to sltst carb ip n-vslcal

SS lt-mbrn wh vf-fgr sbang-sbrd wsrt m-pcmt slcalc arg/slty mtx ip occ carb frag NFSOC

12.5/12.4 52 6.4 2 9.5
Cl 600 Ca 40

SS ltbrn f-vfgr sbrd-sbang wsrt mcmt slcalc arg/ slty mtx ip occ carb frag NFSOC

SH dk-mbrn blkbrn sbblky sl-mfrm carb coaly ip ncalc

SS offwh ltbrn f-vfgr sbang-sbrd wsrt m-pcmt calc arg/slty mtx ip occ carb frag NFSOC

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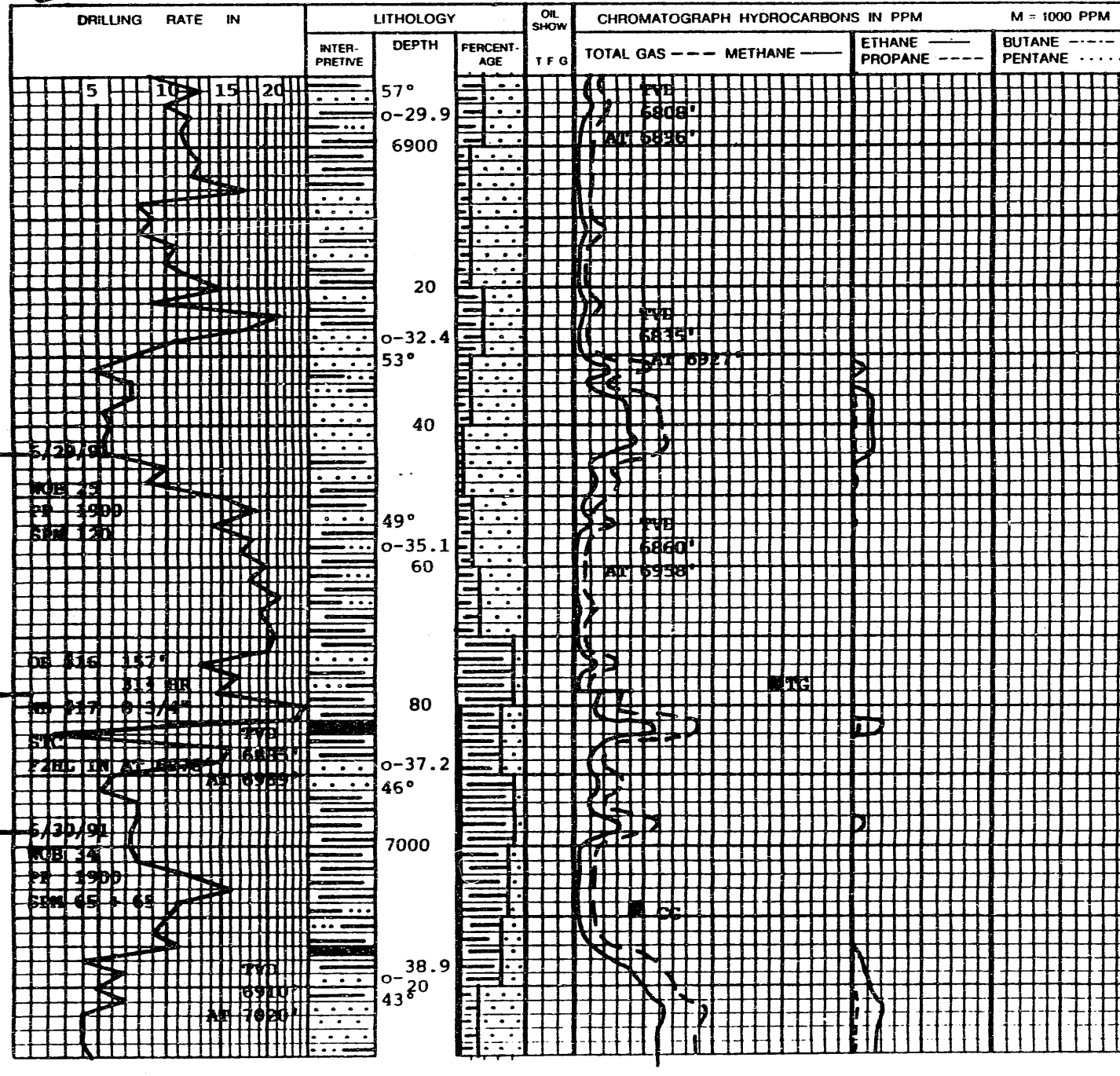

SH dk-mbrn gybrn tan sbblky plty frm occ slty occ carb n-slcalc

SS offwh ltbrn vf-fgr sbang sbrd wsrt mcmt slcalc arg/slty mtx loc grdg to sltst carb&sh frag NFSOC

SH dkbrn gybrn tan sbblky-sbplty m-slfrm occ slty occ carb n-slcalc

SS wh offwh s&p fgr sbrd wsrt p-mcmt calc occ arg mtx carb frag NFSOC

12.5/12.4+ 54/56 6.0 2 9.5
Cl 600 Ca 40

SH dk-ltbrn sbblky-plty sl-mfrm occ slslty occ carb lam ncalc

SS ltbrn wh f-vfgr sbang-sbrd wsrt m-pcmt slcalc arg slty mtx ip occ carb frag NFSOC

SH dk-mbrn sbblky frm occ slslty vcarb ip ncalc

SS offwh wh vf-fgr sbrd wsrt mcmt slcalc slarg slty ip occ carb frag NFSOC

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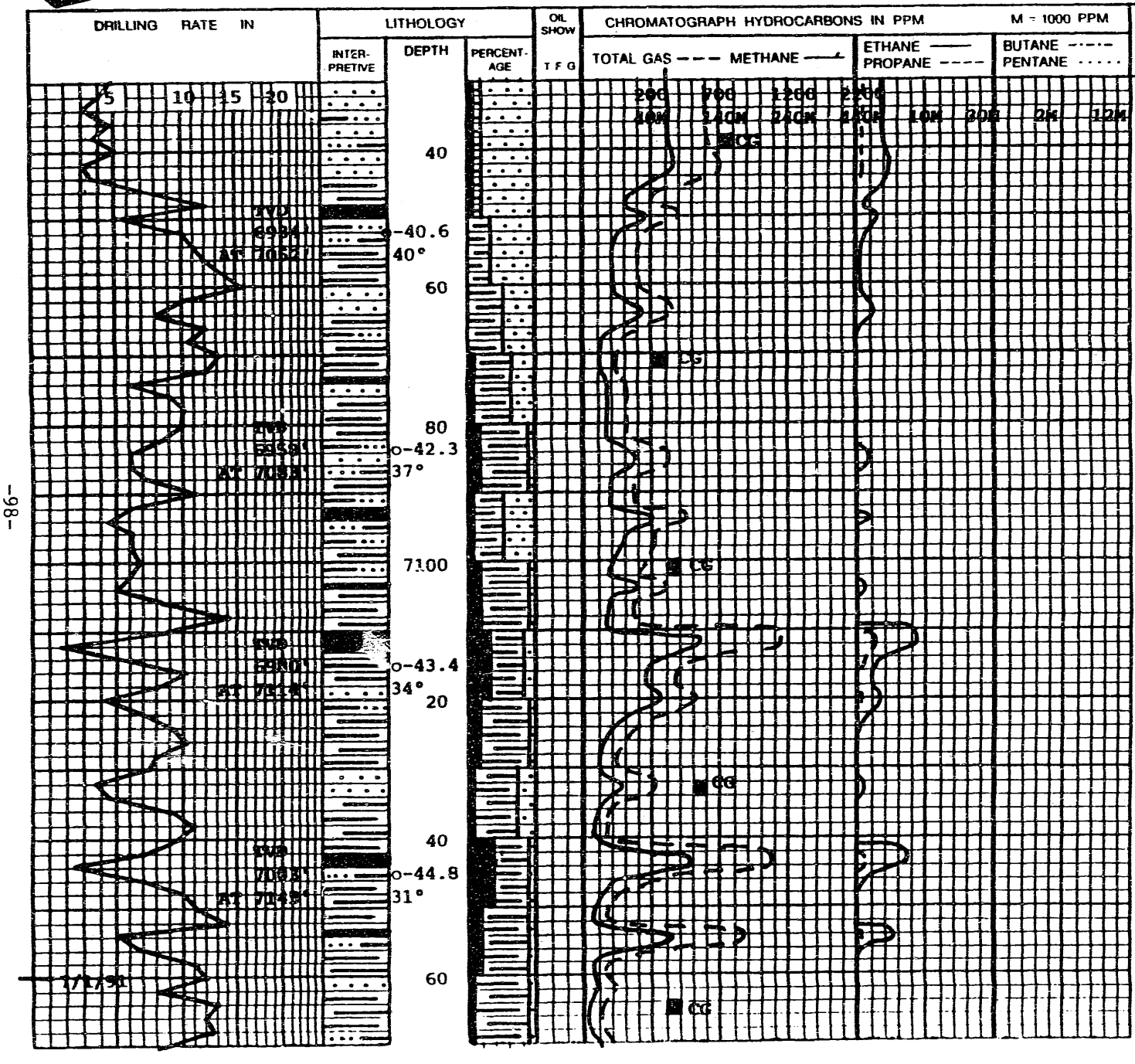

REMARKS

WT | VIS | WL | CKE | PH

SS offwh wh f-vfgr sbrd wsrt m-pcmt slcalc slarg occ carb frag NFSOC

COAL blk dull occ vit sbblky sft sooty

12.5/12.4+ 57 6.0 2 9.0
Cl 600 Ca 40

SH lt-dkbrn sbblky-sbplty sft-frm slty ip loc grdg to sltst carb ip ncalc

SS ltbrn vf-fgr sbrd wsrt mcmt calc slarg vslty loc grdg to sltst NFSOC

COAL blk dull-vit blky frm brit ip sooty

SH dk-mbrn blky-sbplty frm-sft slty ip vcarb n-slcalc

SS ltbrn ltgy f-vfgr sbang wsrt m-wcmt slcalc slty ip occ carb frag NFSOC

COAL blk dull-vit blky-spli frm-sft brit ip shly ip sooty

SH dk-mbrn occ ltbrn sbblky sbplty m-slfrm occ slslty vcarb carb lam ncalc occ vslcalc

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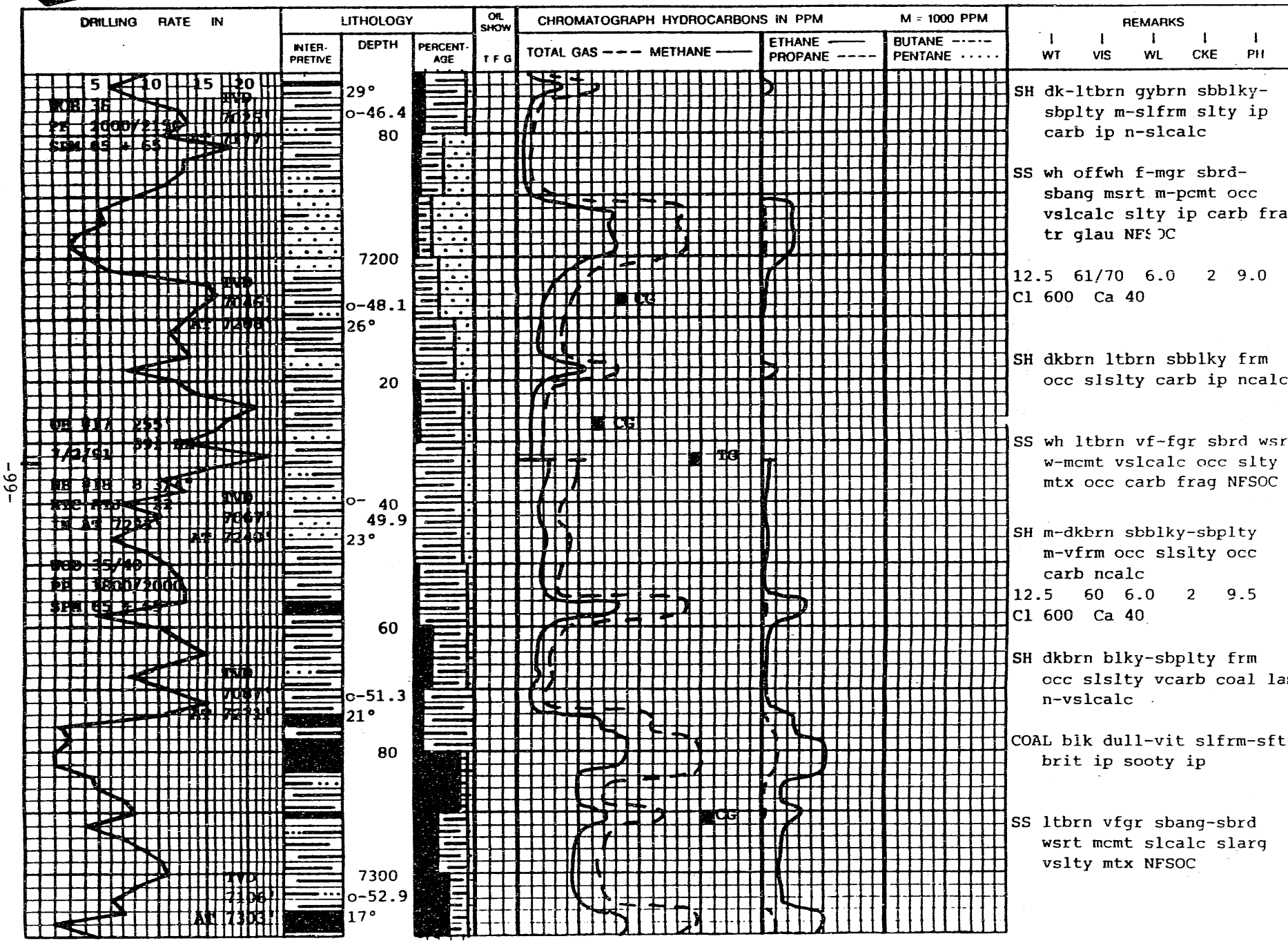

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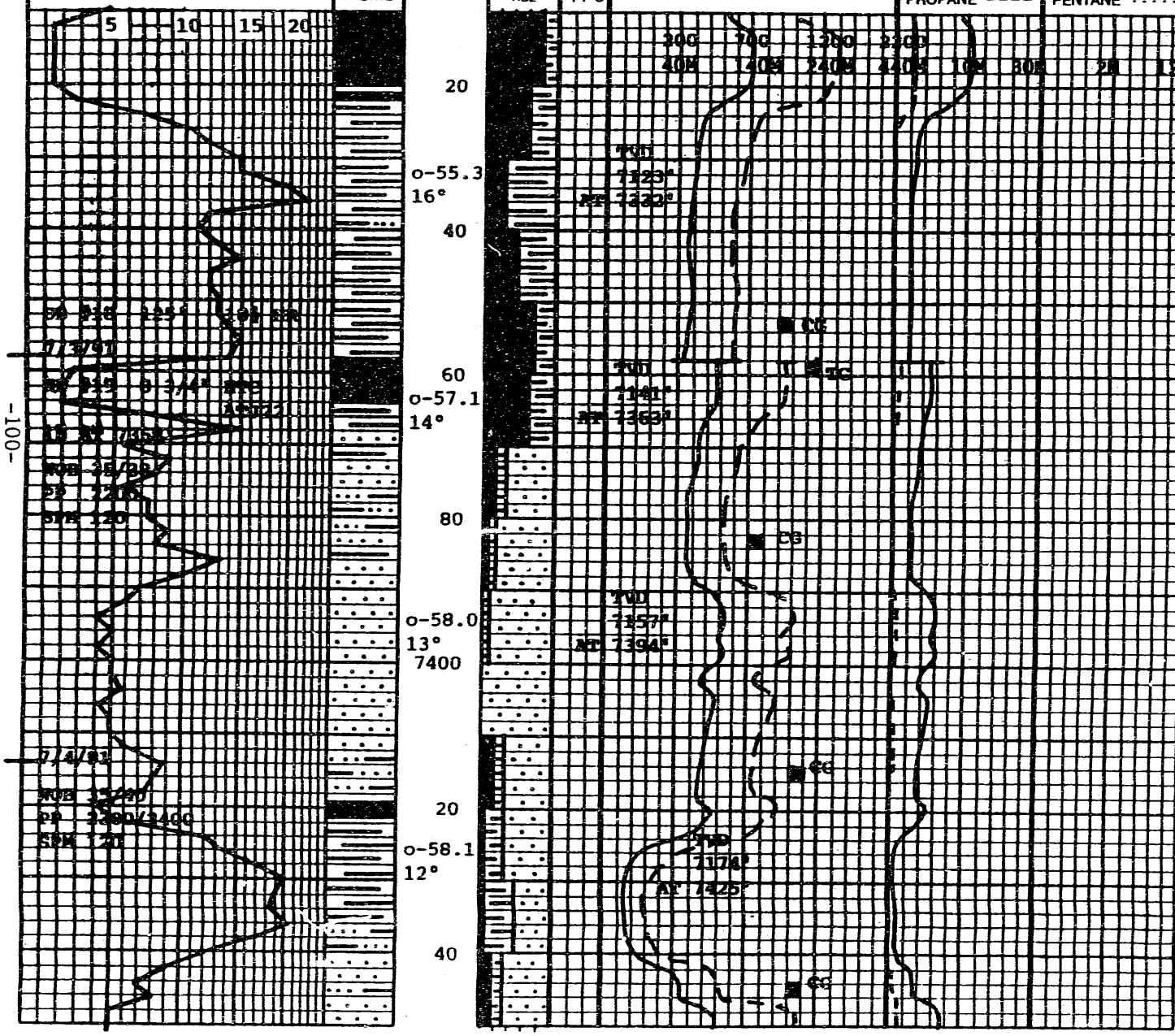

REMARKS

WT	VIS	WL	CKE	PH

COAL blk dull-vit blk slfrm sft brit sooty ip sl bldg gas

SH dkbrn sbblky m-slfrm occ slslty vcarb ip n-vslcalc

SH dkbrn occ mbrn sbblky-sbplty occ slslty carb n-vslcalc

COAL blk dull-vit blky sl-mfrm brit sooty ip

13.2/13.0 54 6.6 2 9.5
Cl 600 Ca 40

SS offwh wh vf-fgr sbrd wsrt m-pcmt calc sl arg/slty ip NFSOC

SS offwh f-vfgr sbrd wsrt m-pcmt calc slarg mtx occ carb frag NFSOC

SH dkbrn dkgy sbblky-blky frm occ slty occ carb ncalc

SS offwh wh f-vfgr sbrd wsrt m-pcmt slcalc arg/slty mtx ip occ carb frag NFSOC

13.4/13.3 53/54 6.2 2 9.5
Cl 600 Ca 40

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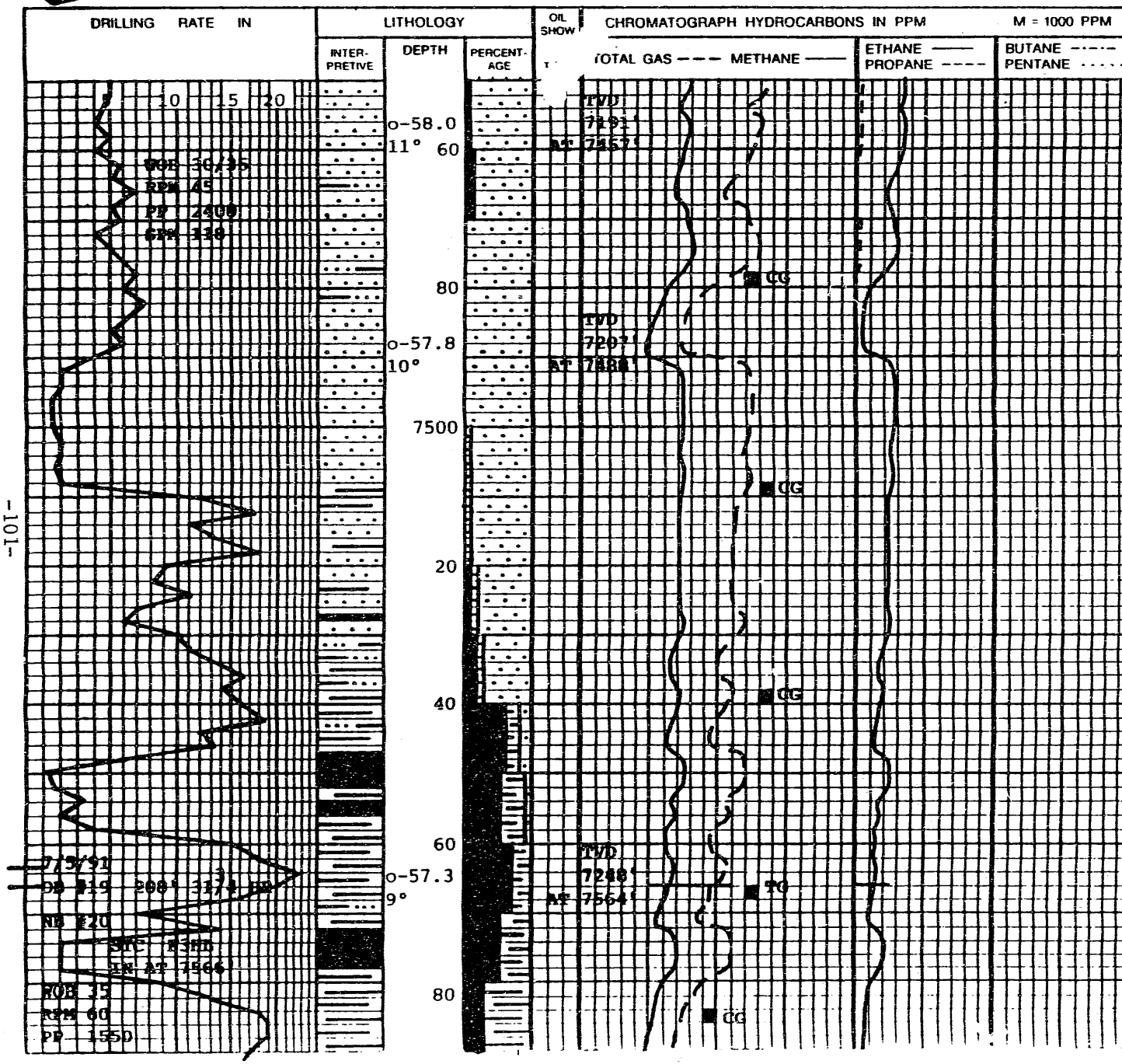

REMARKS

WT	VIS	WL	CKE	PH

SS offwh ltbrn vf-fgr sbrd wsrt mcmt sil slarg mtx NFSOC

SS m-ltbrn f-mgr sbang-sbrd msrt m-wcmt calc arg mtx NFSOC

SS ltbrn ltgy f-vfgr sbrd wsrt w-mcmt sl-mcalc arg ip slty ip occ carb frag NFSOC

SH dkbrn gybrn blky-sbplty m-slfrm carb ip ncalc

SH dkbrn blkbrn dkgy blky frm occ slslty vcarb ip ncalc

COAL blk dull blky sft-slfrm sooty

SH dkbrn blkbrn sbblky frm vcarb carb lam ncalc

13.9 64 6.2 2 9.5
Cl 600 Ca 40

COAL blk dull sbblky sft-slfrm sooty shly ip

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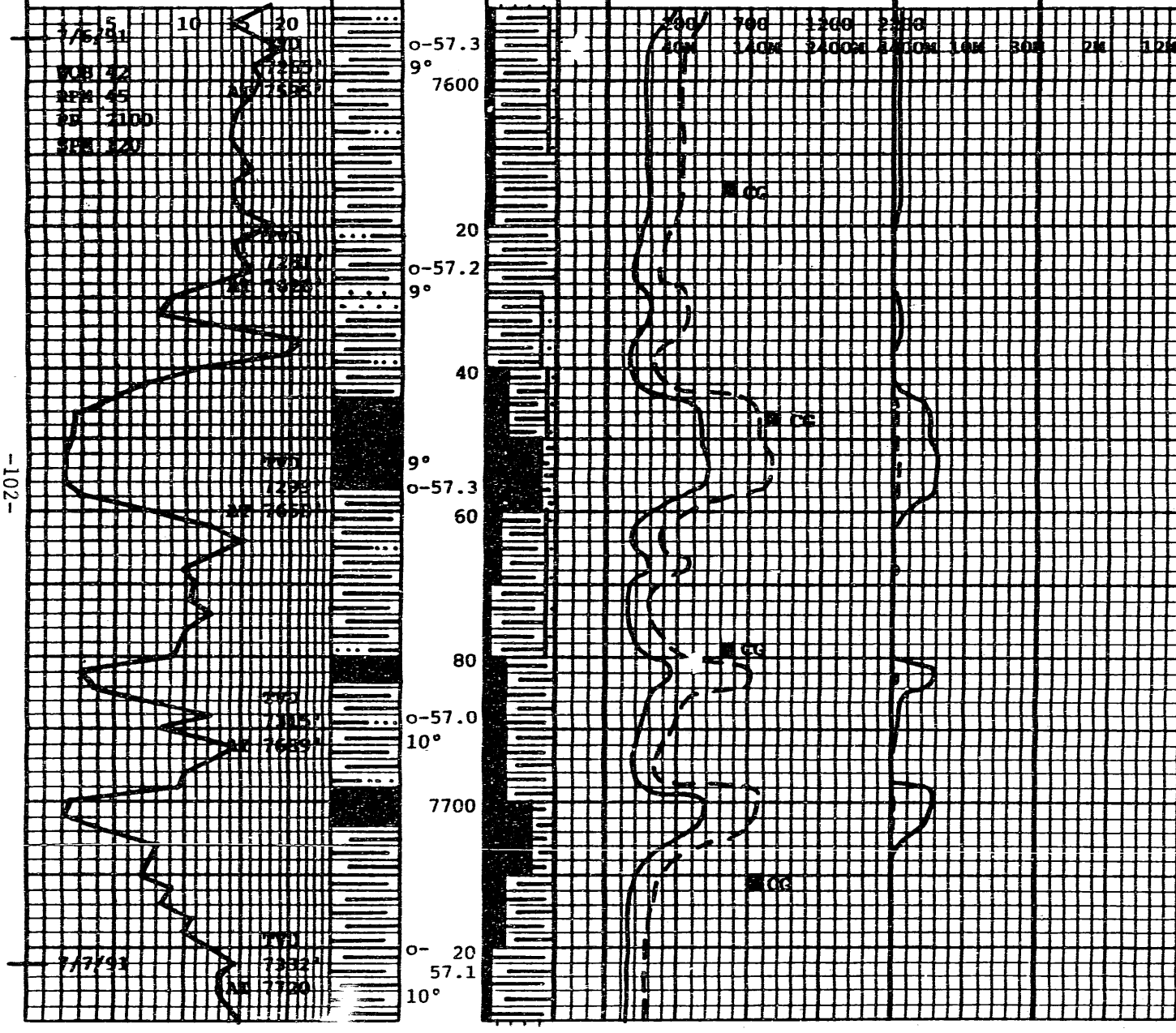


SH m-ltbrn gybrn sbblky-sbplty frm sl-vslty loc grdg to sltst occ sdy m-slcalc

14.2/13.9 50 6.4 2 9.0
Cl 600 Ca 40

SH dkbrn sbblky m-vfrm slty ip carb ip n-vslcalc

SS ltbrn vfgr sbrd wsrt mcmt vslcalc varg vslty tr pyr NFSOC

COAL blk dull-vit sbblky sft-slfrm vsooty

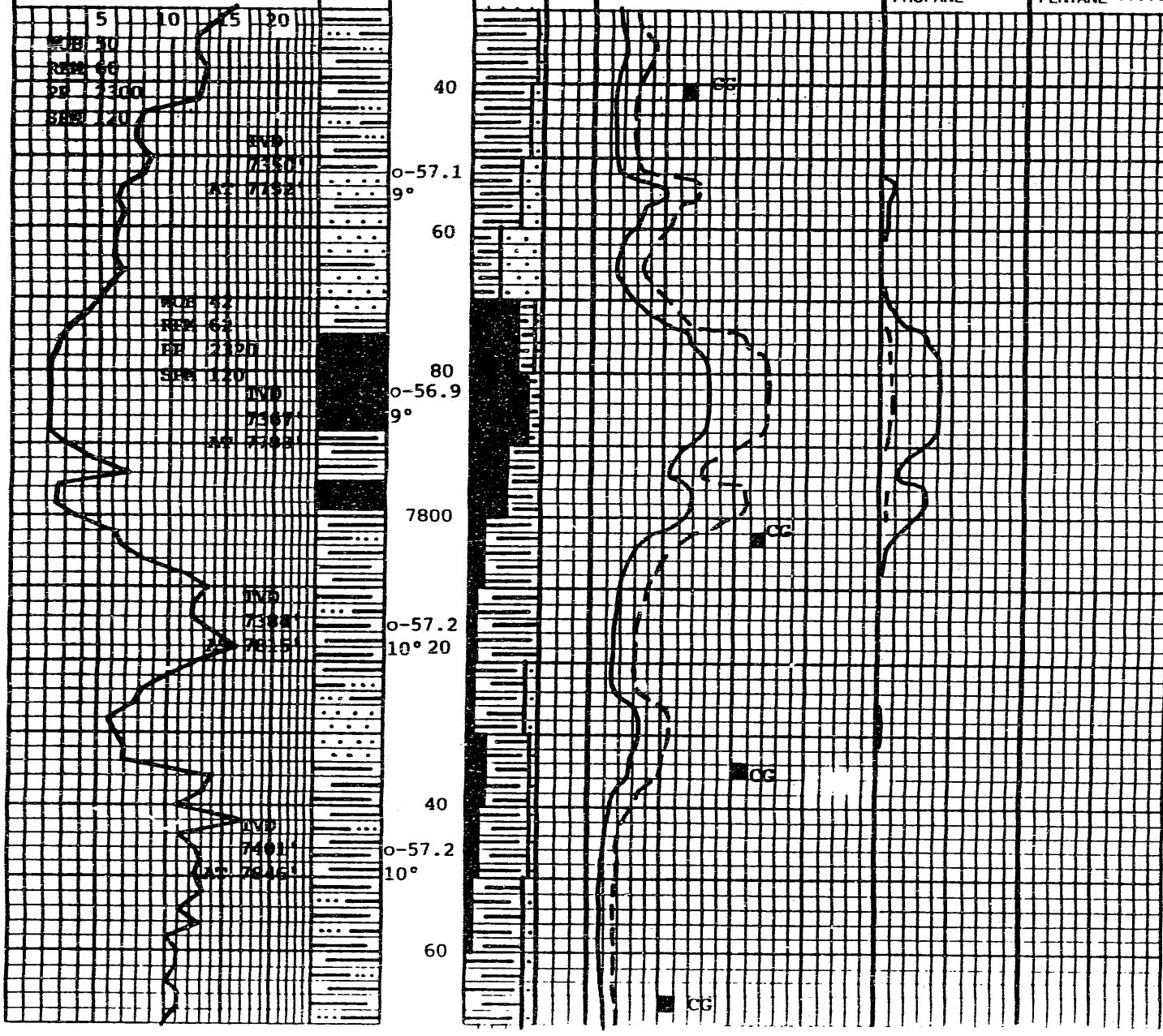
SH dk-ltbrn sbplty-sbblky frm m-vslty loc grdg to sltst occ sdy tr pyr calc

SH dkbrn blkbrn sbblky-blky m-slfrm slslty carb sl-mcalc

COAL blk dull-vit blky frm-sft brit ip sooty shly ip

SH dkbrn sbblky frm slslty ip carb sl-ncalc

SH dk-ltbrn sbblky frm sl-v slty loc grdg to sltst carb ip sl-mcalc



REMARKS

WT	VIS	WL	CKE	PH

SS ltbrn vf-fgr sbrd wsrt m-pcmt slcalc arg/slty mtx NFSOC

SH dk-mbrn sbblky frm sl-m slty occ carb sl-ncalc

14.2 54/60 6.4 2 9.5
Cl 600 Ca 40

SS ltbrn f-vfgr sbrd-sbang wsrt mcmt calc arg/slty mtx loc grdg to sltst NFSOC

COAL blk dull-vit sbblky sft-frm brit ip sooty

SH lt-dkbrn sbblky frm sl-vslty loc grdg to sltst occ sdy n-vslcalc

SH m-ltbrn gybrn sbblky frm sl-mslty occ sdy ncalc

SS ltbrn vfgr sbrd wsrt m-pcmt slcalc ip arg/ slty mtx grdg to sltst tr pyr NFSOC

SH m-dkbrn sbblky frm sl-v slty occ sdy carb ip tr pyr slcalc

SS ltbrn vf-fgr sbrd wsrt mcmt slcalc arg/slty mtx NFSOC

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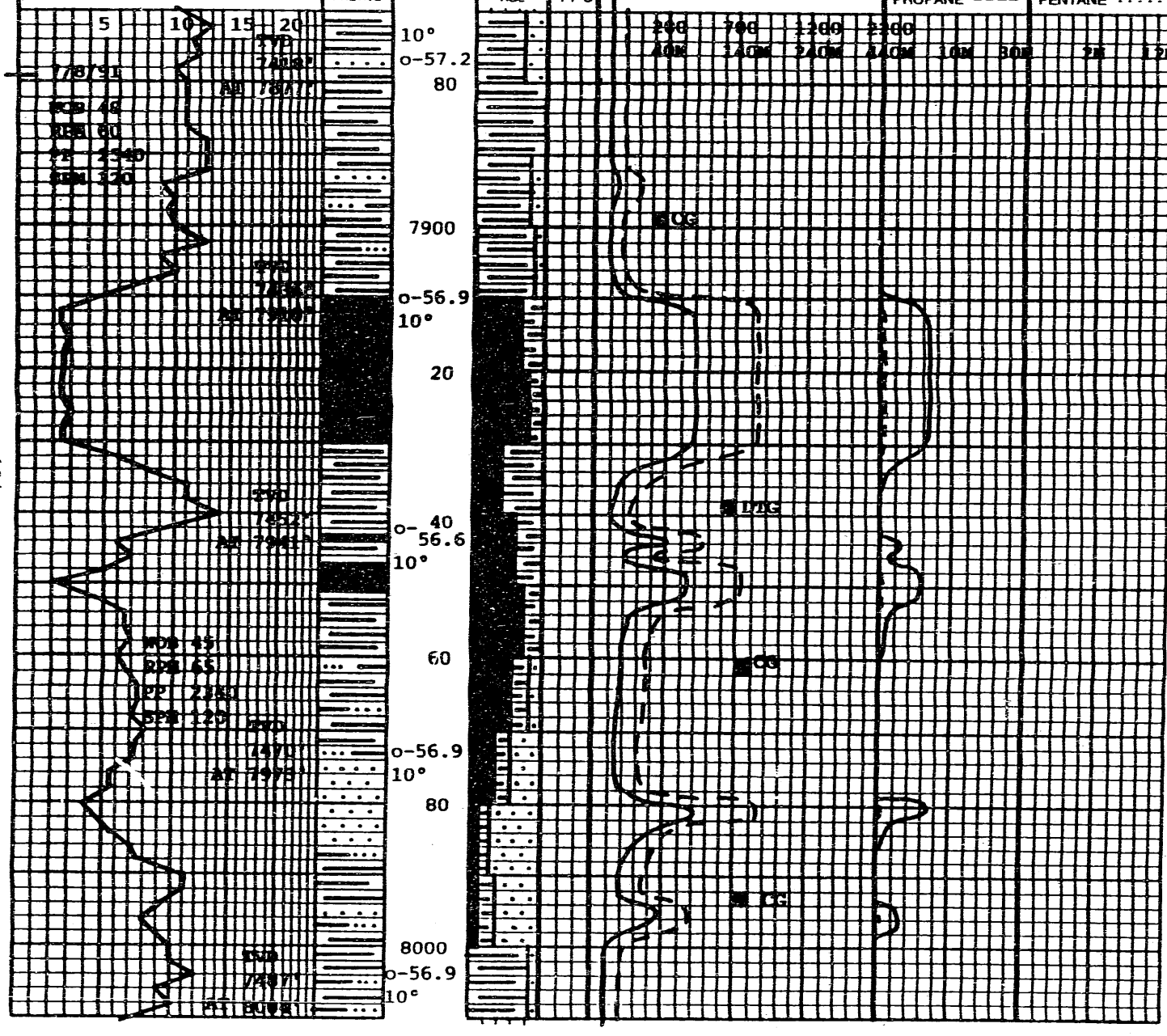

REMARKS

WT	VIS	WL	CKE	PH

SS brn ltgy vf-fgr sbrd wsrt m-pcmt slcalc ip arg/slty mtx tr cht NFSOC

SH dkbrn sbblky m-slfrm slty ip occ carb n-vsl calc

SH dkbrn sbblky m-slfrm slty ip carb lam occ diss pyr ncalc

COAL blk dull occ vit sbblk sft-slfrm occ brit sooty

14.2/14.1 64 6.4 2 9.5
Cl 600 Ca 40

SH dkbrn blkbrn sbplty-sbblky m-slfrm slslty ip carb tr pyr ncalc

COAL blk dull sbblky frm vsooty tr pyr occ shly

SH dkbrn sbblky-blky frm carb lam ncalc

SS ltbrn ltgy f-mgr sbang-sbrd msrt pcmt occ sl calc arg mtx occ carb frag tr cht NFSOC

SH dkbrn ltbrn sbblky frm sl-vslty occ sdy ncalc

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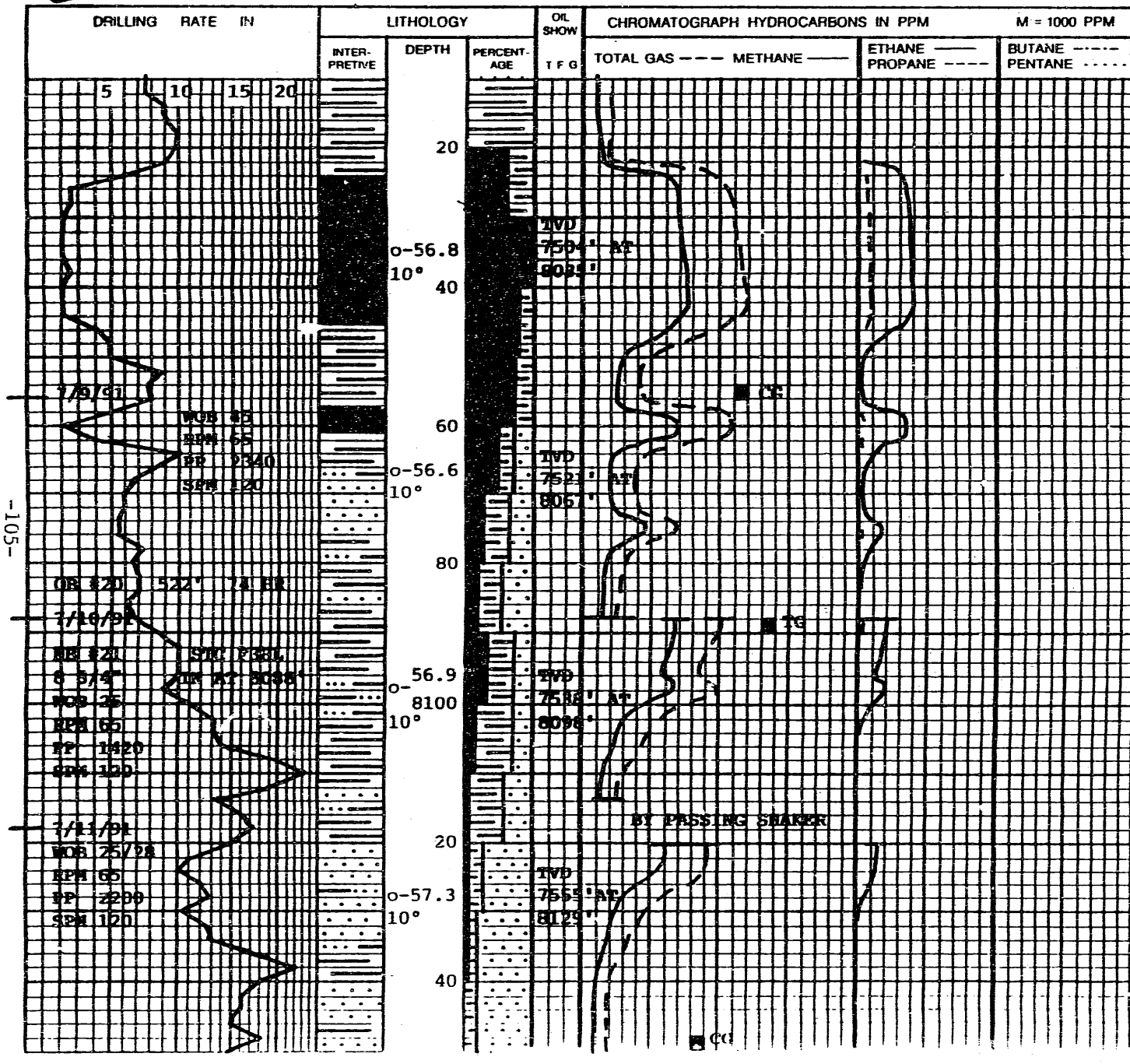
COUNTY
STATE



REMARKS

WT	VIS	WL	CKE	PH

SH dkbrn gybrn sbblky sl-m frm sl-mslty carb ip tr diss pyr ncalc

ABNT LCM

COAL blk dull-vit blky frm-sft brit ip sooty ip sl bldg gas

ABNT LCM VPS

SH dkbrn dkgy sbblky frm occ slslty carb ncalc

SS lt-mbrn f-mgr sbang wsrt pcmt slarg occ wh cly mtx NFSOC

RUN LOGS

13.6 53 7.6 2 9.0
Cl 600 Ca 40

SH dkbrn dkgy sbblky frm occ slslty tr pyr ncalc

SS wh ltgy f-mgr sbang-sbrd wsrt m-pcmt slcalc occ wh cly mtx occ carb frag tr pyr NFSOC

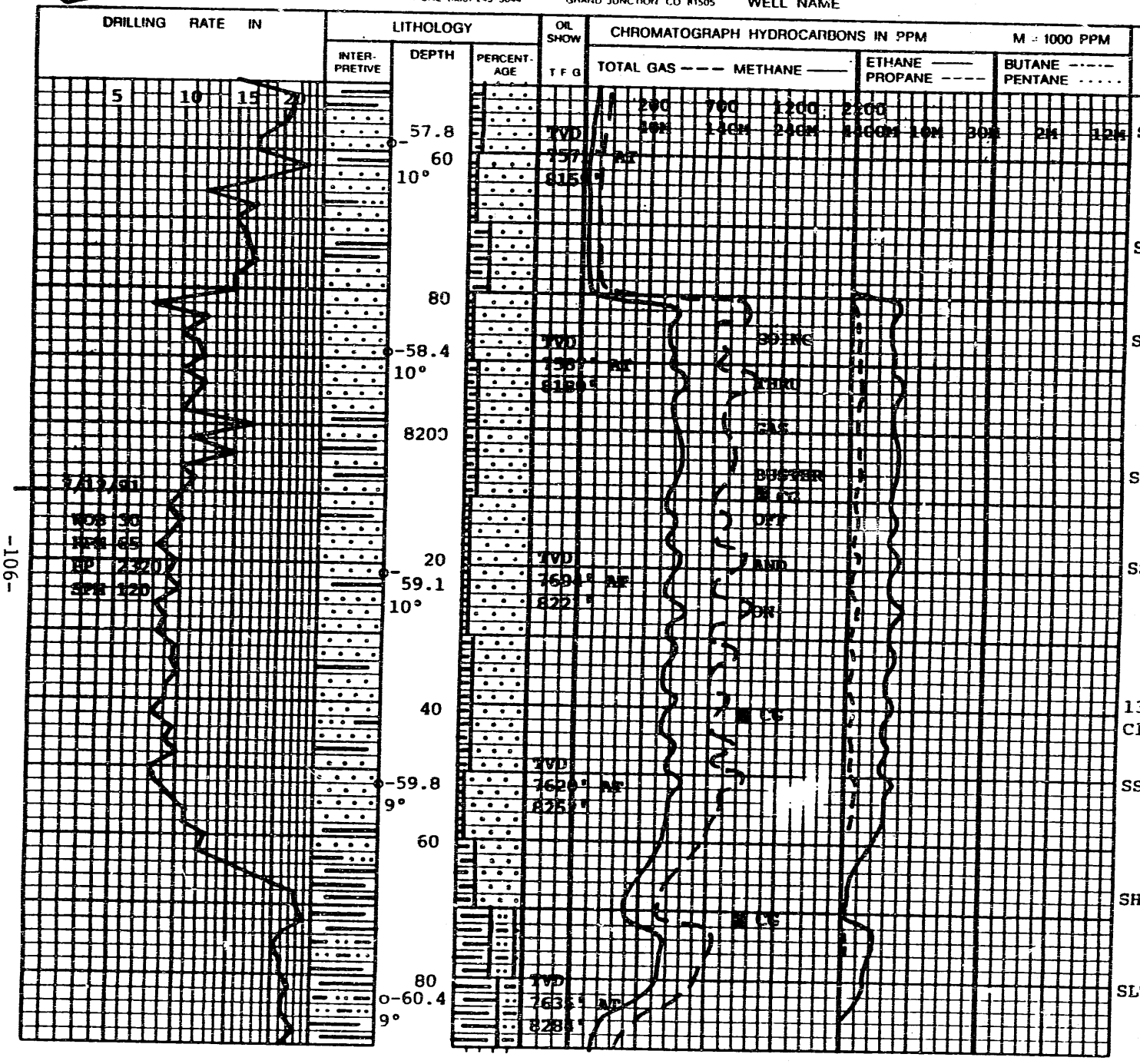
SS ltgy wh m-fgr sbang-sbrd msrt m-wcmt slcalc occ wh cly mtx occ carb frag NFSOC

13.6 56 6.0 2 9.0
Cl 600 Ca 40

PRIMEX
WELL SITE GEOLOGY MUD LOGGING
2450 INDUSTRIAL BLVD PHONE (303) 243-3044 GRAND JUNCTION CO 81505

COMPANY
WELL NAME

COUNTY
STATE



REMARKS

WT	VIS	WL	CKE	PH

SS wh ltgy fgr occ mgr sbang sbrd wsrt mcmt slcalc wh cly mtx ip occ carb frag NFSOC

SH dkbrn mgy blky-sbplty frm occ carb lam ncalc

SS ltgy wh f-vfgr sbang-sbrd wsrt p-mcmt wh cly mtx ip occ carb frag NFSOC

SH dkbrn mgy blky frm occ carb ncalc

SS ltgy s&p occ ltbrn f-vfgr sbang-sbrd wsrt p-mcmt slcalc slarg ip occ slty tr cht occ wh calc xl occ carb frag NFSOC

13.9/13.5 60/74 6.2 2 9.0
Cl 600 Ca 40

SS ltgy ltbrn vf-fgr sbrd wsrt p-mcmt occ slcalc slty ip occ carb frag NFSOC

SH dk-mbrn gybrn sbblky frm slty ip carb ip ncalc

SLTST mbrn gybrn arg sdy ip frm-fri ncalc occ slcalc

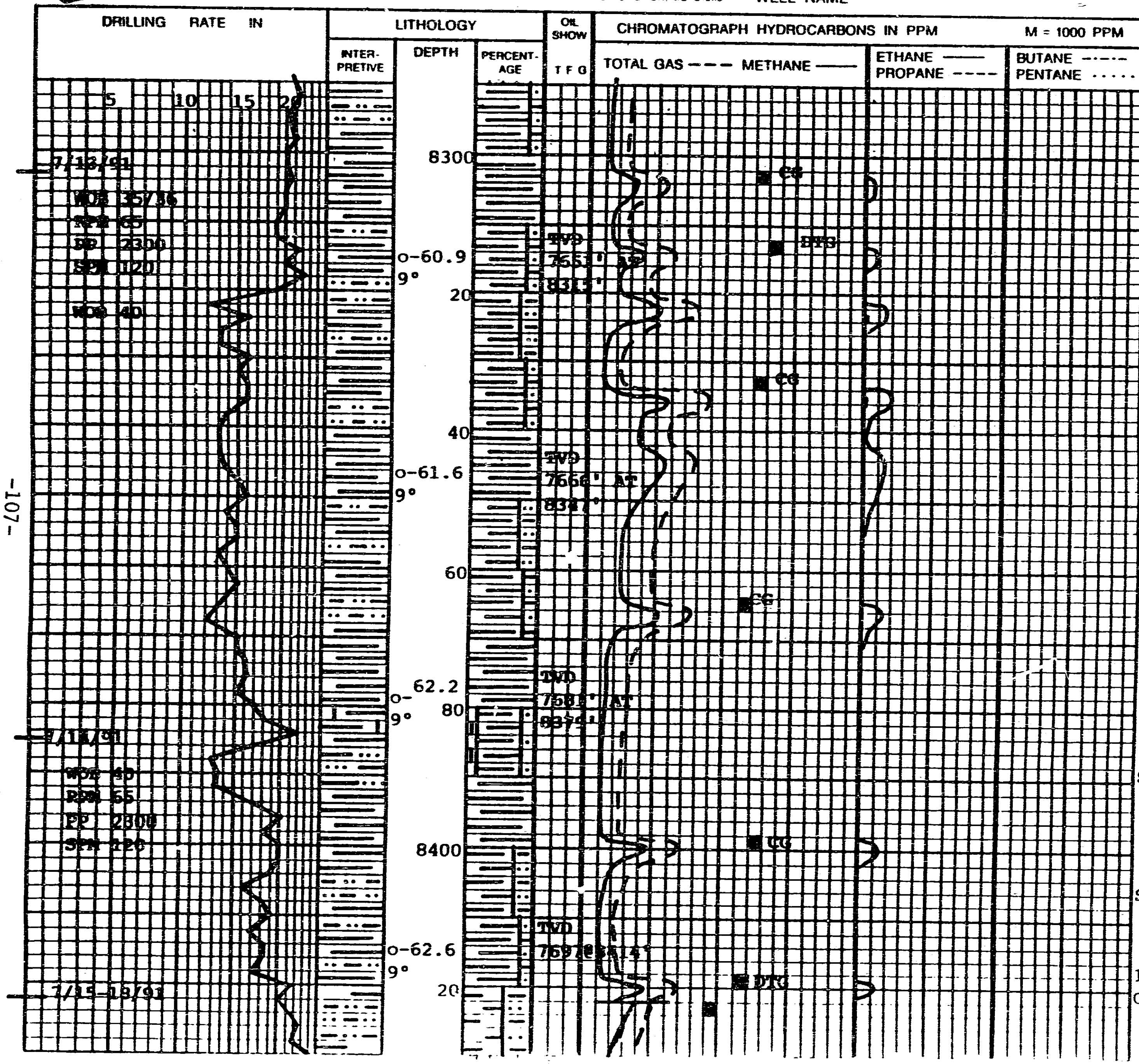
ROCKY MOUNTAIN GEO-ENGINEERING CO.

WELL SITE GEOLOGY - MUD LOGGING

2450 INDUSTRIAL BLVD PHONE (303) 243 3044 GRAND JUNCTION, CO 81505

COMPANY
WELL NAME

COUNTY
STATE



REMARKS

WT VIS WL CKE PH

SH gybrn dkbrn ltgy sbblky m-slfrm m-vslty loc grdg to sltst occ sdy tr pyr ncalc

SLTST lt-mbrn ltgy arg sdy ip frm-fri ncalc

14.1/13.8 59/81 6.4 2 9.0
Cl 600 Ca 40

SH dk-mbrn gybrn sbblky frm sl-vslty tr ptr ncalc

SLTST gybrn mgy arg sdy ip frm ncalc

SH gybrn mbrn sbblky frm slty ip ncalc

LS orngbrn crpxln frm slty arg

SS ltbrn ltgy vf-fgr sbang-sbrd wsrt mcmt vslcalc arg/slty mtx NFSOC

SH gybrn mgy sbblky frm m-vslty loc grdg to sltst n-vslcalc

14.2+/14.0 59/70 6.4 2 9.0
Cl 600 Ca 40

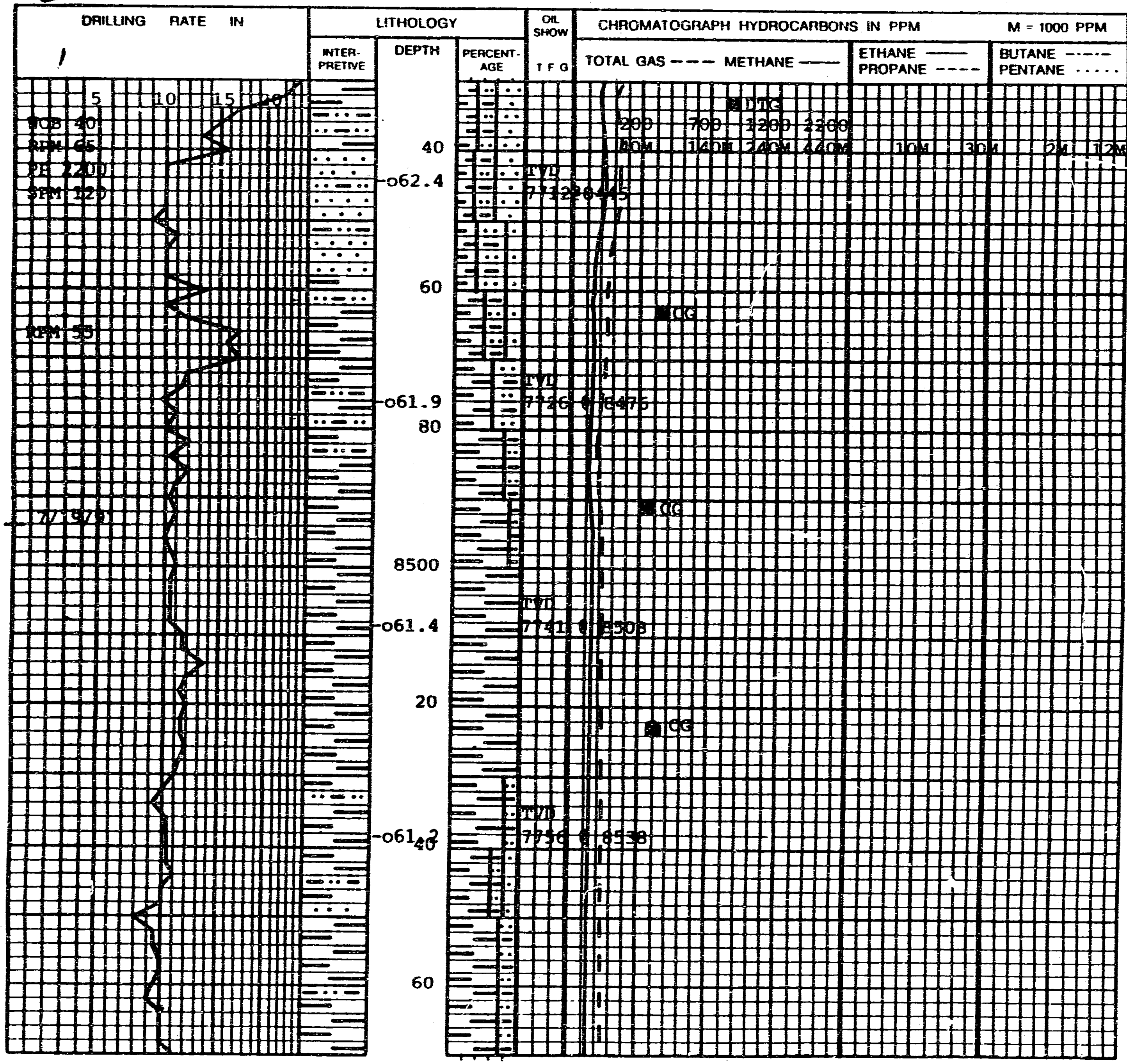
ROCKY MOUNTAIN GEO-ENGINEERING CO.

WELL SITE GEOLOGY - MUD LOGGING

2450 INDUSTRIAL BLVD PHONE (303) 243 3044 GRAND JUNCTION CO 81505

COMPANY
WELL NAME

COUNTY
STATE



REMARKS

WT	VIS	WL	CKE	PH
14.3	40	6.4	1/32	9.0

CL 600

SS clr-trnsl wh lt-mgy gybrn s&p vf-fgr wsrt sbang-sbrd wcmt calc cmt occ arg cmt carb incl tr glauc vp tt ø NFSOC

ABNDT CVGS

SH m-dkgy gybrn sbplty-blky rthy sft-m frm sl-non calc slty-sl sdy grdg to SLTST

ABNDT CVGS

SH AA

SH m-dkgy gybrn sbplty-blky rthy sft-m frm sl-non calc slty-sl sdy grdg to SLTST

ABNDT CVGS

SS clr-trnsl wh tan occ s&p vf-fgr wsrt sbang-sbrd wcmt calc-vsl arg cmt v cln occ carb frags calc NFSOC

SH AA

ROCKY MOUNTAIN GEO-ENGINEERING CO.

WELL SITE GEOLOGY — MUD LOGGING

2450 INDUSTRIAL BLVD · PHONE (303) 243-3044 · GRAND JUNCTION, CO 81505

COMPANY CER CORPORATION
WELL NAME SECT-#1 SIDETRACK
COUNTY GARFIELD
STATE COLORADO

DRILLING RATE IN MIN/FT 2' AVG

LITHOLOGY — INTERPRETIVE | DEPTH | PERCENTAGE

OIL SHOW — T F G

CHROMATOGRAPH HYDROCARBONS IN PPM — M = 1000 PPM
TOTAL GAS ——— METHANE ———
ETHANE ——— PROPANE - - - -
BUTANE -·-·- PENTANE · · · · ·

REMARKS

WT	VIS	WL	CKE	PH
14.2	60	6.0	2/32	9.5

CL 600

CHT clr-trnsl pk orngbrn hd conch frac

SH gy-dkgy gybrn redbrn sft rthy sl slty ip occ carb frags v sl-non calc

SH AA

SH ltgy-dkgy gybrn redbrn orng sft sbplty-sbblky sl slty ip occ carb frags & lams v sl-non calc tr bent

WT	VIS	WL	CKE	PH
13.4	52	6.2	2/32	9.5

CL 600

TOOH FOR NEW BHA & BIT

SH m-dkgy gybrn sbplty-sbblky sft rthy fri slty-v sl sdy occ carb frags & lams non-v sl calc tr bent

SH AA

SH m-dkgy gybrn sbplty-sbblky sft rthy fri slt-v sl sdy occ carb frags & lams non-v sl calc

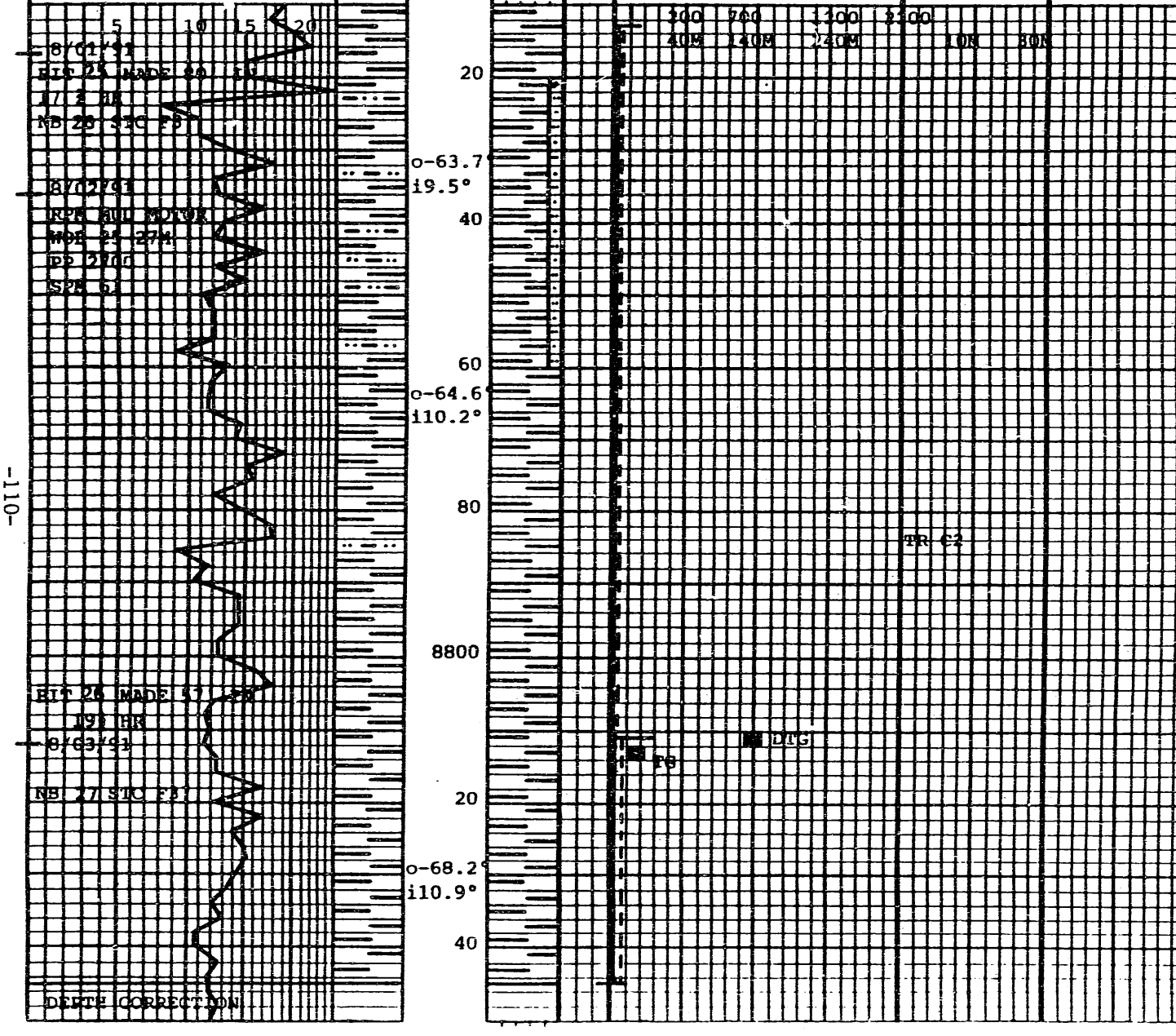
ROCKY MOUNTAIN GEO-ENGINEERING CO.

WELL SITE GEOLOGY - MUD LOGGING

2450 INDUSTRIAL BLVD PHONE (303) 243-3044 GRAND JUNCTION, CO 81505

COMPANY CER CORP COUNTY GARFIELD

WELL NAME SHCT SIDETRACK #1 STATE COLORADO



SH m-dkgy-gybrn sbplty-sb blky sft- mfrm rthy sooty slty-sl sdy sl-n calc occ carb incl grdg to shy SLTST

SLTST orngbrn-brn blky sft-m frm sdy v arg cmt occ carb incl

SH m-dkgy-gybrn sbblky-sb plty sft-m frm slty-sl sdy sl-n calc tr mica occ carb incl and lam grdg to shy SLTST

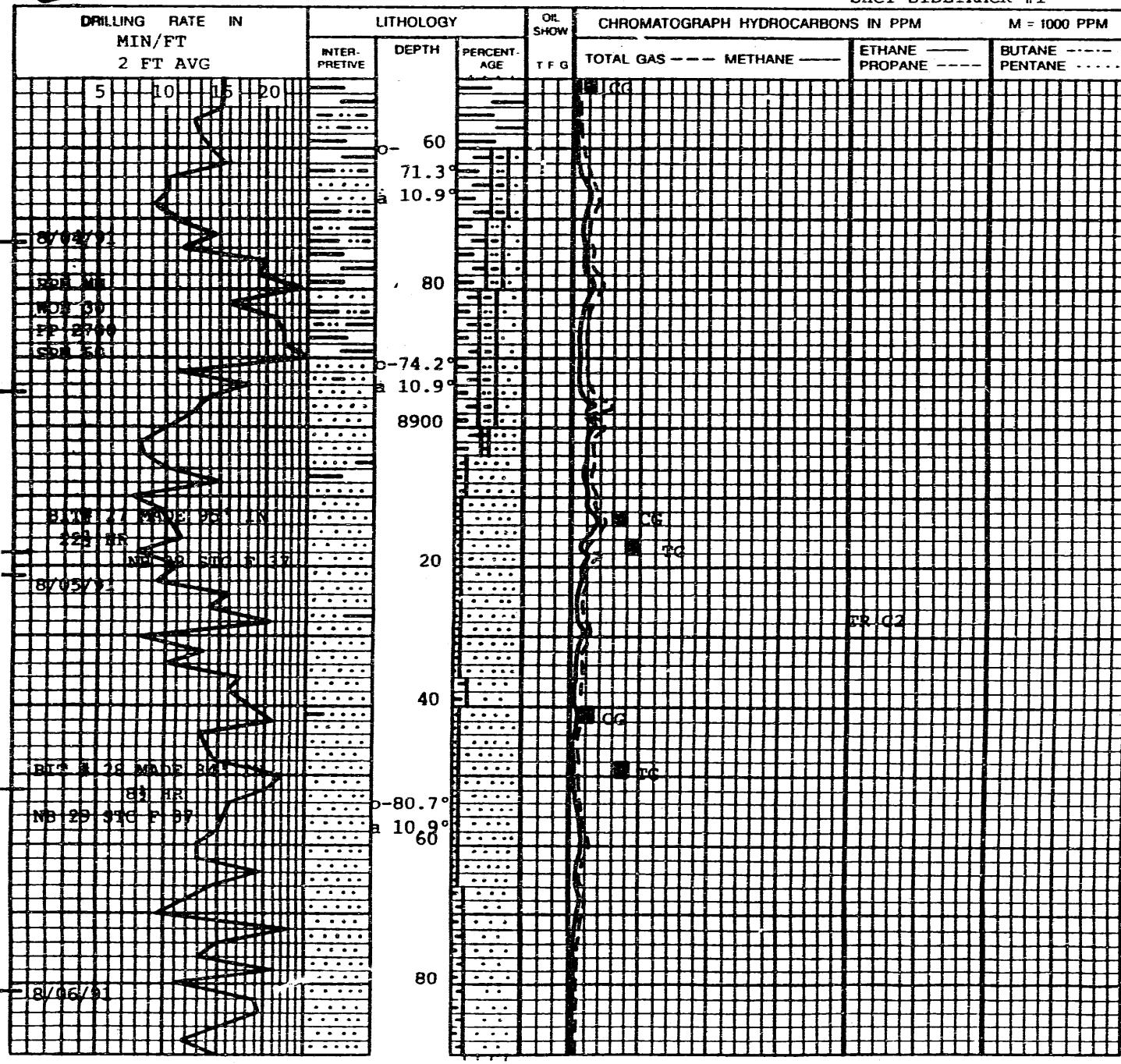
SH AA

13.7 47 6.0 2/32 9.5
Cl 600

SH m-dkgy dkgybrn sbplty-sbblky sft-frm rthy fri slty-sl sdy sl-n calc t mica occ carb incl and lams grdg to shy SLTST

ROCKY MOUNTAIN GEO-ENG[illegible]ING CO.
WELL SITE GEOLOGY — MUD LOGGING
2450 INDUSTRIAL BLVD PHONE (303) 243-3044 GRAND JUNCTION, CO 81505

COMPANY CER
WELL NAME SHCT SIDETRACK #1
COUNTY GARFIELD
STATE COLORADO



REMARKS

WT	VIS	WL	CKE	PH

SH mgy-gybrn plty-sbblky sft-m frm sl calc

SS lt-m brn fcr-cgr ang-sb rd msrt sil cmt m abnt dk brn asph resd in p vis ø n flor or cut

BENT gy-gygn wxy mica ip dull orng mnrl flor

SS ltbrn-wh vfgr-cgr psrt sil cmt frm abnt cly incl n flor or cut dk brn asph resd

TR BENT gy wxy flor AA

SS brn-ltbrn mgr-fgr occ cgr anf-rd msrt sil cmt&occ ovgth dkbrn asph resd in p -occ f vis ø n flor or cut
13.7 48 6.0 2/32 9.5
Cl 600

SS brn-ltbrn mgr decr pyro-bit-asph stn

SS dkbrn-gybrn vfgr-fgr sbrd -sbang mwsrt sil cmt fld gr dk mnrl ip scat pyro-bit tr GLAU tt-vp vis ø n flor or cut
14.0 53 6.0 2/32 9.5
Cl 600

SH dkgy blky mica sl slty sl-n calc sft pred MANCOS cvgs

SS dkgy-dkgybrn-occ wh fgr-occ mgr sbang mwsrt sil cmt dk mnrl,fld& occ GLAU scat p-p pyrobit n-vp vis ø n flor or cut

SS AA occ vcgr lse CHT& QTZ gr rr hline frac

SS dkbrn-wh fgr-mgr occ cgr sil cmt occ pyrobit occ calc fl h line frac

ROCKY MOUNTAIN GEO-ENGINEERING CO.

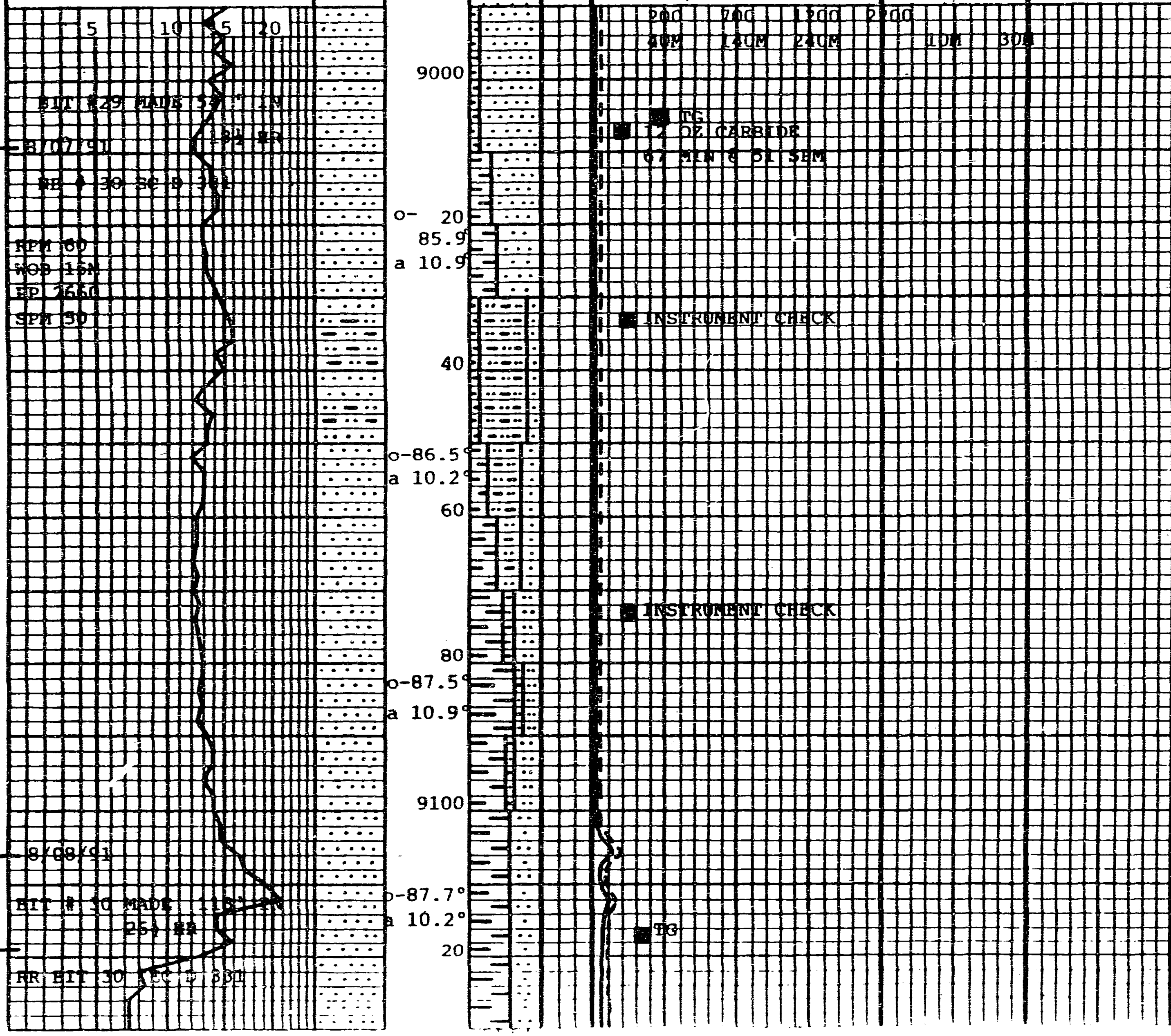
WELL SITE GEOLOGY – MUD LOGGING

2450 INDUSTRIAL BLVD PHONE (303) 243 3044 GRAND JUNCTION CO 81505

COMPANY CER
WELL NAME SHCT SIDETRACK #1

COUNTY GARFIELD
STATE COLORADO

DRILLING RATE IN MIN/FT 2' AVG | LITHOLOGY (INTERPRETIVE, DEPTH, PERCENTAGE) | OIL SHOW (T F G) | CHROMATOGRAPH HYDROCARBONS IN PPM, M = 1000 PPM (TOTAL GAS – – – METHANE ——; ETHANE ——, PROPANE – – – –; BUTANE –·–·–, PENTANE ·····)



REMARKS

WT VIS WL CKE PH

SS brn-wh-dkbrn fgr-mgr occ cgr sbang-sbrd mwsrt sil cmt &ovgth occ calc fl h line frac dk mnrl& fld gr scat lse cgr qtz gr v occ pyrobit NFOC

14.0 49 6.2 2/32 9.5

Cl 600

SS wh-ltgy fgr-mgr occ cgr sbang-sbrd sil cmt&ovgth some qtz frac fl scat dk mnrl and fld gr NSFOC

SLTST ltorng-crm m arg sl sdy n calc frm

ABNT METAL ON SPLS

SS lt-m gy vfgr-fgr sbrd-sbang slty ip sil cmt fri-frm scat dk mnrl some arg MTX SOME HLINE calc fl frac

P SPLS MANCOS CVGS

SS lt-mgy vfgr-fgr v occ cgr sbrd-sbang slty ip sil cmt & ovgth fri scat cgr anhed qtz gr prob frac fl NFSOC

SS mgy-wh vfgr-fgr occ slty & arg mtx occ dk mnrl gr& pyr incl sil cmt fri-frm occ h line frac

SS AA occ GLAU sil cmt&ovgth vcgr qtz gr thru occ hline frac

13.9 48 6.0 2/32 9.5

Cl 600

VP SPLS PRED MANCOS CVGS

ABNT LSE CGR QTZ GR

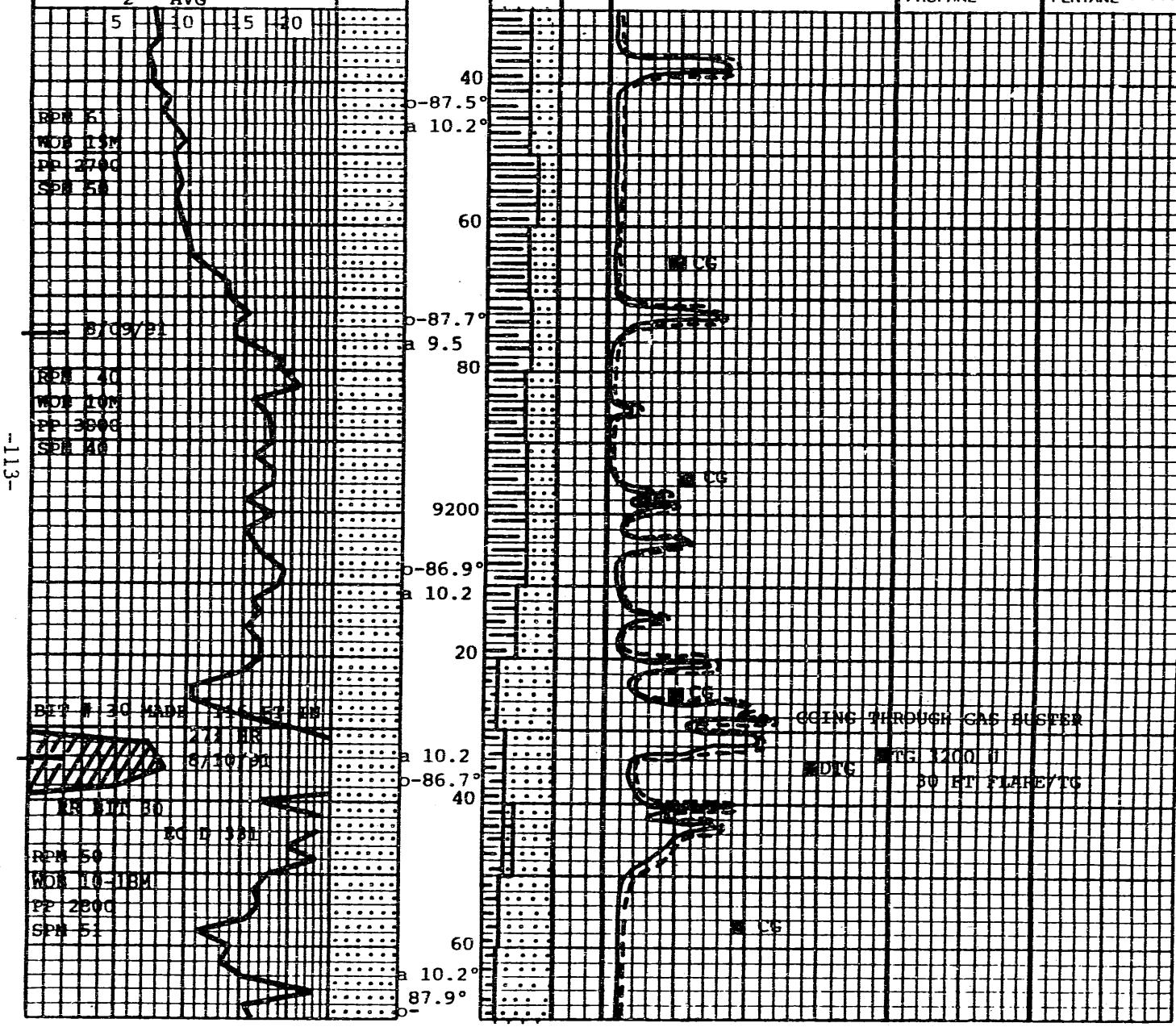
ROCKY MOUNTAIN GEO-ENGINEERING CO.

WELL SITE GEOLOGY MUD LOGGING

2450 INDUSTRIAL BLVD PHONE (303) 243 3044 GRAND JUNCTION CO 81505

COMPANY CER COUNTY GARFIELD

WELL NAME SHCT SIDETRACK #1 STATE COLORADO



SS wh-occ ltgy fgr-mgr some cgr sil cmt fri-frm sl arg mtx anhed qtz gr NFSOC

TR BENT gy wxy dull orng mnrl flor

ABNT MANCOS CVGS

SS wh-occ ltgy vfgr-mgr sbrd -occ sbang mwsrt sil cmt fri dk mnrl,fld and occ GLAU incl p vis ø-tt NFSOC

SS AA sbrd-rd occ sbang sca blk hvy mnrl gr rr h line mnrl fl frac occ calc cmt

14.0 49 6.0 2/32 9.5
Cl 600

SS wh-crm vfgr-fgr sbrd-rd occ sbang mwsrt sil/sl calc cmt fld,hvy mnrl and occ GLAU occ hline frac abnt cgr-vcgr qtz and cht frags prob frac fl

TOH TO CHG BHA @ 9235'

TOH FOR HOLE IN PIPE @ 9235'

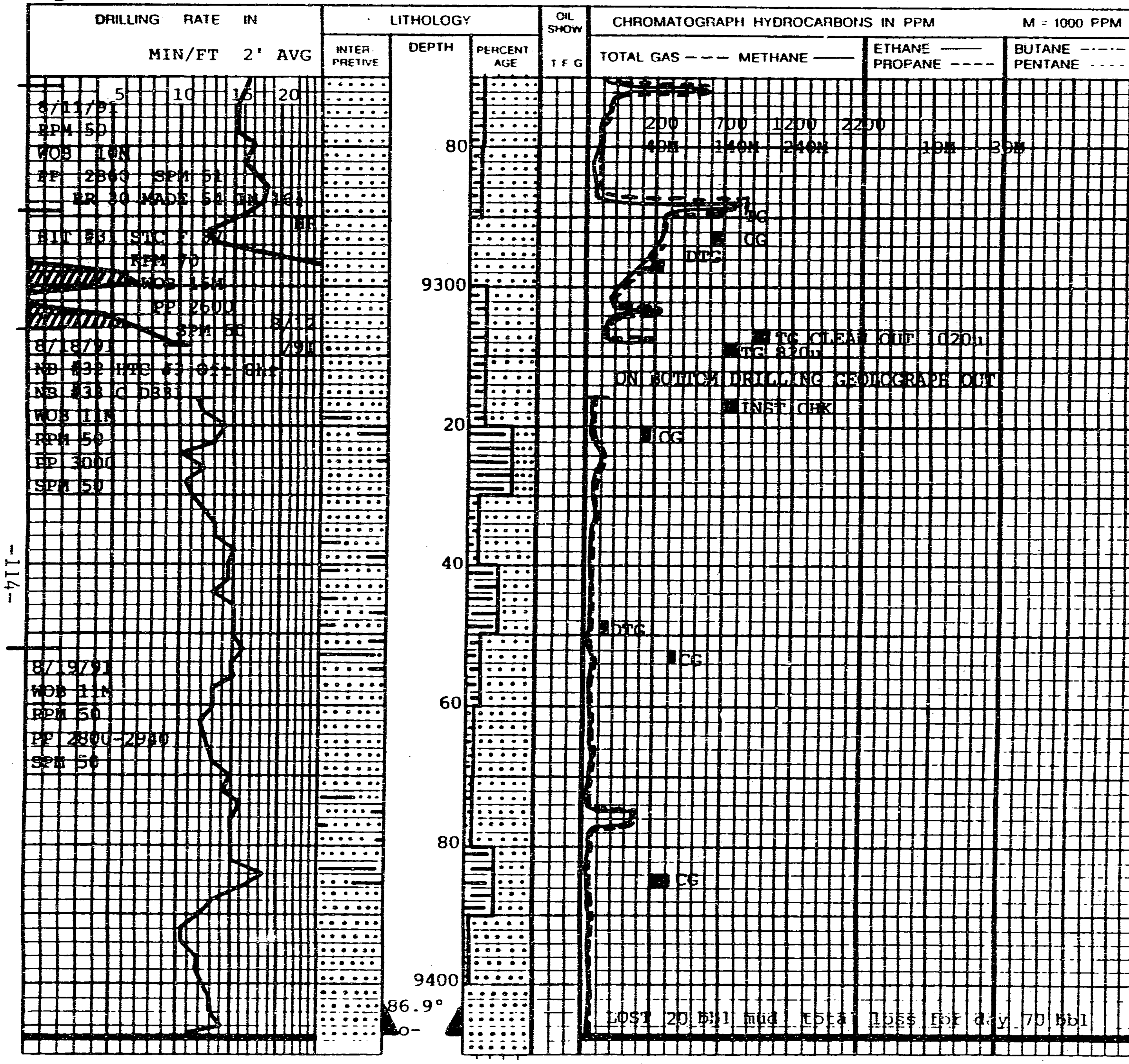
SS ltgy-wh fgr-mgr sbang-sbrd sil cmt sl calc dk mnrl & fld incl rr pyr& qtz frac fl NFSOC

ROCKY MOUNTAIN GEO-ENGINEERING CO.

WELL SITE GEOLOGY — MUD LOGGING
2150 INDUSTRIAL BLVD — PHONE (303) 243-3044 — GRAND JUNCTION, CO 81505

COMPANY CER
WELL NAME SHCT SIDETRACK # 1

COUNTY GARFIELD
STATE COLORADO



REMARKS

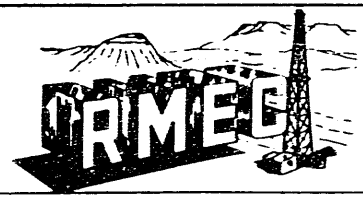
WT	VIS	WL	CKE	PH

SS ltgy vfgr-mgr mw-msrt
sil cmt vsl calc dk mnrl
fld gr slty mtx occ mnrl
fl frac&qtz frac fl tt-vp
ø NFSOC
13.9 52 6.0 2/32 9.5
Cl 600
SS AA v little frac fl
SS ltgy-wh fgr-mgr sbang-sbrd
mwsrt sil cmt occmnrl fl
frac rr qtz frac fl
14.0 50 6.0 2/32 9.5
Cl 600
16.6+ 58 6.4 2/32 9.0
CLOR 600
SS off wh fgr frm-fri sbang
sbrd wsrt tt no vis por
pred sil v sl calc occ
f-mxln qtz NFSOC
16.4 61 5.6 2/32 9.0
CLOR 600
SS AA:bcm s&p occ w defined
qtz xls & sil nod frac fl
occ fe stn NFSOC

SS AA:/opaline qtz frag vhd
trnsl conq frac NFSOC
SH dkgy blky occ hkly frm-
hd occ pyrobit
GAS INCR @ 9376 pos frac
16.4 56 6.4 2/32 8.5
CLOR 600
SS off wh s&p fgr frm-fri
sbrd-wrd wsrt tt no vis
por sil v sl calc tr qtz
m-fxln w some twining
& broken xls NFSOC
TD 9407' 8/19/91
PROJ. TVD 7948.22

Appendix 4

MUD LOG, TRUE VERTICAL DEPTH



ROCKY MOUNTAIN GEO-ENGINEERING CO.

WELL SITE GEOLOGY MUD LOGGING

2450 INDUSTRIAL BLVD PHONE (303) 243 3044 GRAND JUNCTION, COLORADO 81505

COMPANY	CER CORPORATION	LOCATION	2450' FSL 747' FWL SEC 34 T6S R94W
WELL	SHCT- 1 SIDETRACK	COUNTY	GARFIELD
FIELD	RULISON	STATE	COLORADO
ELEVATION	5407' GL 5438.8' KB	DRILLING FLUID	LSND

THIS LOG IS A TOTAL VERTICAL DEPTH LOG CALCULATED FROM COSINE OF DEVIATION

	FROM	TO
DEPTH LOGGED	6500' TVD	
DATE LOGGED	6 JUNE 91	
ENGINEERS	PETER RECKS	

SHALE · DOLOMITE · COAL

SANDSTONE · CHERT · ANHY-GYP

LIMESTONE · SALT · SILTSTONE

DTG - DOWN TIME GAS
DST - DRILL STEM TEST
SLM - STEEL LINE MEAS
LAT - LOGGED AFTER TRIP
WOB - WEIGHT ON BIT
RPM - REVOLUTIONS/MIN
SPM - STROKES/MIN
PP - PUMP PRESSURE
O— DEVIATION

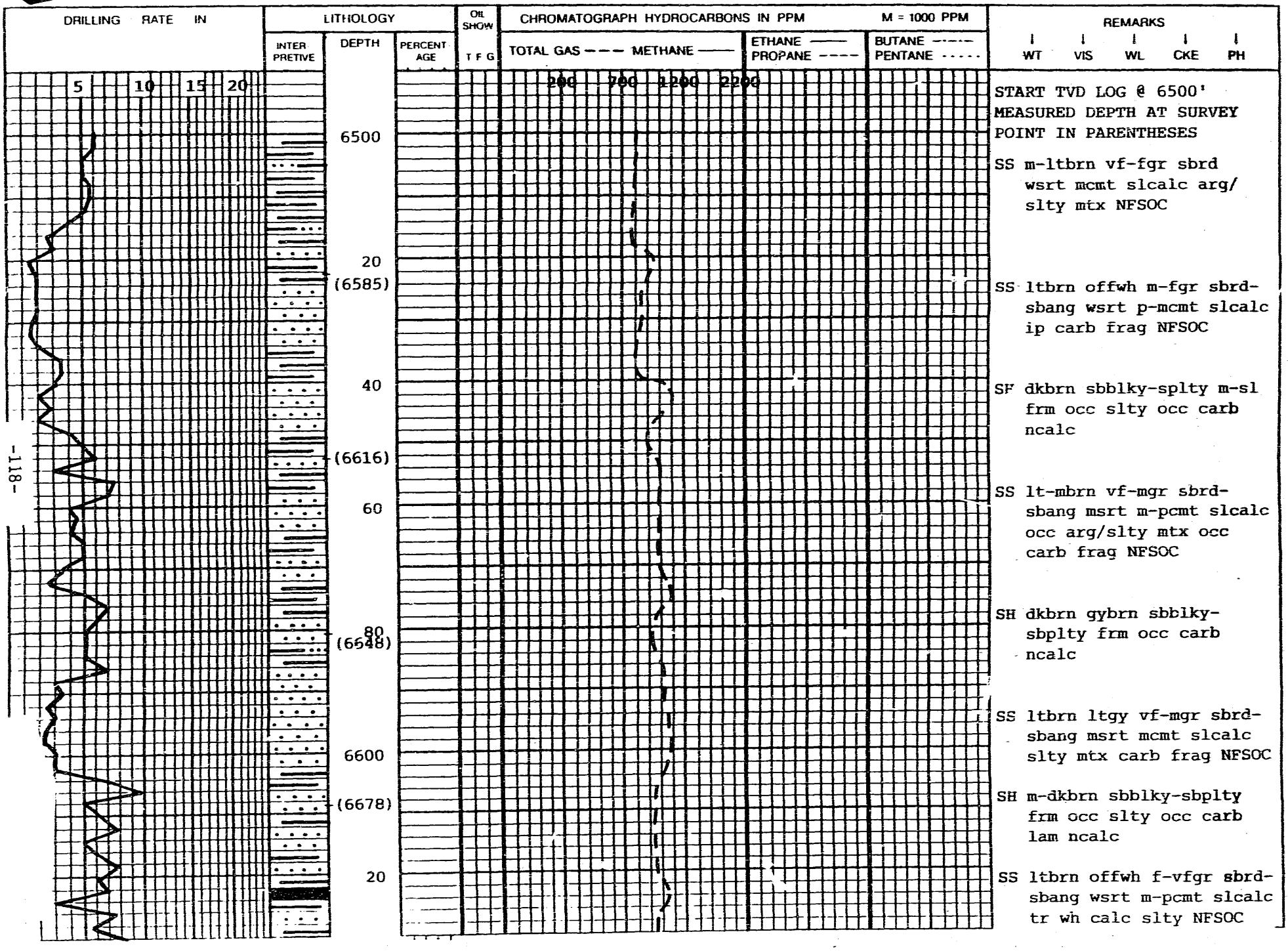
TG - TRIP GAS
CG - CONNECTION GAS
NB - NEW BIT
NR - NO RETURNS
CO - CIRCULATE OUT
NS - NO SAMPLE
RR - RERUN
CB - CORE BIT
O SHOW REPORT

DRILLING RATE IN MIN/FT	LITHOLOGY: INTERPRETIVE	DEPTH	PERCENTAGE	OIL SHOW: T F G	CHROMATOGRAPH HYDROCARBONS IN PPM — M 1000 PPM: TOTAL GAS —— METHANE ——	ETHANE —— PROPANE ——	BUTANE —·—·— PENTANE - - - - -	REMARKS: WT	VIS	WL	CKE	PH

WELL SITE GEOLOGY MUD LOGGING
2451 INDUSTRIAL BLVD PHONE (303) 243-3044 GRAND JUNCTION CO 81505

COMPANY
WELL NAME

COUNTY
STATE



REMARKS

WT	VIS	WL	CKE	PH

START TVD LOG @ 6500'
MEASURED DEPTH AT SURVEY POINT IN PARENTHESES

SS m-ltbrn vf-fgr sbrd wsrt mcmt slcalc arg/ slty mtx NFSOC

SS ltbrn offwh m-fgr sbrd-sbang wsrt p-mcmt slcalc ip carb frag NFSOC

SF dkbrn sbblky-splty m-sl frm occ slty occ carb ncalc

SS lt-mbrn vf-mgr sbrd-sbang msrt m-pcmt slcalc occ arg/slty mtx occ carb frag NFSOC

SH dkbrn gybrn sbblky-sbplty frm occ carb ncalc

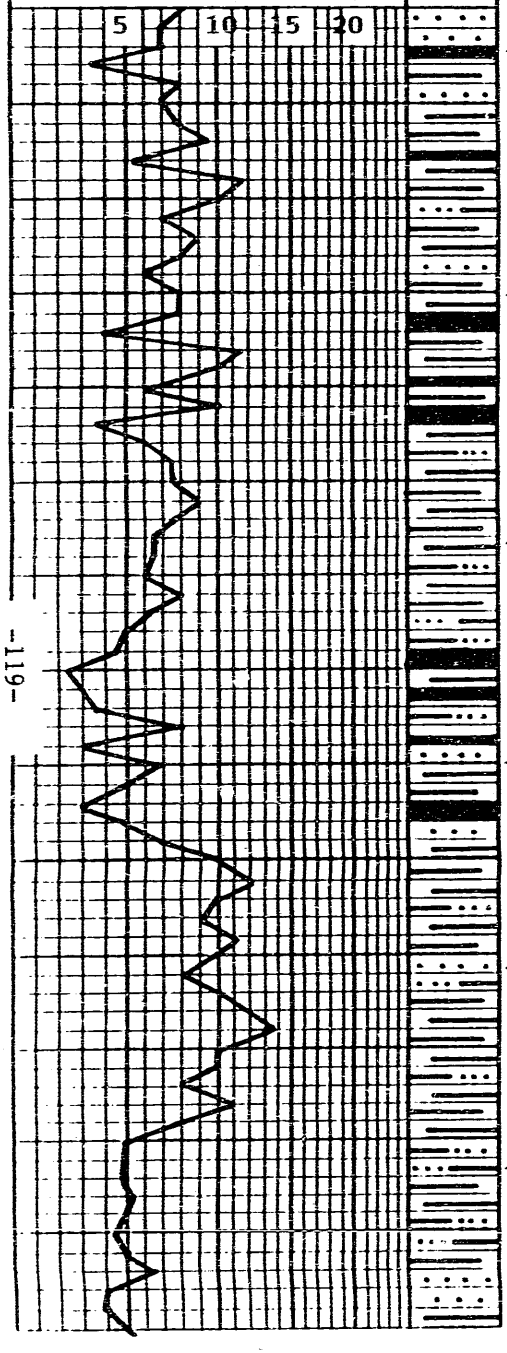
SS ltbrn ltgy vf-mgr sbrd-sbang msrt mcmt slcalc slty mtx carb frag NFSOC

SH m-dkbrn sbblky-sbplty frm occ slty occ carb lam ncalc

SS ltbrn offwh f-vfgr sbrd-sbang wsrt m-pcmt slcalc tr wh calc slty NFSOC

COMPANY
WELL NAME

COUNTY
STATE



LITHOLOGY			OIL SHOW	CHROMATOGRAPH HYDROCARBONS IN PPM — M - 1000 PPM			REMARKS				
INTERPRETIVE	DEPTH	PERCENTAGE	T F G	TOTAL GAS - - - METHANE ——	ETHANE —— PROPANE - - - -	BUTANE -·-·- PENTANE ·····	WT	VIS	WL	CKE	PH
	(6708)										
	40										
	(6739)										
	80										
	(6772)										
	6700										
	(6803)										
	20										
	(6833)										
	40										
	(6864)										
	60										

COAL blk dull blky frm brit shly ip

SH dkbrn gybrn sbblky-sbplty frm slslty ip occ carb n-slcalc

COAL blk dull-vit blky-plty frm-sft brit ip occ shly

SH dk-mbrn sbblky-sbplty frm slslty ip occ carb n-slcalc

SS lt-mbrn ltgy vf-fgr sbrd-sbang wsrt mcmt slcalc slty NFSOC

SS mbrn f-mgr sbang-sbrd wsrt mcmt vslcalc ip arg mtx occ carb frag NFSOC

COAL blk dull-vit sbblky frm-sft sooty ip

SH dk-mbrn sbblky m-vfrm vslty ip occ sdy occ carb n-slcalc

SS lt-mbrn f-vfgr sbang-sbrd wsrt m-wcmt occ vslcalc arg/slty mtx occ carb frag NFSOC

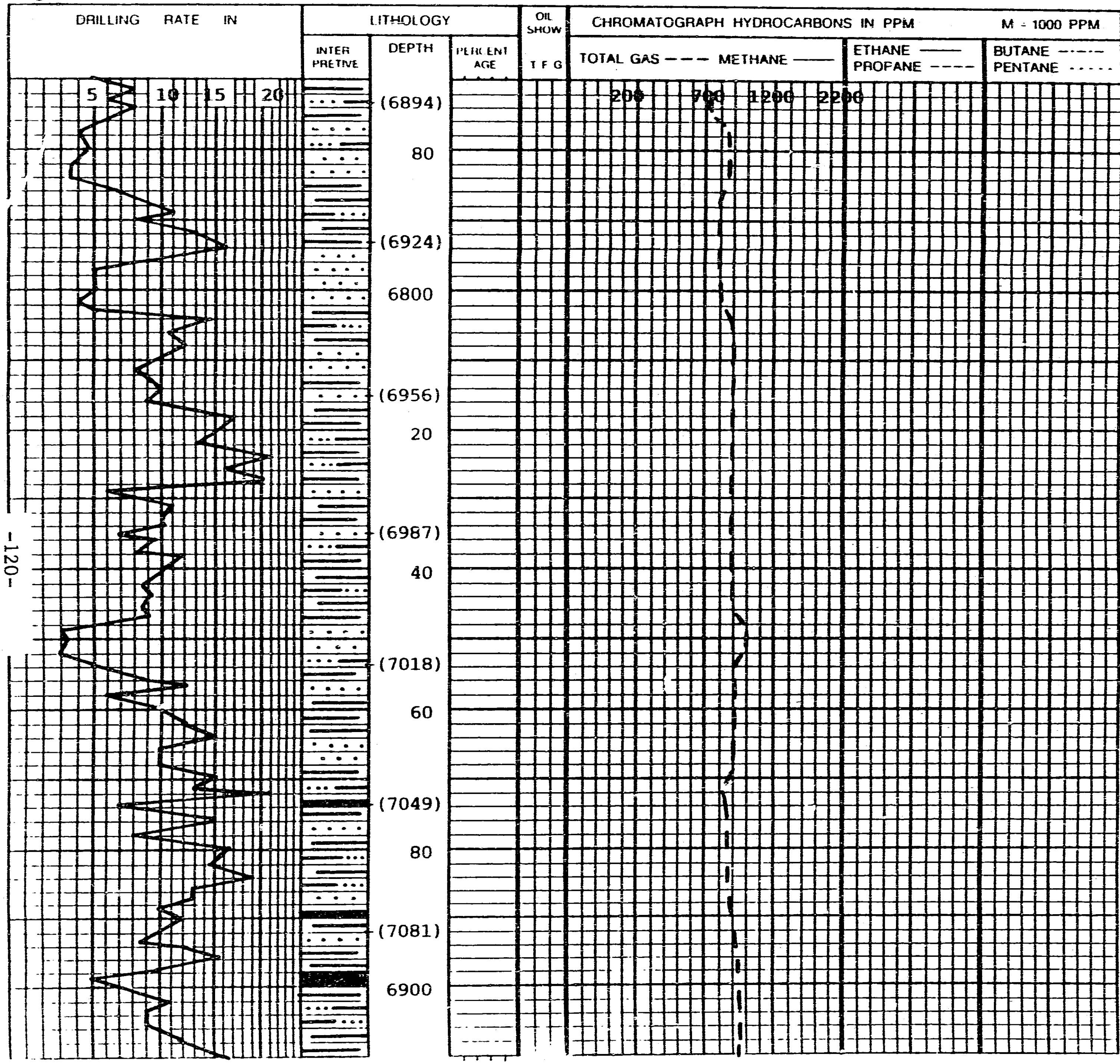
SH dkbrn gybrn mgy blky-sbplty frm slty ip occ carb ncalc occ vslcalc

WELL SITE GEOLOGY · MUD LOGGING
2440 INDUSTRIAL BLVD · PHONE (303) 241-3044 · GRAND JUNCTION, CO 81505

COMPANY
WELL NAME

TVD LOG

COUNTY
STATE



REMARKS

↓ WT ↓ VIS ↓ WL ↓ CKE ↓ PH

SS ltbrn ltgy vf-fgr sbrd-sbang wsrt p-mcmt slcalc arg/slty mtx occ carb frag NFSOC

SH dk-mbrn gybrn sbblky-sbplty frm slty ip occ carb lam ncalc

SS wh offwh vf-fgr sbrd-sbang wsrt p-mcmt slcalc arg/slty mtx ip occ carb frag NFSOC

SH dkbrn gybrn tan mgy sbblky-plty m-vfrm occ slslty tr carb lam n-vslcalc

SS wh ltbrn vf-fgr sbrd wsrt m-pcmt slcalc arg/slty mtx NFSOC

SS wh offwh vf-fgr sbrd wsrt p-mcmt slcalc incr slty occ carb frag NFSOC

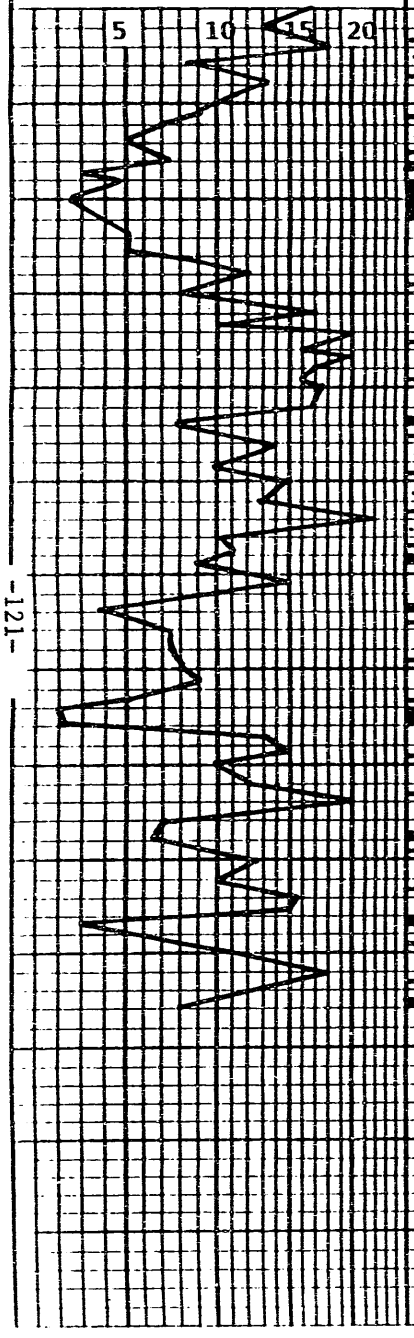
SH gybrn m-dkbrn mgy blky-sbplty frm sl-mslty occ carb n-vslcalc

SS ltbrn wh vf-fgr sbrd-sbang wsrt m-pcmt slcalc arg/slty mtx occ carb frag NFSOC

SH dkbrn gybrn sbblky-blky frm slty occ carb ncalc

COAL blk dull-vit blky frm brit ip sooty ip

COMPANY
WELL NAME
COUNTY
STATE



LITHOLOGY

INTERPRETIVE	DEPTH	PERCENTAGE
	-(7112)	
	20	
	-(7144)	
	40	
	-(7175)	
	60	
	-(7206)	
	80	
	-(7237)	
	-(7257)	
	7000	
	20	

OIL SHOW T F G

CHROMATOGRAPH HYDROCARBONS IN PPM M 1000 PPM

TOTAL GAS --- METHANE ——
ETHANE ——
PROPANE ----
BUTANE -·-·-
PENTANE ·····

REMARKS

WT	VIS	WL	CKE	PH

SS ltbrn offwh vf-fgr sbrd wsrt p-mcmt slcalc vslty mtx loc grdg to sltst occ carb frag NFSO(

COAL blk dull-vit blky-plty frm brit ip sooty ip

SH dkbrn gybrn mgy sbplty-blky frm occ slty carb ip ncalc

SS ltbrn wh vf-fgr sbrd wsrt m-pcmt slcalc slty mtx occ carb frag NFSOC

SH dkbrn gybrn sbblky-plty m-slfrm occ slty carb carb lam ncalc

SS ltbrn offwh vf-fgr sbrd-sbang wsrt mcmt slcalc ip slty mtx occ carb frag NFSOC

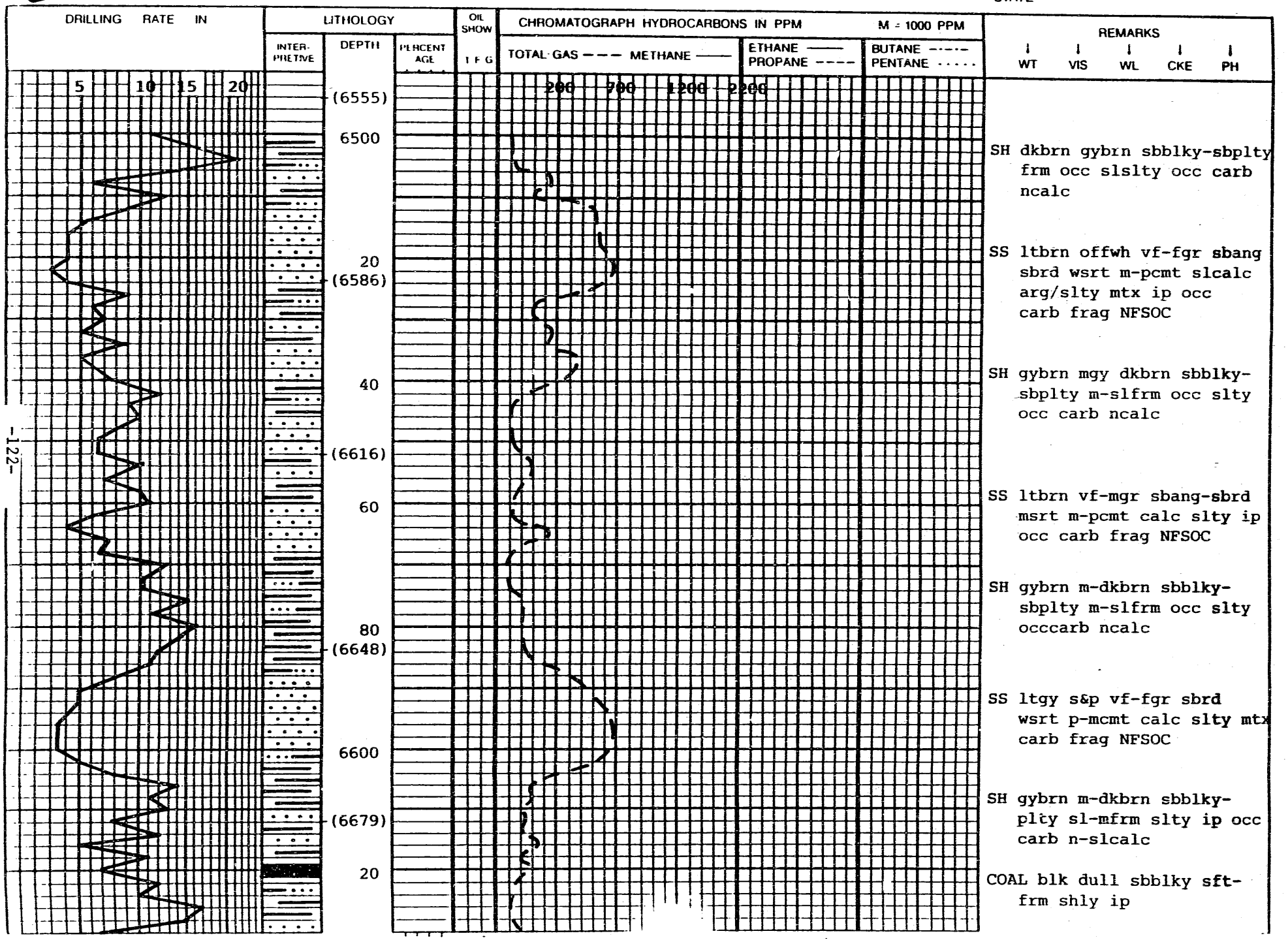
COAL blk dull blky sft-slfrm occ brit sooty

SH dk-mbrn gybrn dkgy sbblky sbplty frm occ slty carb ncalc

[redacted]

COMPANY -
WELL NAME

COUNTY
STATE

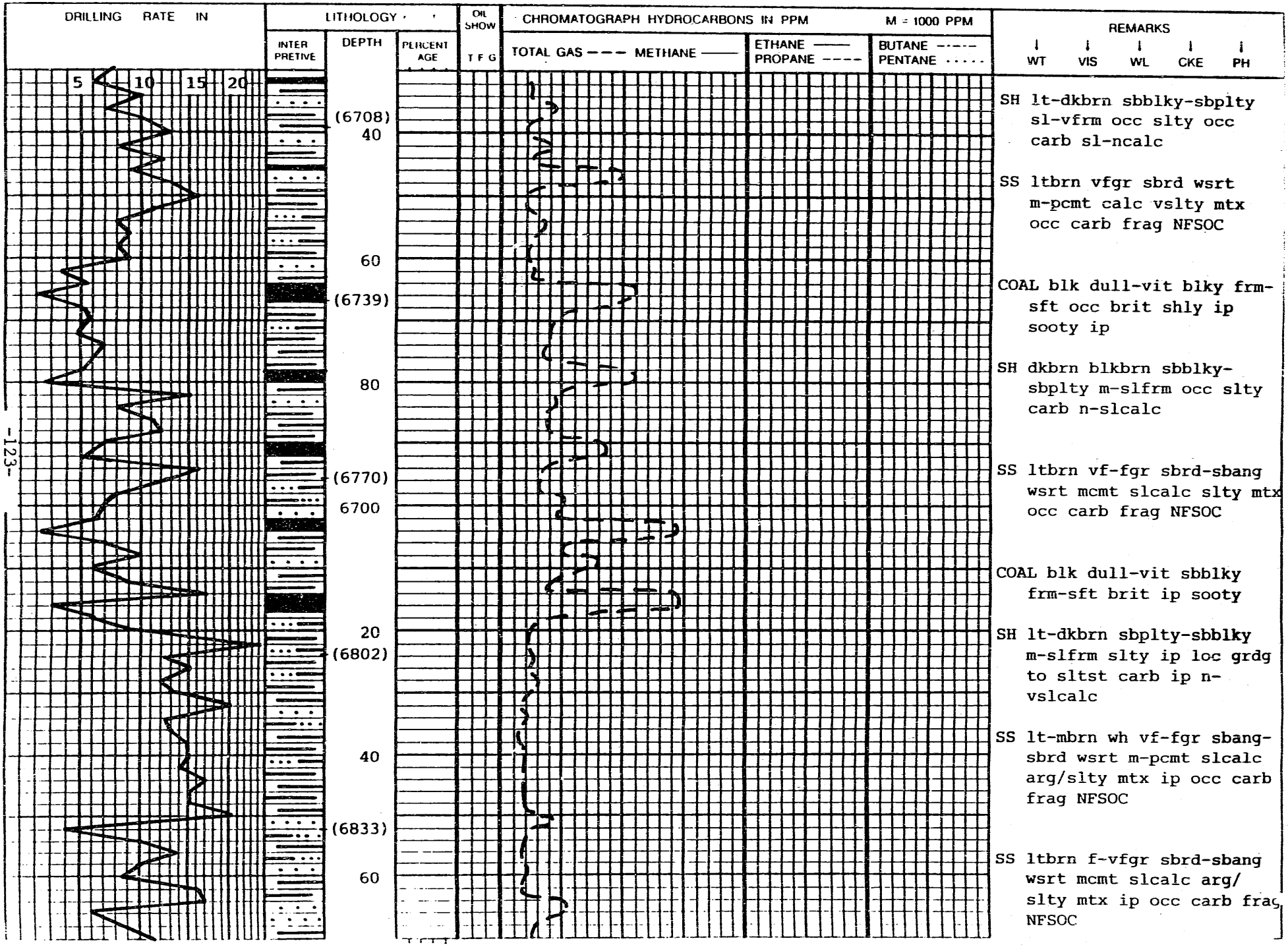


WELL SITE GEOLOGIST MUD LOGGING

2450 INDUSTRIAL BLVD PHONE (303) 241-3044 GRAND JUNCTION CO 81505

COMPANY
WELL NAME

COUNTY
STATE



REMARKS

WT	VIS	WL	CKE	PH

SH lt-dkbrn sbblky-sbplty sl-vfrm occ slty occ carb sl-ncalc

SS ltbrn vfgr sbrd wsrt m-pcmt calc vslty mtx occ carb frag NFSOC

COAL blk dull-vit blky frm-sft occ brit shly ip sooty ip

SH dkbrn blkbrn sbblky-sbplty m-slfrm occ slty carb n-slcalc

SS ltbrn vf-fgr sbrd-sbang wsrt mcmt slcalc slty mtx occ carb frag NFSOC

COAL blk dull-vit sbblky frm-sft brit ip sooty

SH lt-dkbrn sbplty-sbblky m-slfrm slty ip loc grdg to sltst carb ip n-vslcalc

SS lt-mbrn wh vf-fgr sbang-sbrd wsrt m-pcmt slcalc arg/slty mtx ip occ carb frag NFSOC

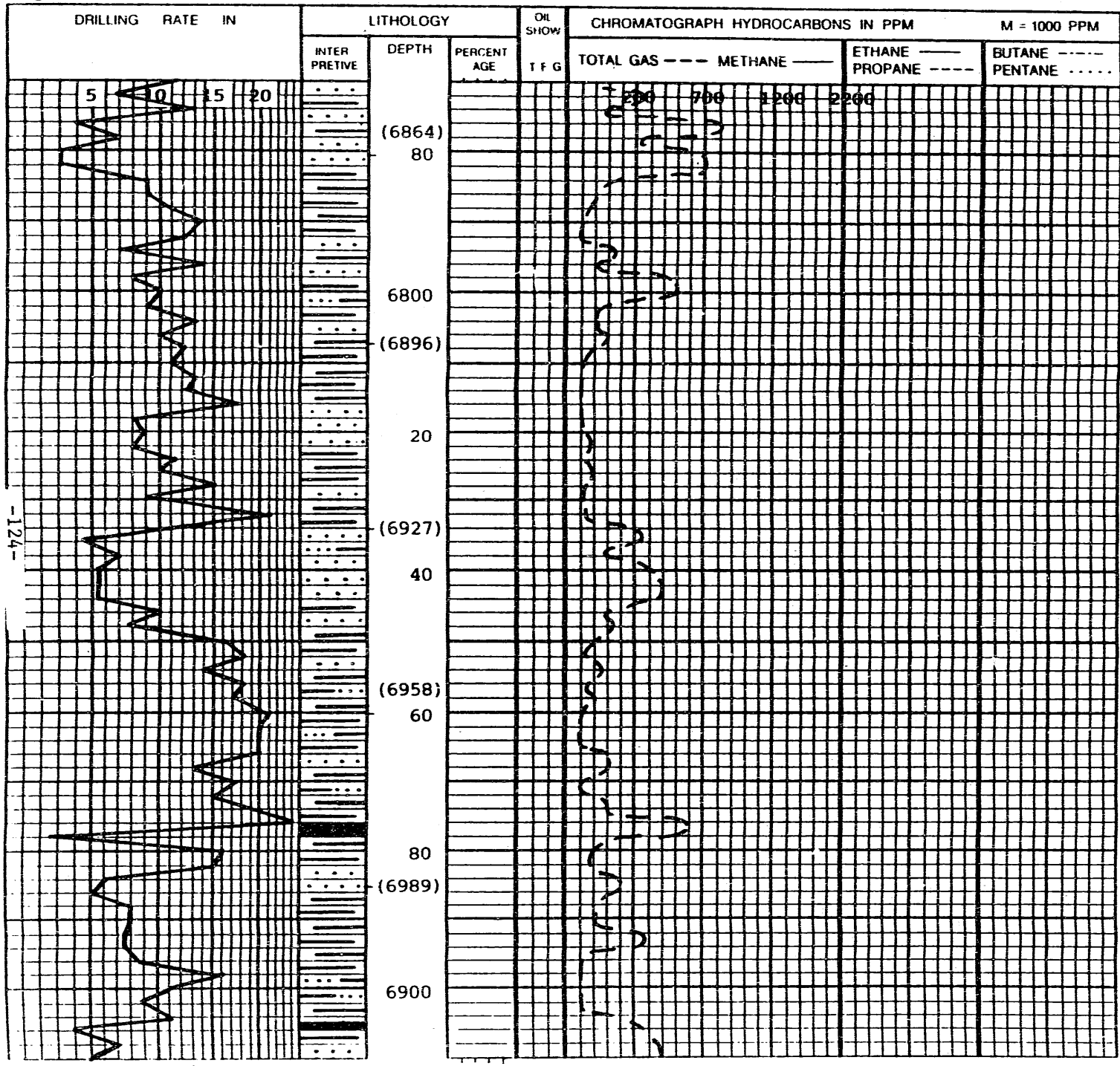
SS ltbrn f-vfgr sbrd-sbang wsrt mcmt slcalc arg/ slty mtx ip occ carb frag NFSOC

WELL SITE GEOLOGY MUD LOGGING

2450 INDUSTRIAL BLVD PHONE (303) 243-3044 GRAND JUNCTION CO 81505

COMPANY
WELL NAME

COUNTY
STATE



REMARKS

WT	VIS	WL	CKE	PH

SH dk-mbrn blkbrn sbblky sl-mfrm carb coaly ip ncalc

SS offwh ltbrn f-vfgr sbang sbrd wsrt m-pcmt calc arg/slty mtx ip occ carb frag NFSOC

SH dk-mbrn gybrn tan sbblky plty frm occ slty occ carb n-slcalc

SS offwh ltbrn vf-fgr sbang sbrd wsrt mcmt slcalc arg/slty mtx loc grdg to sltst carb&sh frag NFSOC

SS wh offwh s&p fgr sbrd wsrt p-mcmt calc occ arg mtx carb frag NFSOC

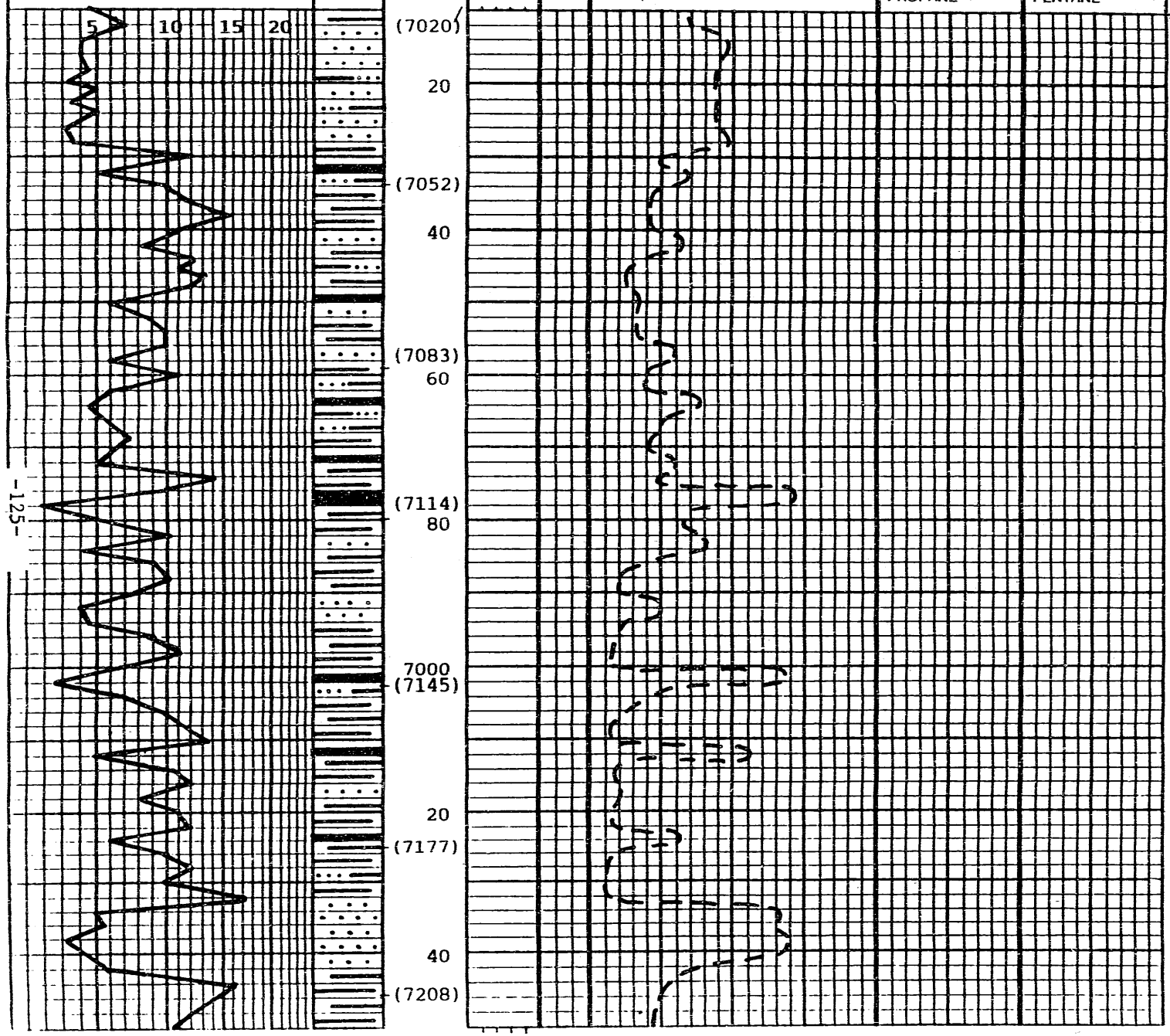
SH dk-ltbrn sbblky-plty sl-mfrm occ slslty occ carb lam ncalc

SS ltbrn wh f-vfgr sbang-sbrd wsrt m-pcmt slcalc arg slty mtx ip occ carb frag NFSOC

SH dk-mbrn sbblky frm occ slslty vcarb ip ncalc

SS offwh wh vf-fgr sbrd wsrt mcmt slcalc slarg slty ip occ carb frag

COMPANY
WELL NAME TVD LOG
COUNTY
STATE



REMARKS

WT	VIS	WL	CKE	PH

SS offwh wh f-vfgr sbrd wsrt m-pcmt slcalc slarg occ carb frag NFSOC

COAL blk dull occ vit sbblky sft sooty

SH lt-dkbrn sbblky-sbplty sft-frm slty ip loc grdg tosltst carb ip ncalc

SS ltbrn vf-fgr sbrd wsrt mcmt calc slarg vslty loc grdg to sltst NFSOC

COAL blk dull-vit blky frm brit ip sooty

SH dk-mbrn blky-sbplty frm-sft slty ip vcarb n-slcalc

SS ltbrn ltgy f-vfgr sbang wsrt m-wcmt slcalc slty ip occ carb frag NFSOC

SH dk-mbrn occ ltbrn sbblky sbplty m-slfrm occ slslty vcarb carb lam ncalc occ vslcalc

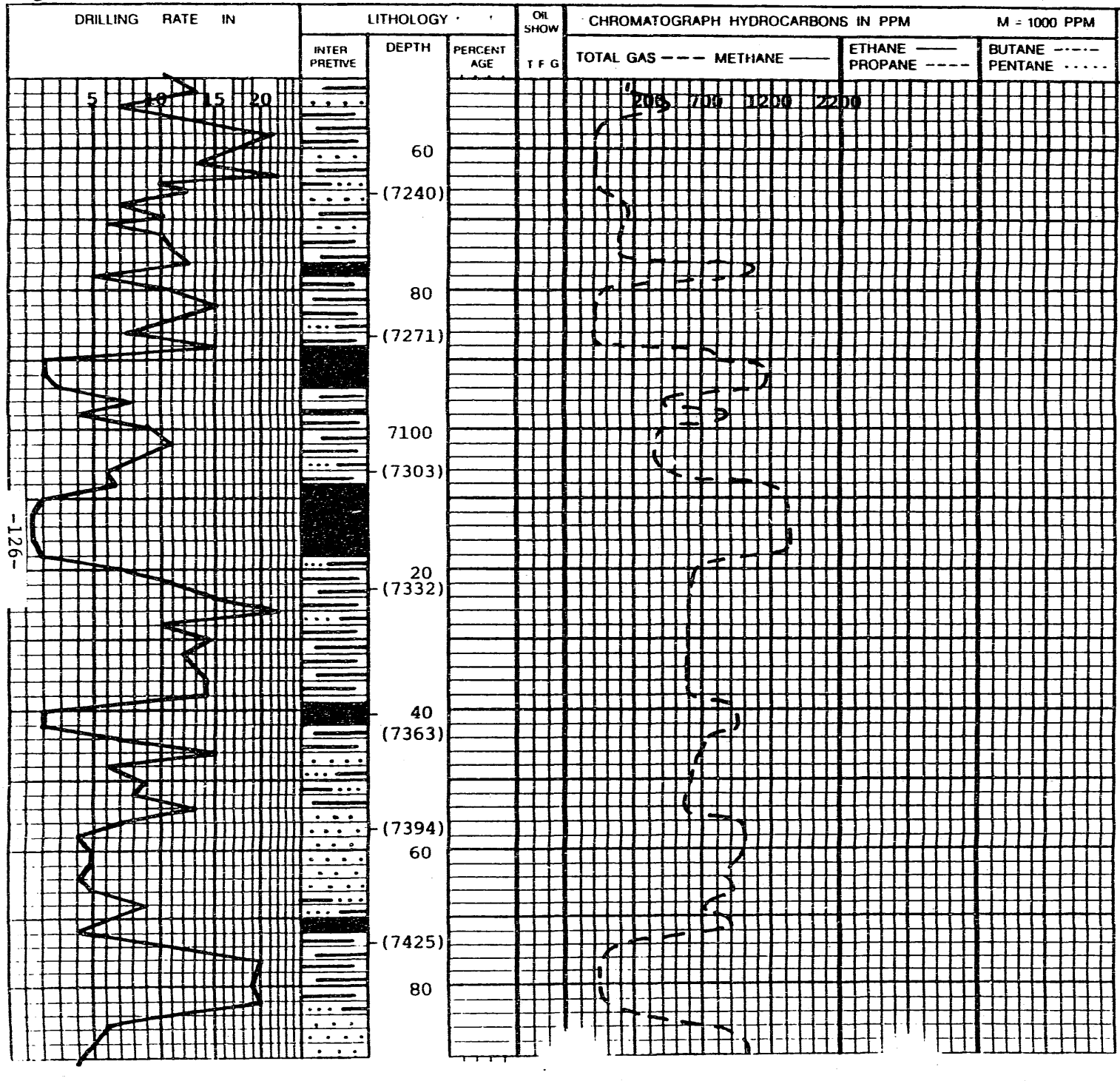
SH dk-ltbrn gybrn sbblky-sbplty m-slfrm slty ip carb ip n-slcalc

SS wh offwh f-mgr sbrd-sbang msrt m-pcmt occ vslcalc slty ip carb frag tr glau NFSOC

PRIME
WELL SITE GEOLOGY MUD LOGGING
2450 INDUSTRIAL BLVD PHONE (303) 243-3044 GRAND JUNCTION, CO 81505

COMPANY
WELL NAME

COUNTY
STATE



REMARKS

WT	VIS	WL	CKE	PH

SH dkbrn ltbrn sbblky frm occ slslty carb ip ncalc

SS wh ltbrn vf-fgr sbrd wsrt w-mcmt vslcalc occ slty mtx occ carb frag NFSOC

SH dkbrn blky-sbplty frm occ slslty vcarb coal lam n-vslcalc

COAL blk dull-vit slfrm-sft brit ip sooty ip

SS ltbrn vfgr sbang-sbrd wsrt mcmt slcalc slarg vslty mtx NFSOC

COAL blk dull-vit slfrm-sft brit sooty ip sl bldg gas

SH dkbrn occ mbrn sbblky-sbplty occ slslty carb n-vslcalc

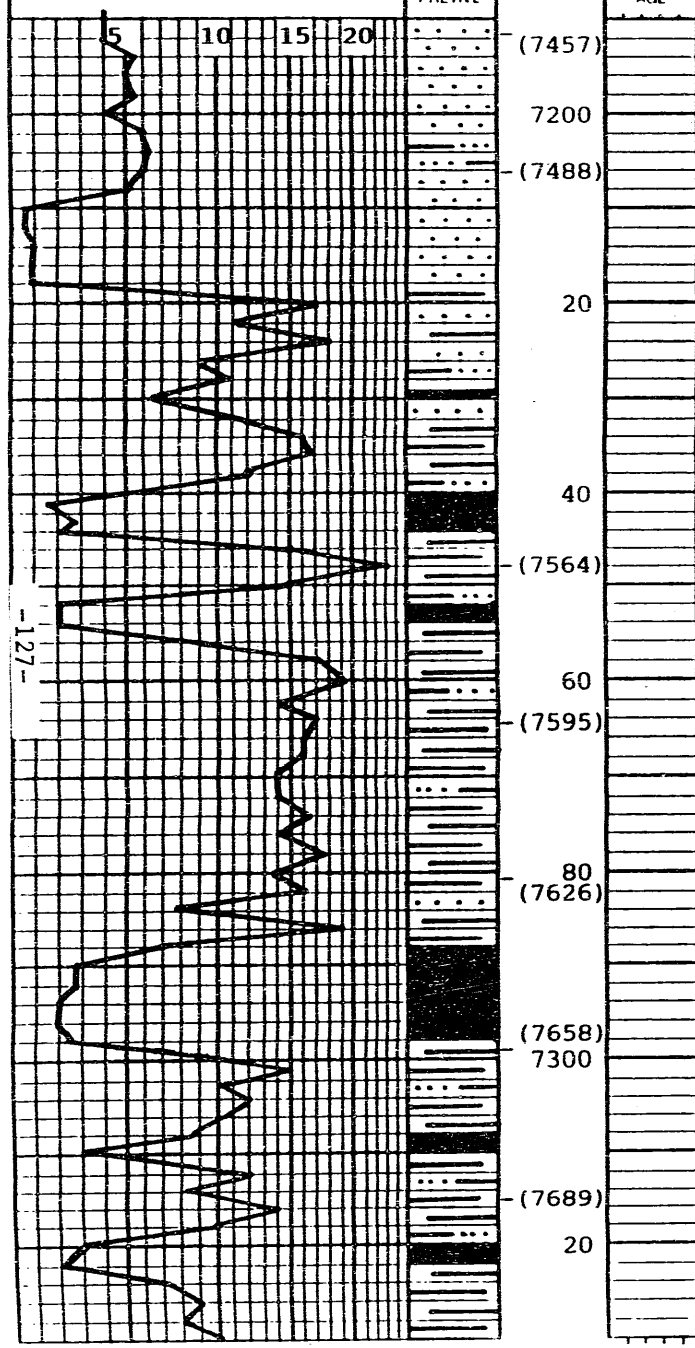
COAL blk dull-vit blky sl-mfrm brit sooty ip

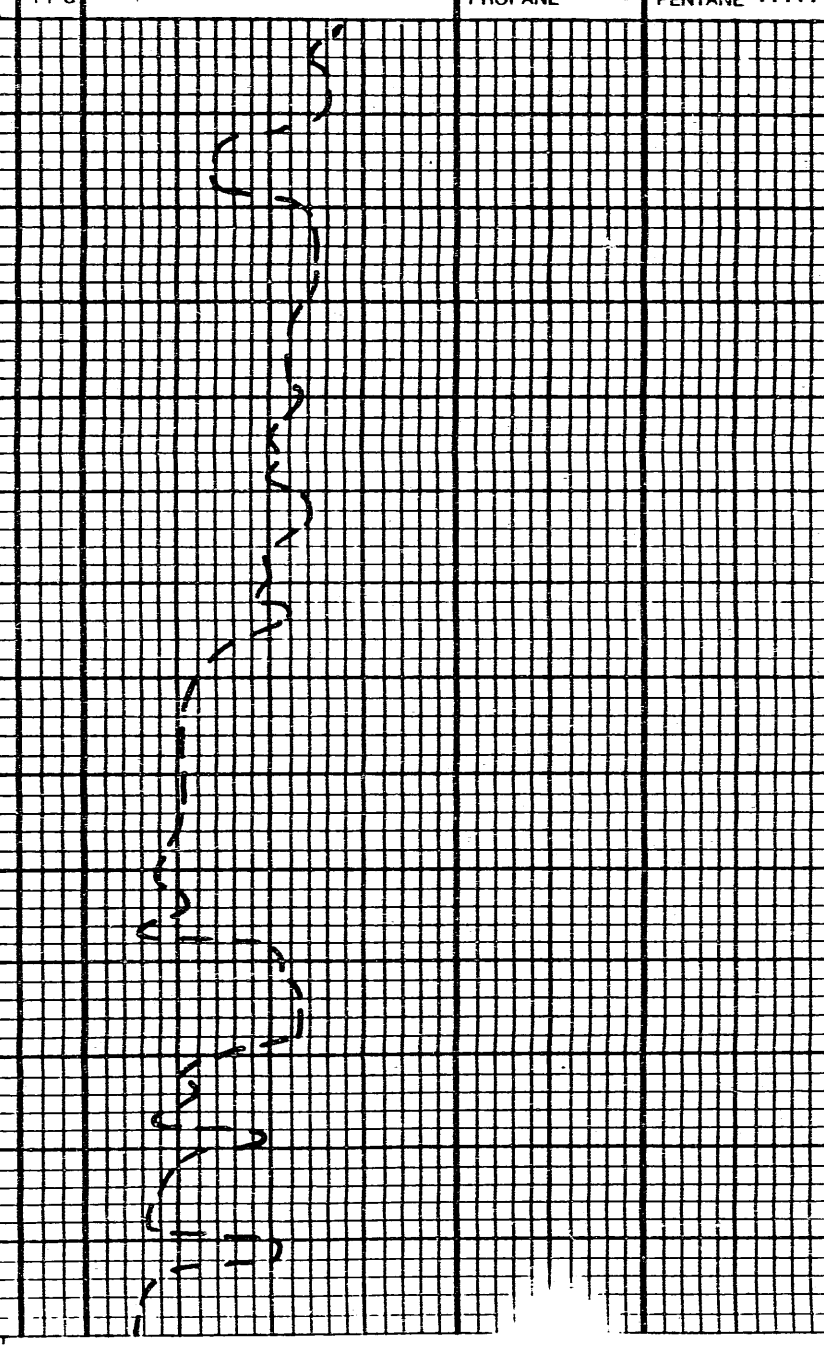
SS offwh wh vf-fgr sbrd wsrt m-pcmt calc slarg/slty ip NFSOC

SS offwh f-vfgr sbrd wsrt m-pcmt calc slarg mtx occ carb frag NFSOC

SH dkbrn dkgy sbblky-blky frm occ slty occ carb ncalc

COMPANY
WELL NAME
COUNTY
STATE





REMARKS

WT	VIS	WL	CKE	PH

SS offwh ltbrn vf-fgr sbrd wsrt mcmt sil slarg mtx NFSOC

SS m-ltbrn f-mgr sbang-sbr msrt m-wcmt calc arg mt: NFSOC

SS ltbrn ltgy f-vfgr sbrd wsrt w-mcmt sl-mcalc arg ip slty ip occ carb frag NFSOC

SH dkbrn gybrn blky-sbplty m-slfrm carb ip ncalc

COAL blk dull blky sft-slfrm sooty

SH dkbrn blkbrn sbblky frm vcarb carb lam ncalc

SH m-ltbrn gybrn sbblky-sbplty sl-vslty loc grd to sltst occ sdy m-sl calc

SS ltbrn vfgr sbrd wsrt mcr vslcalc varg vslty tr pyr NFSOC

COAL blk dull-vit sbblky sft-slfrm vsooty

SH dk-ltbrn sbplty-sbblky frm m-vslty loc grdg to sltst occ sdy tr pyr calc

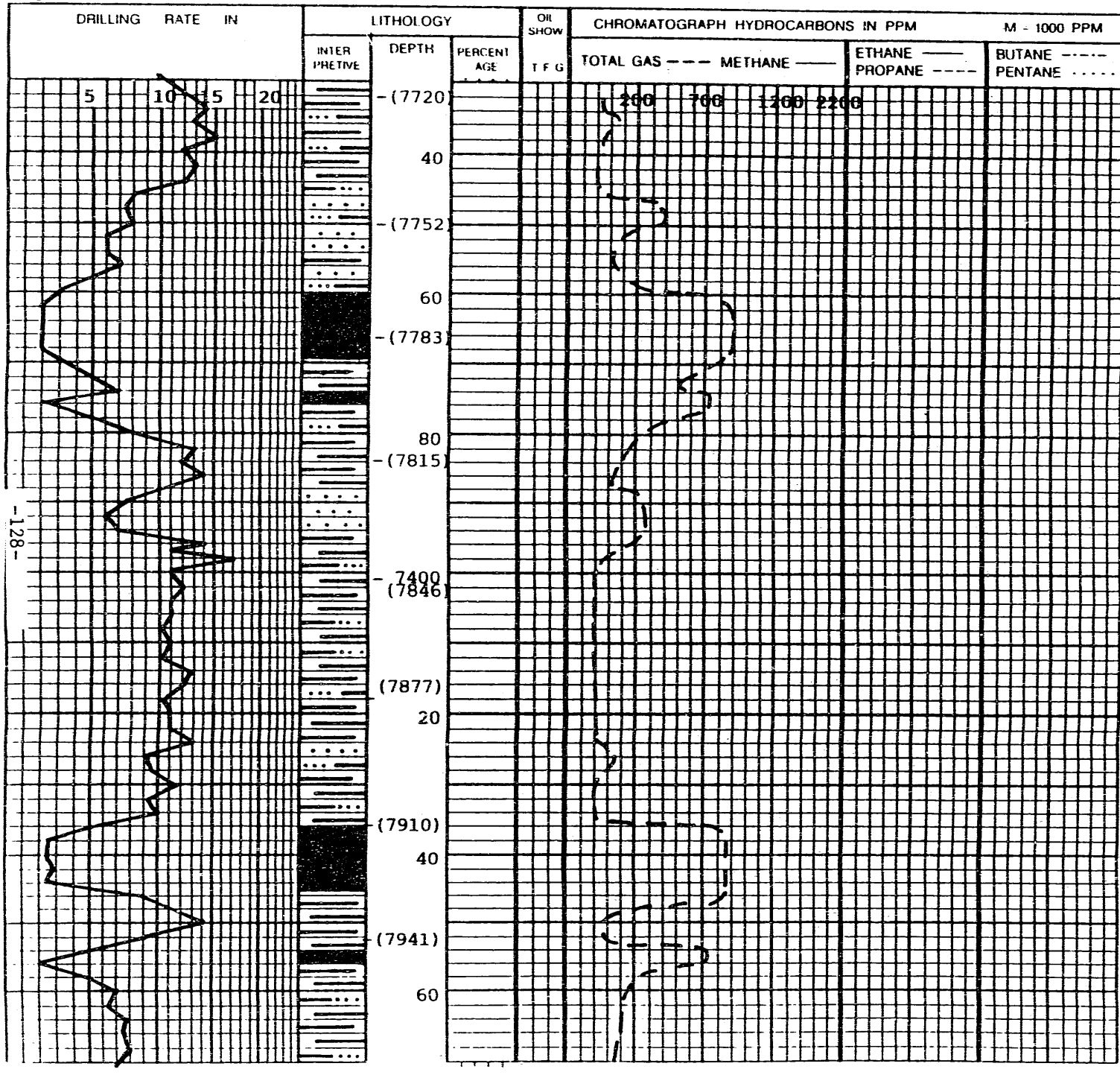
COAL blk dull-vit blky frm sft brit ip sooty shly i

WELL SITE GEOLOGY MUD LOGGING

2350 INDUSTRIAL BLVD PHONE (303) 243-3044 GRAND JUNCTION CO 81505

COMPANY
WELL NAME

COUNTY
STATE



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REMARKS

WT	VIS	WL	CKE	PH

SH dk-ltbrn sbblky frm sl-v slty loc grdg to sltst carb ip sl-mcalc

SS ltbrn vf-fgr sbrd wsrt m-pcmt slcalc arg/slty mtx NFSOC

SS ltbrn f-vfgr sbrd-sbang wsrt mcmt calc arg/slty mtx loc grdg to sltst NFSOC

COAL blk dull-vit sbblky sft-frm brit ip sooty

SH m-ltbrn gybrn sbblky frm sl-mslty occ sdy ncalc

SS ltbrn vfgr sbrd wsrt m-pcmt slcalc ip arg/ slty mtx loc grdg to sltst tr pyr NFSOC

SS ltbrn vf-fgr sbrd wsrt mcmt slcalc arg/slty mtx NFSOC

SH dkbrn sbblky m-slfrm slty ip occ carb n-vsl calc

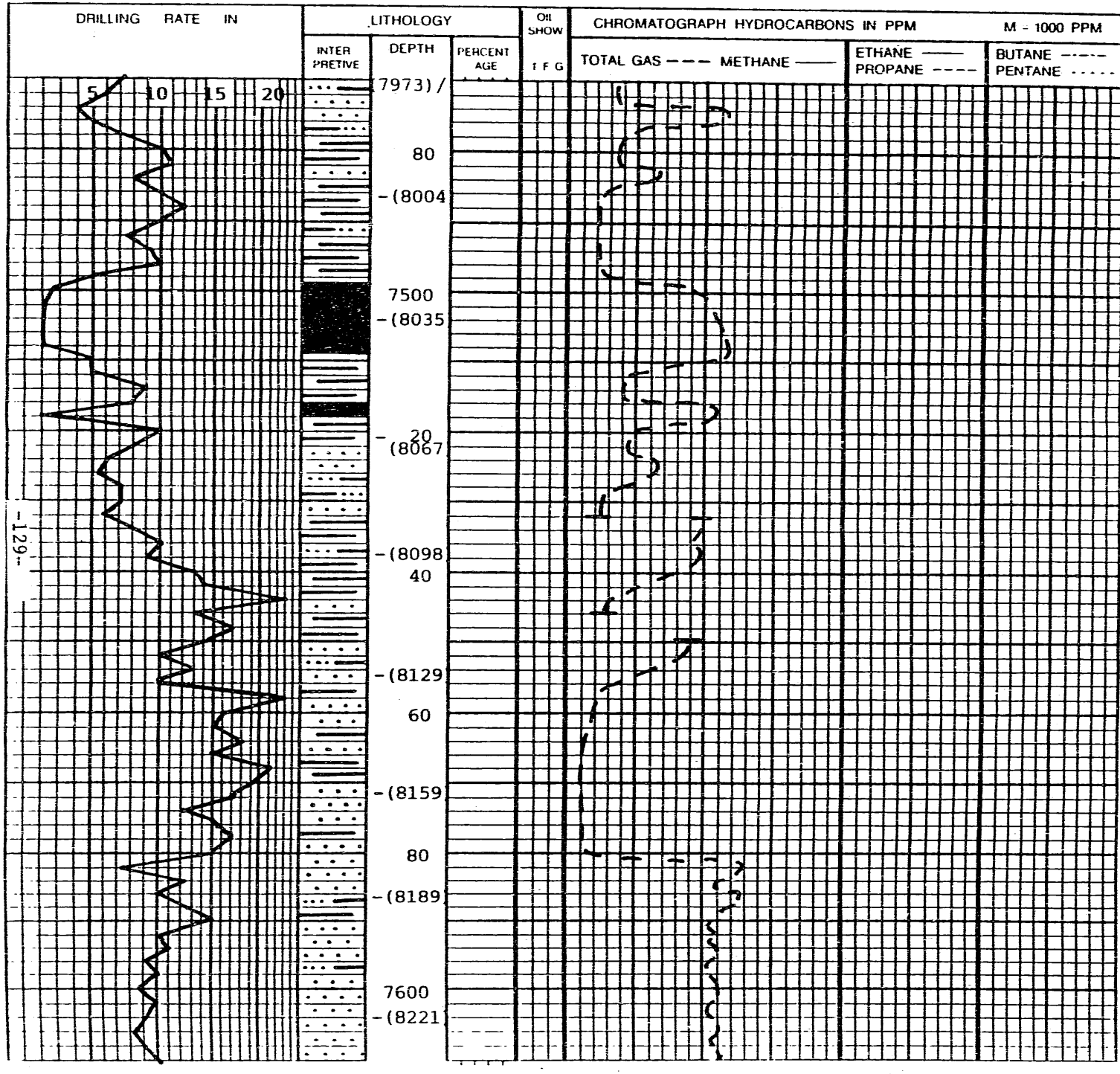
SH dkbrn sbblky m-slfrm slty ip carb lam tr diss pyr ncalc

COAL blk dull occ vit sbblky sft-slfrm occ brit vsooty

SH dkbrn blkbrn sbplty-sbblky m-slfrm slslty ip carb tr pyr ncalc

COMPANY
WELL NAME

COUNTY
STATE



REMARKS

WT	VIS	WL	CKE	PH

SS ltbrn ltgy f-mgr sbang-sbrd msrt pcmt occ sl calc arg mtx occ carb frag tr cht NFSOC

SH dkbrn gybrn sbblky sl-m frm sl-mslty carb ip tr diss pyr ncalc

COAL blk dull-vit blky frm-sft brit ip sooty ip sl bldg gas

SH dkbrn dkgy sbblky frm occ slslty carb ncalc

SS lt-mbrn f-mgr sbang wsrt pcmt slarg occ wh cly mtx NFSOC

SH dkbrn dkgy sbblky frm occ slslty tr pyr ncalc

SS wh ltgy f-mgr sbang-sbrd wsrt m-pcmt slcalc occ wh cly mtx occ carb frag tr pyr NFSOC

SS wh ltgy fgr occ mgr sbang-sbrd wsrt mcmt slcalc wh cly mtx ip occ carb frag NFSOC

SS ltgy wh f-vfgr sbang-sbrd wsrt p-mcmt wh cly mtx ip occ carb frag NFSOC

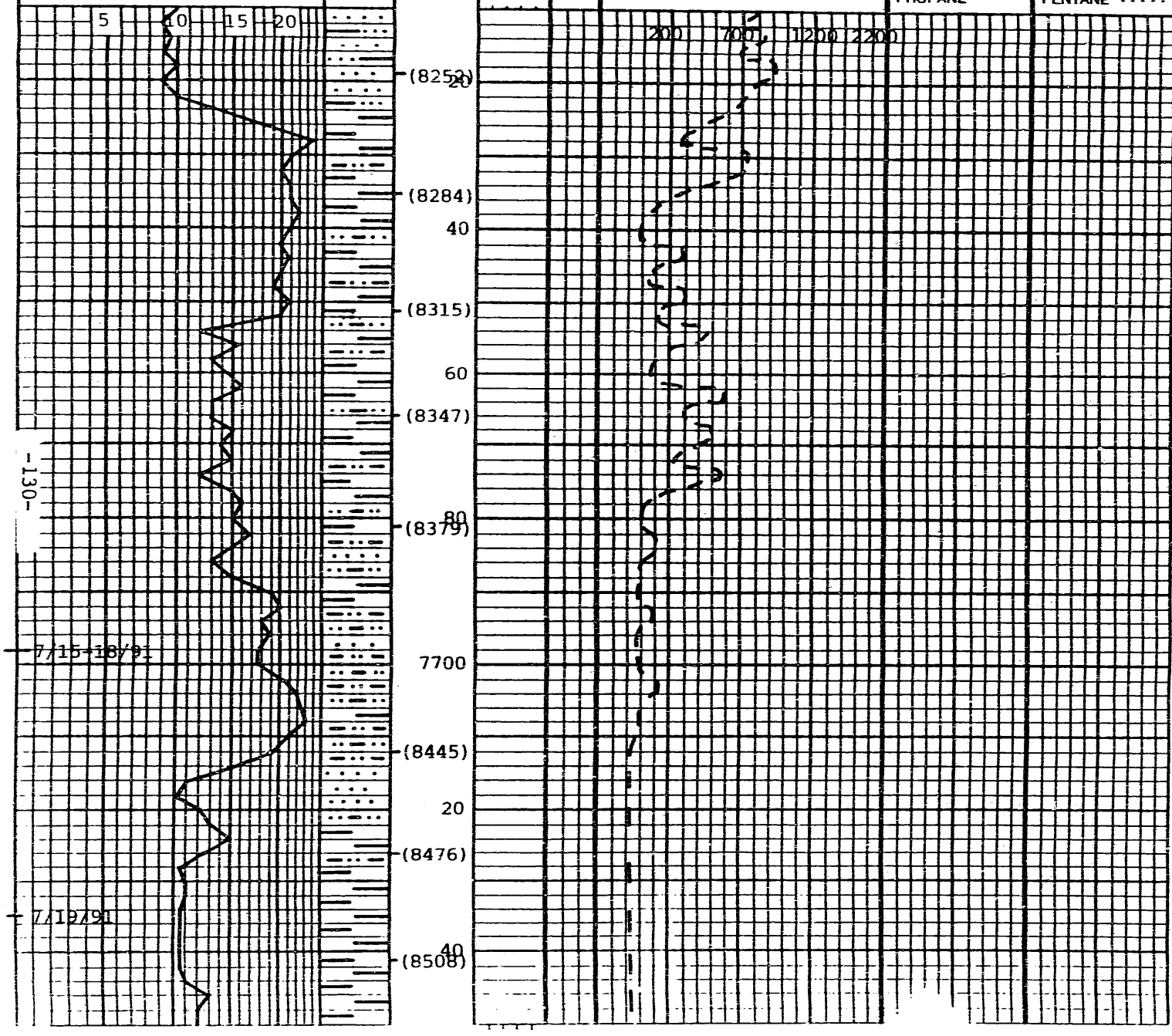
SS ltgy s&p occ ltbrn f-vfgr sbang-sbrd wsrt p-mcmt slcalc ip occ slty tr cht occ wh calc xl NFSOC

WELL SITE GEOLOGY MUD LOGGING

2450 INDUSTRIAL BLVD PHONE (303) 243 3044 GRAND JUNCTION CO 81505

COMPANY
WELL NAME

COUNTY
STATE



REMARKS

WT	VIS	WL	CKE	PH

SLTST lt-m brn lt gy arg sdy ip sft-frm fri n calc

SH dk-m gy gybrn sbplty-sbblky sft-mfrm sl-v slty tr pyr n calc

SLTST gybrn mgy arg sdy ip sft-mfrm n calc

SH mgy gybrn sbplty-sbblky sft-mfrm slty ip n calc

tr LS orngbrn crpxln frm sl slty argip

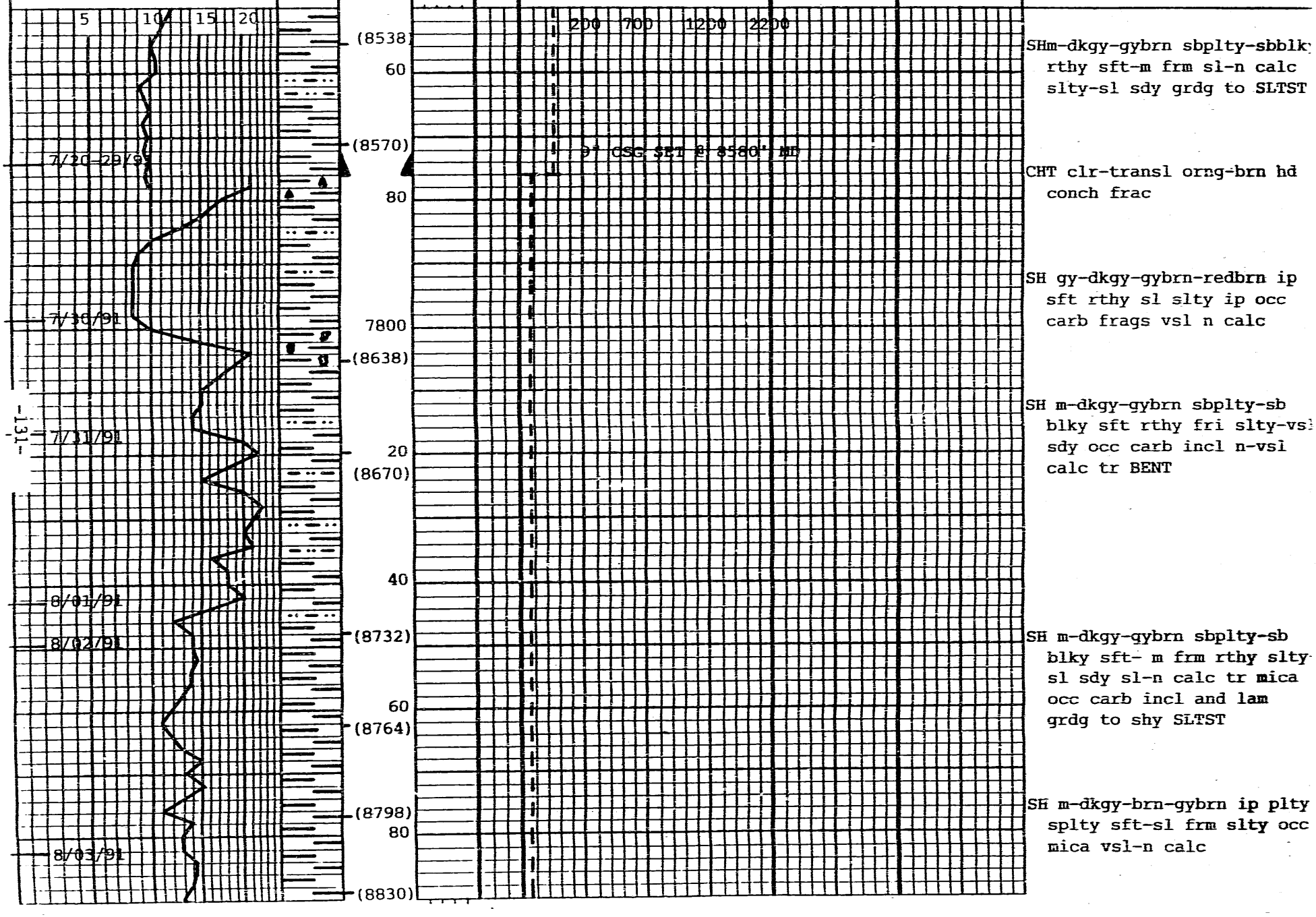
SS clr-trnsl ltbrn ltgy vf-fgr wsrt sbang-sbrd mcmt v sl calc arg/slty mtx NFSOC

SH m-dkgy gybrn sft-mfrm sbplty-sbblky rthy n-sl calc sl carb slty-sl sdy grdg to SLTST

SH AA

SH m-dkgy gybrn sft-mfrm sbplty-sbblky rthy n-sl calc sl carb slty-sl sdy grdg to SLTST

COMPANY CER CORP
WELL NAME SHCT SIDETRACK #1
COUNTY GARFIELD
STATE COLORADO



ROCKY MOUNTAIN GEO-ENGINEERING CO.

WELL SITE GEOLOGY MUD LOGGING

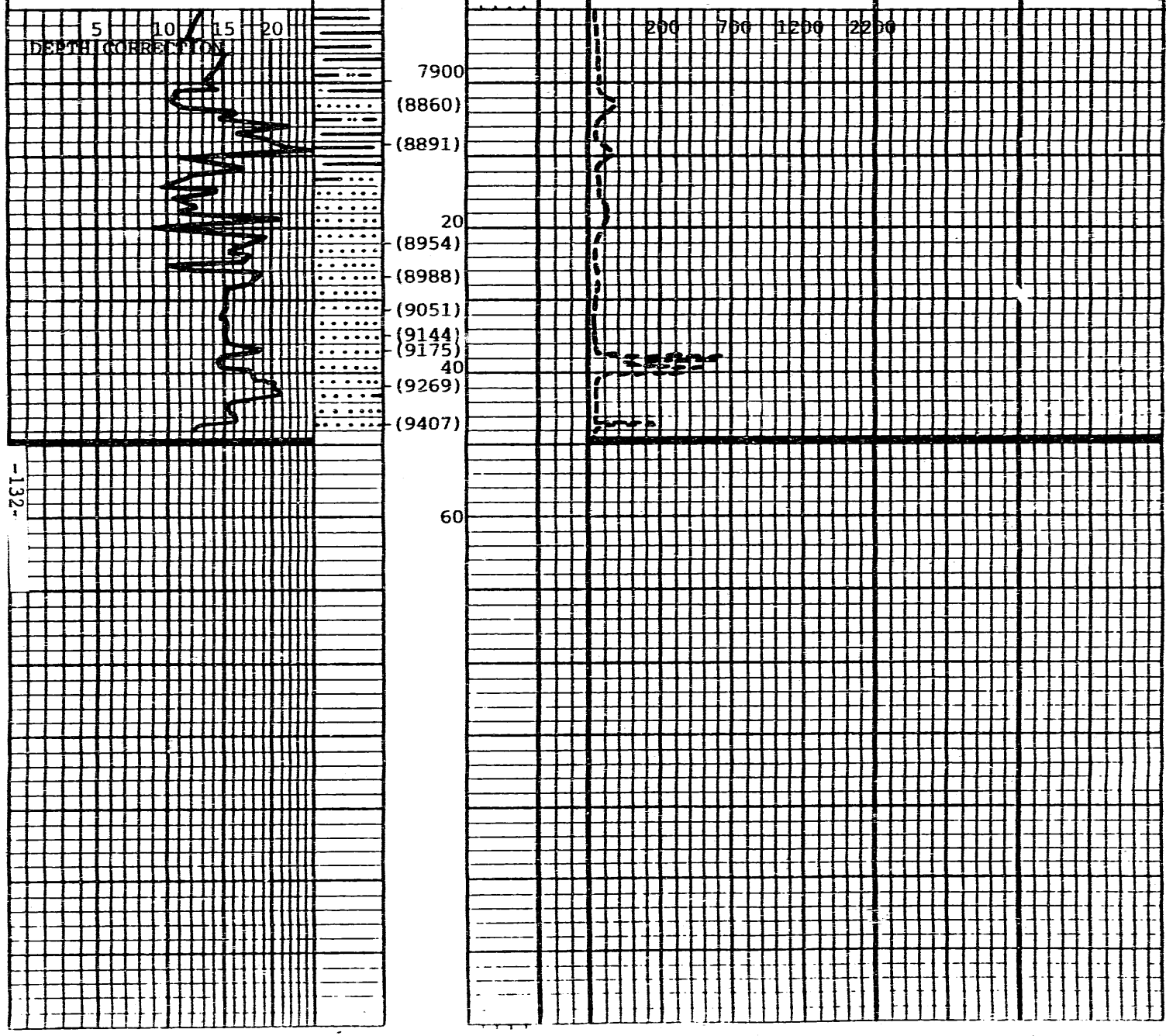
2494 INDUSTRIAL BLVD PHONE (303) 243-3044 GRAND JUNCTION, CO 81505

COMPANY CER

WELL NAME SHCT SIDETRACK # 1

COUNTY GARFIELD

STATE COLORADO



REMARKS

WT | VIS | WL | CKE | PH

SH m-dkgy dkgybrn sbplty-sbblky sft-frm rthy fri slty-sl sdy sl-n calc tr mica occ carb incl and lams grdg to shy SLTSTN

SS dkgy-dkgybrn-occ wh fgr-occ mgr sbang mwsrt sil cmt dk mnrl,fld& occ GLAUC scat p-p pyrobit n-vp vis ø n flor or cut

SS off wh s&p fgr frm-fri sbrd-wrd wsrt tt no vis por sil v sl calc tr qtz m-fxln w some twining & broken xls NFSOC

TVD 7948.22

DRILLERS TD 9407

8/19/91

END

DATE
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12/9/92