SPERRY-SUN DRILLING SERVICES
LOGGING SYSTEMS
Anchorage, Alaska

FINAL
ADT WELL SUMMARY REPORT
ARCO Alaska, Inc.
OCS-Y-0865 No. 1 & OCS-Y-0866 No. 2
Kuvlum No. 2 & Kuvlum No. 3
Beaufort Sea, Alaska

Final Report Summary
October 1993

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Logging Systems
Anchorage, Alaska

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INTRODUCTION

Drilling operations for OCS-Y-0865 No. 1, the second well on the Kuvlum Prospect, were initiated 7-19-93 by ARCO Alaska, Inc. The well was drilled by Canmar's CDU Kulluk on a location in NR6-4 Block 672 of the Beaufort Sea, offshore Alaska. Kuvlum No. 2 was drilled to a total depth of 11125' on 8-20-93. The total number of operating days that were required to reach 11125' was 24 days from spud. After logging operations were completed, the well was plugged and abandoned on 8-27-93.

Drilling operations for OCS-Y-0866 No. 2, Kuvlum No. 3, were initiated on 9-9-93 after moving the Kulluk to a new location on NR6-4 block 673. This is the same block that the first Kuvlum well was completed during last years drilling season. Kuvlum No. 3 was drilled to a total depth of 8000' on 9-28-93, requiring a total of 20 operating days to complete. The well was plugged and abandoned on 10-4-93 after successfully evaluating the well with electric logs.

A Sperry-Sun Logging Systems MPT/2000 Unit was in operation from surface to TD providing full mud logging, applied drilling technology, and Mud Pulse-MWD services. The MPT/2000 Unit and crew provided essential assistance in the drilling of Kuvlum No. 2 & No. 3 by monitoring intrinsic drilling parameters and gas levels. Also provided were real-time Gamma Ray and EWR information, directional surveys, fluid hydraulics information, pore pressure vs. necessary mud weight evaluations, and a wide range of geological interpretations and sampling services.

The following pages of this report are designed to supply concise historical data of the events that occurred on both of these wells, along with some analysis and recommendations for specific problems that were experienced during different sections of the hole. All of the information compiled in this report was acquired and recorded by the MPT/2000 Unit at the well site.

The sensors incorporated in this unit are independent from the rig sensors and may differ slightly from those reported by the rig contractor. In addition, any evaluations in this report regarding formation evaluations, pore pressure estimates, or other geologic interpretations are made entirely by Sperry-Sun personnel from on site examination of drill cutting samples and pertinent data supplied solely by the MPT/2000 Unit.

SPERRY-SUN DRILLING SERVICES

ALASKA DISTRICT

WELL OCS-Y-0865 NO. 1

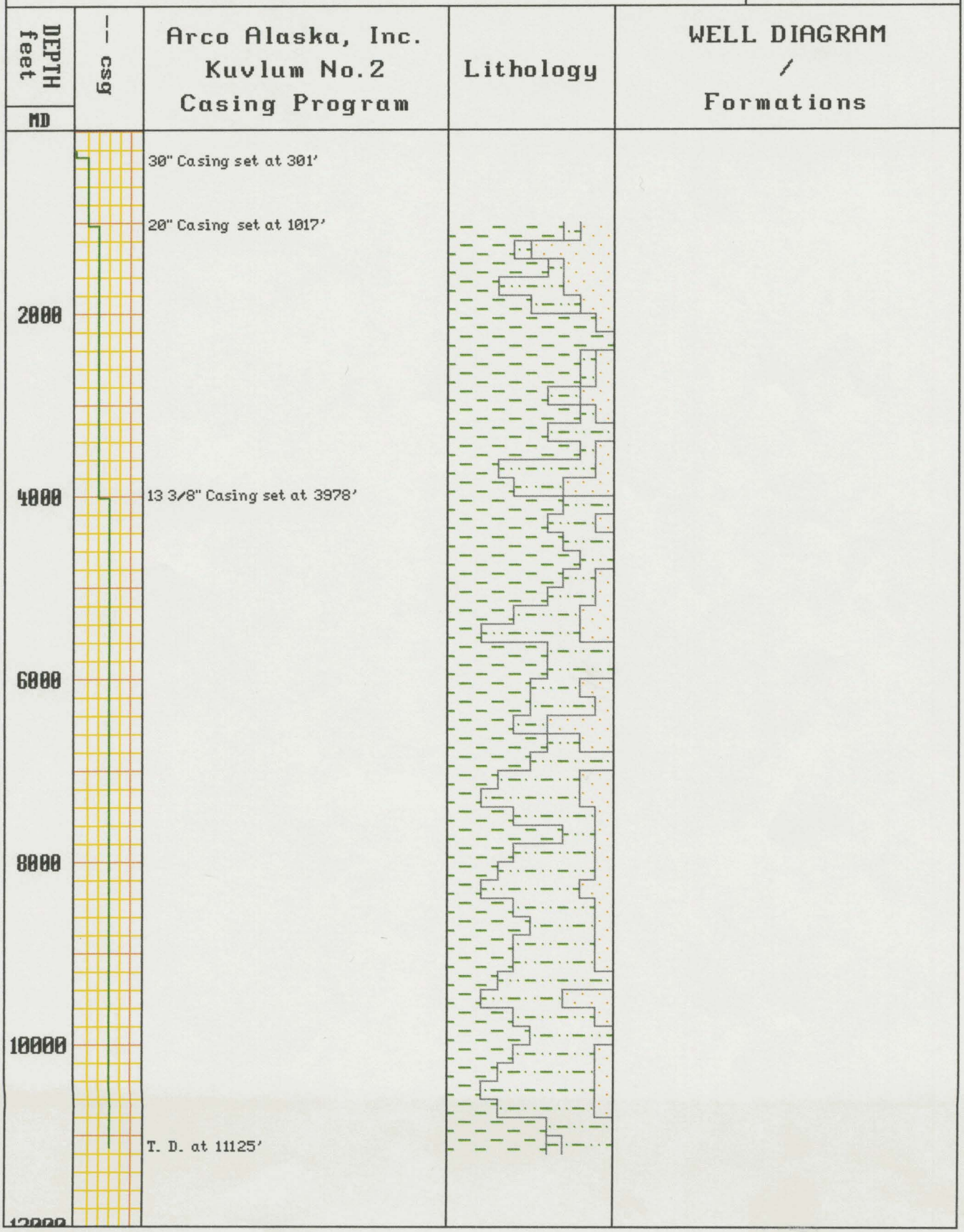
COMPANY ARCO ALASKA, INC.

LOCATION BLOCK 672, BEAUFORT SEA, AK.

SPERRY SUN LOGGING SYSTEMS

WELL DIAGRAM

3



SPERRY-SUN DRILLING SERVICES

ALASKA DISTRICT

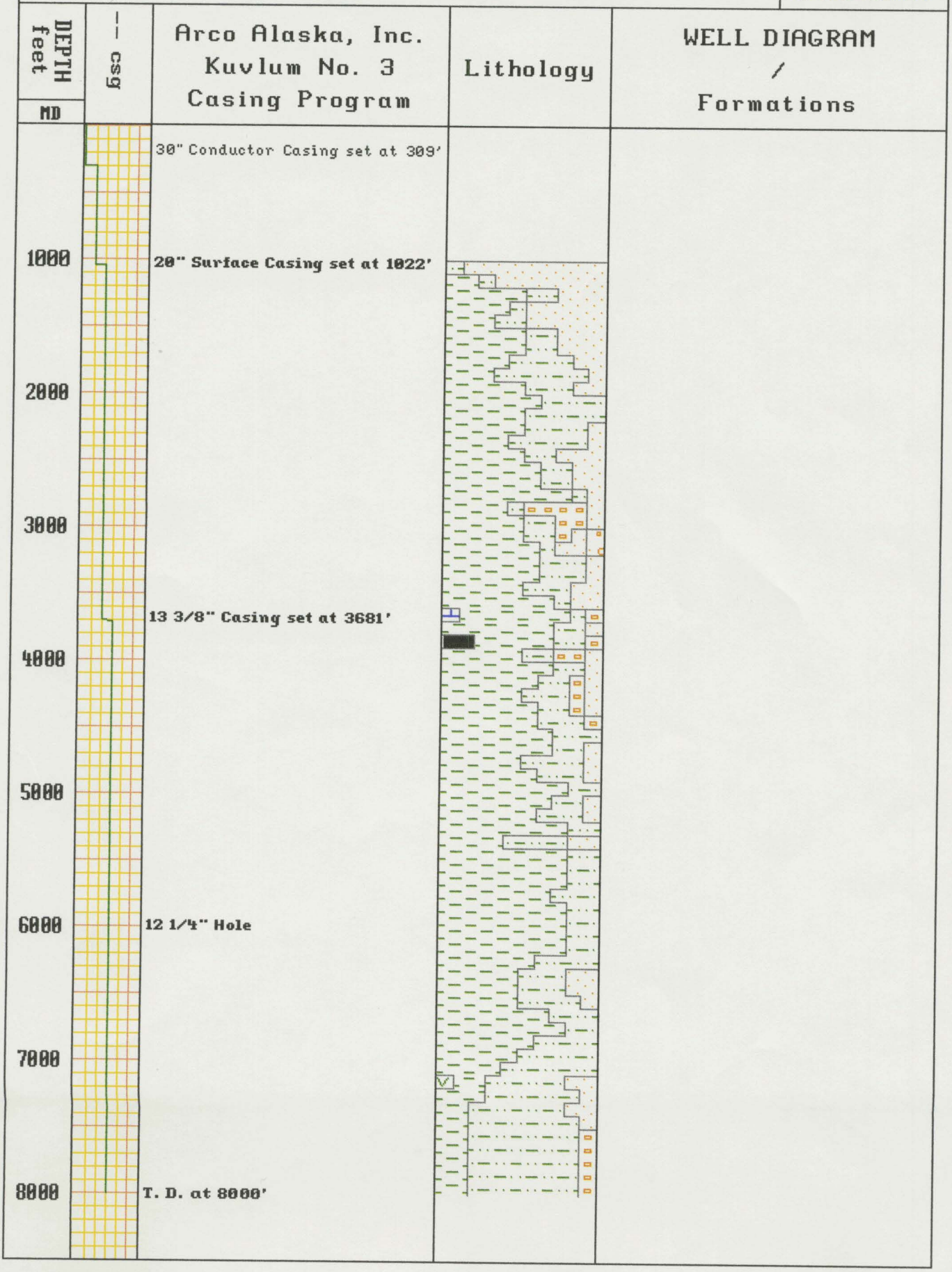
WELL OCS-Y-0866-2 KUVLUM NO. 3

COMPANY ARCO ALASKA, INC.

LOCATION NR6-4 BLK 673, BEAUFORT SEA, AK.

BAROID LOGGING SYSTEMS

WELL DIAGRAM



WELL SUMMARY BY INTERVALS

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KUVLUM NO. 2

Interval: 226' to 1030'

Days:	6	Average WOB:	21 klb
Hole Size:	26"	Average RPM:	83
No. Bits:	1	Average GPM:	1015
Rotating Hours:	33.7	Average SPP:	1875 psi
Deviation:	NA deg	Average ROP:	23 ft/hr
Mud Weight:	8.5 ppg	Mud Type:	Sea Water

Discussion:

The Canmar Kulluk was positioned on location prior to the spud in date of 7-28-93. Drilling operations were initiated by drilling a large diameter glory hole from the mud line at 167' to a depth of 211' to allow for the positioning of the blow out preventer stack below the ocean floor. A 24' diameter caisson was washed down with the glory hole bit to provide a barrier from sediments falling back into hole. Penetration rates for this large diameter hole were slow due to mechanical problems with the glory hole bit. Three additional trips were needed to repair this bit before completing the glory hole on 7-27-93.

After landing a temporary guide base, 30"- 310 lb/ft casing was jet drilled to 296' in conjunction with Bit No. 1. With the 30" casing landed on the guide base, drilling was continued with Bit No. 1 using a mud motor and without returns to surface as the riser system had not been connected. An air lift system was then installed at the glory hole to help remove cuttings from this area with some of the returns passed through the shaker box. Formation gasses were monitored during this interval with this system. A maximum gas of 8 units was recorded during this process while the background gas averaged 5 units. The 26" hole was drilled to a depth of 1030' on 7-31-93 occasionally pumping high viscosity sweeps to clean the hole. 20" - 133 lb/ft casing was then run and cemented to a depth of 1017'. No hole problems were encountered while drilling this section of the well.

Interval: 1,030′ to 4005′

Days:	8	Average WOB:	14 klb
Hole Size:	12.25/17.5″	Average RPM:	122
No. Bits:	2	Average GPM:	720
Rotating Hours:	37.3	Average SPP:	2400 psi
Deviation:	.39 deg	Average ROP:	88 ft/hr
Mud Weight:	9.8 ppg	Mud Type:	PHPA

Discussion:

The blow out preventer stack was run on the riser assembly and landed on the well head housing allowing for mud returns to surface. The BOP Stack and the 20″ casing were pressure tested to 2200 psi prior to drilling ahead with Bit No. 2.

The seawater mud system was replaced with 9.8 ppg seawater-PHPA mud prior to drilling the 20″ casing shoe. Bit No. 2, a 17.5″ bit, was used to drill out the 20″ conductor casing along with 10′ of new hole to 1,040′ on 8-2-92. A leak off test was performed at this depth yielding a fracture pressure equivalent mud weight of 12.9 ppg.

Bit No. 2 was then pulled out of the hole and replaced with a 12.25″ bit. Bit No. 3 was then used to drill ahead through clay and sand at a controlled drilling rate of 100± feet per hour to a depth of 2430′ where a short trip was made to clean hole. On the way out, the hole pulled tight at 1766′. The hole was then washed and reamed from 1729′ to 1761′ and at 2380′ on the trip back into the hole. The maximum gas recorded from circulating bottoms up on the trip was 61 units. Bit 3 drilled through clay, siltstone, and sand to 4005′. The estimated pore pressure during this interval was 8.5-8.7 ppg while maintaining the mud weight at 9.8 ppg.

Upon reaching the interval depth of 4005′, the hole was conditioned with a short trip to the shoe that experienced drag on the way out that was probably due to swelling clays or possibly drill cuttings adhering to the borehole. Because of the excess drag, the hole was back reamed from 3561′ to 1016′. The maximum gas from this short trip gas was 85 units. The hole was then circulated and conditioned in preparation for running electric logs.

Electric logs were successfully run and operations to open the hole were initiated on 8-7-93 with Bit No. 3 was run into the hole ahead of a 17.5″ hole opener. Drilling rates were very good during the hole opening process. The hole was then conditioned with a short trip in preparation for running casing. On the trip out, the pipe was back reamed and pumped out of hole due to tight hole conditions and then washed and reamed back to bottom. The maximum short trip gas

was 60 units. $13^3/_8$" - 68 lbs/ft casing was landed at a total depth of 3978'. This casing was cemented in place without problems.

Lithologies of this section consisted of sand, clay, and siltstone with traces of limestone, gravel, and coal. No abnormal gas readings or any indication of gas hydrates were encountered. The pore pressure estimate for this section of the hole was 8.5-8.7 ppg, a normal gradient. Hole problems for the interval were attributed to swelling clays-siltstones and some bit balling.

Interval: 4,005' to 11,125'

Days:	10	Average WOB:	10-20 klb
Hole Size:	12.25"	Average RPM:	145
No. Bits:	5	Average GPM:	620/700
Rotating Hours:	99.4	Average SPP:	3000 psi
Deviation:	4.03 deg (max)	Average ROP:	80 ft/hr
Mud Weight:	9.8-10.7 ppg	Mud Type:	PHPA

Discussion:

The Blow Out Preventers were tested prior to running in the hole with Bit No. 4. The 13 3/8" casing was tested to 3500 psi. Bit No. 4 was then used to drill the cement, the float collar, and the shoe along with 10' of new formation to 4015'. A leak-off test was performed at this depth and realized a test of 14.9 ppg equivalent mud weight without breaking down. This value differs somewhat from a calculated value of 13.9 ppg at this depth using the Eaton Method for estimating the fracture gradient in shales.

After completing the leak-off test, Bit No. 4 was used to drill to 5525' where a short trip to the shoe was performed to condition the hole. The hole pulled tight and had to be back reamed and pumped out of hole. The trip gas reading from this short trip was 95 units. While drilling ahead, the mud weight was raised to 10.0 ppg to stabilize hole conditions on trips. Drilling continued with this bit to 6593' where Bit No. 4 was pulled out of the hole. Connection gas readings were consistently logged below 4300'. A slightly increasing pore pressure trend noted on pressure plots. The estimated pore pressure was raised to 9.0 ppg in reference to this data.

Bit No. 5, a PDC type bit, was run back in the hole on the same bottom hole assembly. Drilling continued with this bit to 6729'. The decision was made to core this interval due to a potential show indicated from information provided by the MWD tool in addition to previous shows of oil fluorescence in the drill cutting samples. The hole was then circulated out and conditioned for a coring run. Bit No. 5 was pulled without encountering excessive drag.

Core Bit No.1 was then run in the hole. The trip gas from bottom was 246 units. After getting on bottom with the core bit, penetration rates were very slow. Core bit No.1 was pulled at 6732' after attempting to core for only 3 feet. There was no core recovery. The core bit was apparently balling up due to clay.

Bit No. 5RR was run back in hole to continue drilling. The trip gas reading from bottom was 142 units. Penetration rates were good while drilling ahead through clay, siltstone, and sand to 7698' where a short trip to the shoe was made to condition hole. The hole again pulled tight and

was back reamed from 6842' to 6570'. The maximum trip gas was 625 units, a notable increase from the previous trip. Drilling continued with Bit No. 5RR to 9500' where it was pulled out of hole for BOP test. Tight hole conditions again required pumping out of hole from bottom to a depth of 7620'.

A pressure trend was estimated to develop below 7000' using information detailed on the D-Exponent plot and a slight increase in recorded connection gas readings. The estimated pore pressure was raised to 9.4 ppg at 7675'. Additional evidence for a pressure transition zone was indicated by the Condensed Resistivity Plot during this interval. The pore pressure estimate was steadily increased to 9.7 ppg by 9500'. The mud weight was raised in two stages to 10.4 ppg for additional overbalance.

Bit No. 6, also a PDC type bit, was ran back into hole. The maximum trip gas from bottom was 1543 units. Very good penetration rates were achieved with this new bit. Drilling continued to 10551' where a short trip was made to condition hole. The trip gas after short trip was 683 units. Bit No. 6 then drilled ahead through a predominant siltstone/clay formation to the total depth of this well at 11125'. Resistivity and D-exponent data indicated an increasing pore pressure gradient continuous to about 10000'. The estimated formation pressure was raised to 9.9/10.0 ppg by this depth. The mud weight was increased to 10.7 ppg to provide for additional overbalance. The increasing pressure trend appeared to stabilize while drilling below 10000' and required no additional changes in pore pressure estimates or mud weight.

The hole was circulate out prior to running a short trip to shoe. Excess drag was noted while pulling pipe between 10261'-10071' and 9057' - 8767'. The hole was then circulate and condition in preparation for running E-logs. No tight hole problems were experienced while pulling out of hole for logs. Electric logging operations commenced on 8-21-93.

Logging operations were completed on 8-27-93. Operations to plug and abandon Kuvlum No. 2 were initiated on this date.

Lithologies of this section consisted of clay, thin bedded sands, hydrated shale, and siltstone. Minor shows of oil fluorescence were logged in sands below 6000'. Hole problems for the interval were minor and largely included tight hole conditions experienced on trips.

WELL SUMMARY BY INTERVALS

KUVLUM NO. 3

Interval: 230' to 1040'

Days:	4	Average WOB:	2/10 klb
Hole Size:	26"	Average RPM:	160
No. Bits:	1	Average GPM:	967
Rotating Hours:	26.7	Average SPP:	1375 psi
Deviation:	NA deg	Average ROP:	30.7 ft/hr
Mud Weight:	8.8 ppg	Mud Type:	Sea Water

Discussion:

The Canmar Kulluk was positioned on location prior to the spud in date of 9-9-93. Drilling operations were initiated by drilling a large diameter glory hole from the mud line at 172' to a depth of 211' to allow for the positioning of the blow out preventer stack below the ocean floor. A 24' diameter caisson was positioned in the glory hole to provide a barrier from sediments falling back into hole. The 24' caisson was washed down with the glory hole bit to 216'. The glory hole was completed on 9-10-93.

After landing a temporary guide base, a string of 30"- 310 lb/ft casing was jet drilled to 309' in conjunction with Bit No. 1. With the 30" casing landed on the guide base, drilling was continued with Bit No. 1 using a mud motor. No mud was returned to surface as the riser system had not been connected. An air lift system was then installed at the moon pool area to help remove cuttings from the base of the glory hole with some returns of sea water coming back through the shaker box. Formation gasses were sometimes monitored during the interval with this system. A maximum gas of 3 units was recorded during this process.

The 26" hole was drilled to a depth of 1040' on 9-11-93 while occasionally pumping high viscosity sweeps to clean the hole and then displaced with 9.6 ppg mud. A string of 20" - 133 lb/ft casing was then run and cemented to a depth of 1022'. The BOP stack was landed and pressure tested; however, the 20" casing failed to test. The casing was then cleaned out with Bit No. 2. A stinger was run inside the casing and a squeeze was made with 83 bbls of cement. The casing then tested to 2200 psi for 30 minutes.

Interval: 1,040' to 3705'

Days:	10	Average WOB:	15 klb
Hole Size:	12.25/17.5"	Average RPM:	118
No. Bits:	2	Average GPM:	633
Rotating Hours:	28.2	Average SPP:	2667 psi
Deviation:	.22 deg	Average ROP:	98 ft/hr
Mud Weight:	9.8 ppg	Mud Type:	PHPA-POLY

Discussion:

The seawater mud system was replaced with 9.8 ppg PHPA-polymer mud prior to drilling the casing shoe. Bit No. 2, a 17.5" bit, was used to drill out the 20" surface casing along with 10' of new hole to 1050' on 9-14-93. A leak off test was performed at this depth yielding a fracture pressure equivalent mud weight of 14.3 ppg.

Bit No. 2 was then pulled out of the hole and replaced with a 12.25" bit. Bit No. 3 was then used to drill ahead through clay and sand at a controlled drilling rate of 100+/- feet per hour to a depth of 2336' where a short trip was made to clean the hole. On the way out, the hole pulled tight at 1866' and the drill string was pumped and back reamed to the shoe. The maximum gas recorded from bottoms up from this trip was 153 units. Bit 3 drilled through clay, siltstone, and sand to 3705'. The estimated pore pressure during this interval was 8.7 pp while maintaining the mud weight between 9.7 to 9.9 ppg.

Upon reaching the interval depth of 3705', the hole was conditioned with a short trip to the shoe that experienced drag on the way out that was probably due to swelling clays. The drill string was then pumped and back reamed from a depth of 3235' to the 20" shoe. The maximum gas from this short trip was 313 units. Additional circulating time was applied to the hole in preparation for running electric logs. On this trip out, the drill string pulled tight inside the 20" casing, an indication of clay cuttings balling on the BHA.

After electric logs failed to reach bottom, another clean out run was made. The maximum trip gas reading while circulating at bottom was 214 units. After successfully completing the electric logs, rig operations were then suspended for 12 hours because of weather. Preparations were then made to open the hole.

Bit No. RR 3 was run into the hole ahead of a 17.5" hole opener. Drilling rates were very good during the hole opening process. The hole was then conditioned with a short trip in preparation for running casing. The pipe was back reamed and pumped out of hole from 1304' to the 20"

casing shoe to condition the area around the shoe. After getting back to bottom and circulating, a maximum short trip gas of 114 units was recorded. No excess drag was noted on the trip out of the hole. A string of $13^3/_8$" - 68 lbs/ft casing was then landed at a total depth of 3681'. This casing was cemented in place without problems.

Lithologies of this section consisted of sand, clay, and siltstone with traces of limestone, gravel, and coal. No abnormal gas readings or any indication of gas hydrates were encountered. The pore pressure estimate for this section of the hole was 8.7 ppg, a normal gradient. Hole problems for the interval were attributed to swelling clays/siltstones and bit/BHA balling.

Interval: 3705' to 8000'

Days:	6	Average WOB:	8-10 klb
Hole Size:	12.25"	Average RPM:	160
No. Bits:	2	Average GPM:	700
Rotating Hours:	45.6	Average SPP:	2625 psi
Deviation:	2.18 deg	Average ROP:	90 ft/hr
Mud Weight:	9.8-10.7 ppg	Mud Type:	PHPA

Discussion:

The Blow Out Preventers were tested prior to running in the hole with Bit No. 5. The 13 3/8" casing was tested to 3000 psi. Bit No. 5, a PDC type, was run in hole but would not drill the float collar. Bit No. 5 was pulled out of the hole and Bit No. 6, an FDT, was run into the hole in its place. This bit drilled the float collar, the shoe, and 20' of new hole to 3725'. A leak-off test was performed at this depth and yielded a value of 14.8 ppg equivalent mud weight. This value differs somewhat from a calculated value of 13.9 ppg using the Eaton Method for estimating the fracture gradient in shales.

After completing the leak-off test, Bit No. 6 was used to drill to 4584'. The bit was pulled due to slow penetration rates. The hole pulled tight and the drill string had to be back reamed and pumped out of hole from 3937' to the 13 3/8" shoe.

Connection gas readings were consistently logged below 3800'. A slightly increasing pore pressure trend noted on pressure plots. The estimated pore pressure was raised to 8.9 ppg.

Bit No. 7, a PDC type bit, was run back in the hole on the same bottom hole assembly. While drilling ahead, the maximum trip gas reading was 520 units. Drilling continued with this bit to 6658' where a short trip was made to condition the hole. The hole pulled tight on the way out and was back reamed to shoe recording a maximum short trip gas of 365 units.

A pressure trend was estimated to develop below 4500' using information from the Condensed Resistivity Plot in conjunction with an increase in recorded connection gas readings. The estimated pore pressure was raised to 9.4 ppg by 6900'. The pore pressure estimate was steadily increased to 9.7 ppg by 7500' while the average mud weight was raised to 10.7 ppg for additional overbalance.

Bit No. 7 was used to drill to the total depth of this well to 8000'. The hole was circulated out prior to performing a short trip to shoe. Excess drag was noted while pulling pipe between bottom and 6120'. The hole was then circulated and conditioned in preparation for running

electric logs and recorded a short trip gas of 525 units. No tight hole problems were experienced while pulling out of hole for logs. Electric logging commenced on 9-29-93.

On the first logging attempt the logging tool would not penetrate beyond the casing shoe. A clean out run was made to further condition the hole. The maximum gas recorded from this trip was 181 units. Logging operations were completed on 10-4-93 and operations to plug and abandon Kuvlum No. 3 were initiated on this date.

Lithologies of this section consisted of clay, thin bedded sands, hydrated shale, and siltstone. Minor shows of oil fluorescence were logged in siltstones below 6000'. Hole problems for the interval were minor and largely due to tight hole conditions experienced on trips caused by swelling clays and siltstones.

CONCLUSIONS AND RECOMMENDATIONS

The drilling program for OCS-Y-0865 No. 1 - Kuvlum No. 2 was designed to penetrate to an estimated depth of 9500' and to evaluate the possible extension of the field discovered on Kuvlum No. 1 during the previous drilling season. After drilling through the targeted area, the decision was made to deepen this well for additional data. Kuvlum No. 2 was successfully drilled to a total depth of 11125' on 8-20-93 requiring 24 operating days after spudding in the well.

The drilling program for OCS-Y-0866 No. 2 - Kuvlum No. 3 was designed to penetrate to an estimated depth of 8000' and to evaluate the same potential zones discovered on Kuvlum No. 1 during the previous drilling season. Kuvlum No. 3 was successfully drilled to a total depth of 8000' on 9-28-93 requiring 20 operating days after spudding in the well.

Minor hole problems were experienced in the upper intervals of both wells in handling the nature and volume of cuttings at the shale shakers of which resulted in some additional mud losses when the shakers were overloaded. Minor fluid losses to the hole were also noted while logging and running casing.

In the bottom intervals of the Kuvlum No. 2 & No. 3, notable amounts of drag were experienced on trips causing swabbing conditions that lead to improper pipe displacement fill. The probable causes for this condition were swelling clays and some buildup of cuttings adhering to the bore hole. Short trips were employed while drilling this section to clean and condition the hole but required some additional rig time; especially when conditions warranted pumping and back reaming out of the hole. We would like to recommend additions of a hole stabilizing product, Resinex, which is often effective in controlling clay swelling problems experienced in other areas on the North Slope for this interval of the well.

Pore pressure estimates were very near a normal gradient for the majority of formations logged on. On Kuvlum No. 2, a modest pore pressure gradient was estimated to develop below 7000' and extend to a depth of 10000' before formation pressure increases appeared to stabilize at an estimated value of 9.9/10.0 ppg. This trend analysis is supported through interpretation of data supplied by the D-Exponent and Condensed Resistivity Plots provided in the Parameters vs Depth section of this report. A slightly less defined gradient was estimated to occure on Kuvlum No. 3 below 4200' and extending to a depth of 7800' where the pore pressure was estimated to reach a value of 9.6/9.7 ppg. No significant hole problems were experienced because of the gradients as the mud weight maintained throughout this section on both wells provided for ample overbalance to safely drill.

On Kuvlum No. 2, shows of fluorescence were noted on the mud logs in sands logged below 6000'. Five show evaluation reports were made while drilling this well beginning at 6470' and extending to a depth of 7115'. Analysis of the reports provide evidence of the presence of hydrocarbons over this zone of interest; however, ratio analysis of the gas readings indicate that this zone is predominantly gas bearing or possibly tight. No porosity estimates could be effectively made from the drill cutting samples as the sand came back unconsolidated. A more detailed description of the individual zones can be found in the Show Report section of this report.

On Kuvlum No. 3, shows of fluorescence were noted on the mud logs in the sand logged at 3785' and the siltstones below 7000'. Porosity estimates for the sand were poor and ranged from 0% - 5%. There were no heavy hydrocarbons (C2-C5) associated with the sand interval although consistent readings of C2-C5 were logged below 4900'. No show reports were completed for this interval on this well.

The following hydraulics and mud property recommendations are based on the drilling program used on Kuvlum No. 2 and No. 3. The recommendations are made using a similar casing design and differ very little from the mud weights observed on each well.

RECOMMENDED MUD PROPERTIES

Depth	Csg Seat	Mud Weight	Yield Point	Water Loss
0-1000	20"	Sea Water	Sweeps	N/A
-3900	$13^3/_8$"	9.6	20-30	<10
-7000	8½" Hole	9.8	20-30	< 6
-TD	8½" Hole	10.0/10.7	20-30	< 5

RECOMMENDED HYDRAULICS

Hole Size:	26"	17.5"	12.25"	12.25"
Depth:	800	2500	6000	9000
Gallons Per Min:	1100	925	650	650
Nozzles:	4-20's	4-16's	4-12's	4-14's
Pump Pressure:	2200	3000	3000	3000

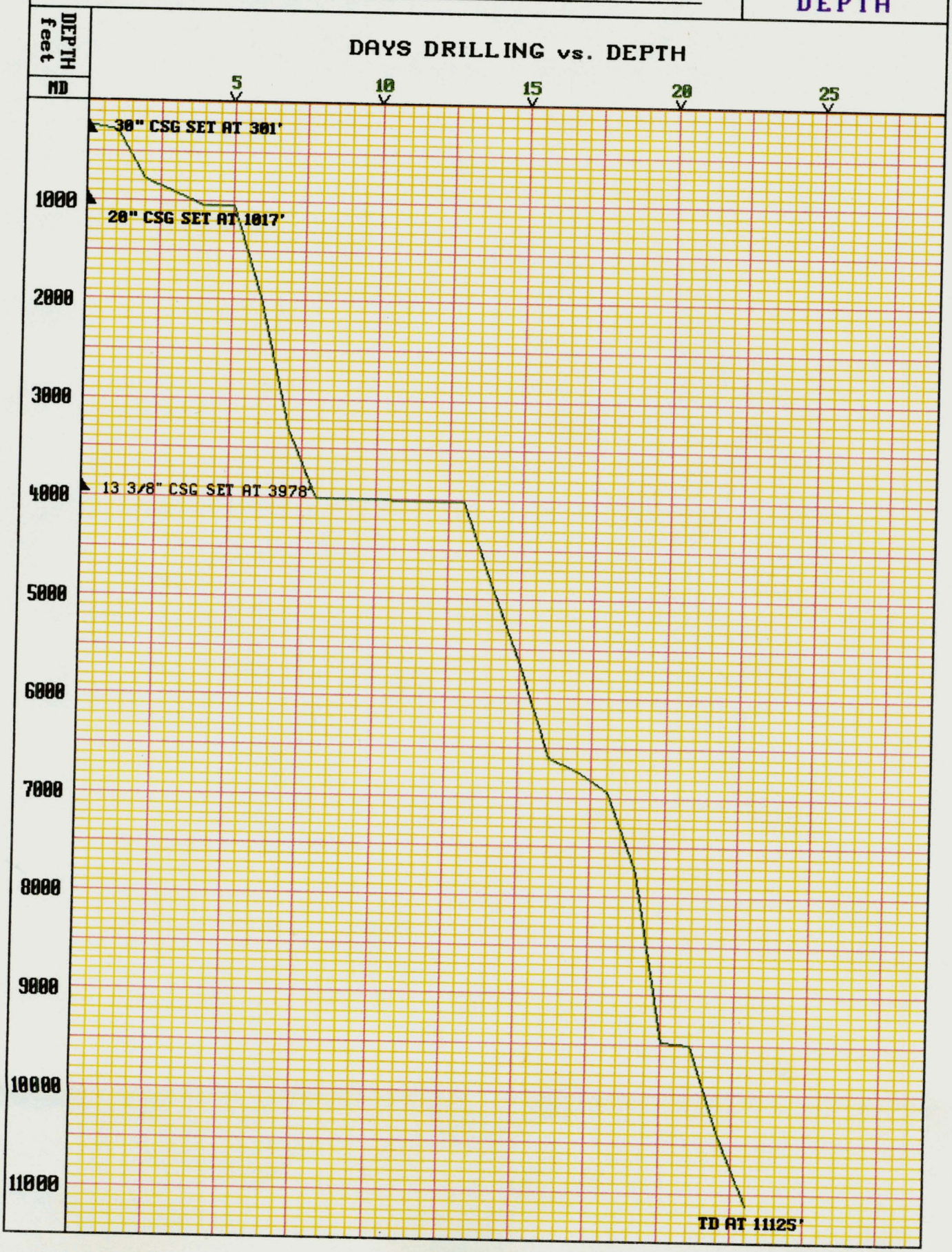
SPERRY SUN DRILLING SERVICES
A BAROID COMPANY

WELL OCS-Y-0865 NO. 1
COMPANY ARCO ALASKA, INC.
LOCATION BLOCK 672 BEAUFORT SEA, AK.

SPERRY SUN LOGGING SYSTEMS

DAYS VS DEPTH

6



SPERRY SUN DRILLING SERVICES

A BAROID COMPANY

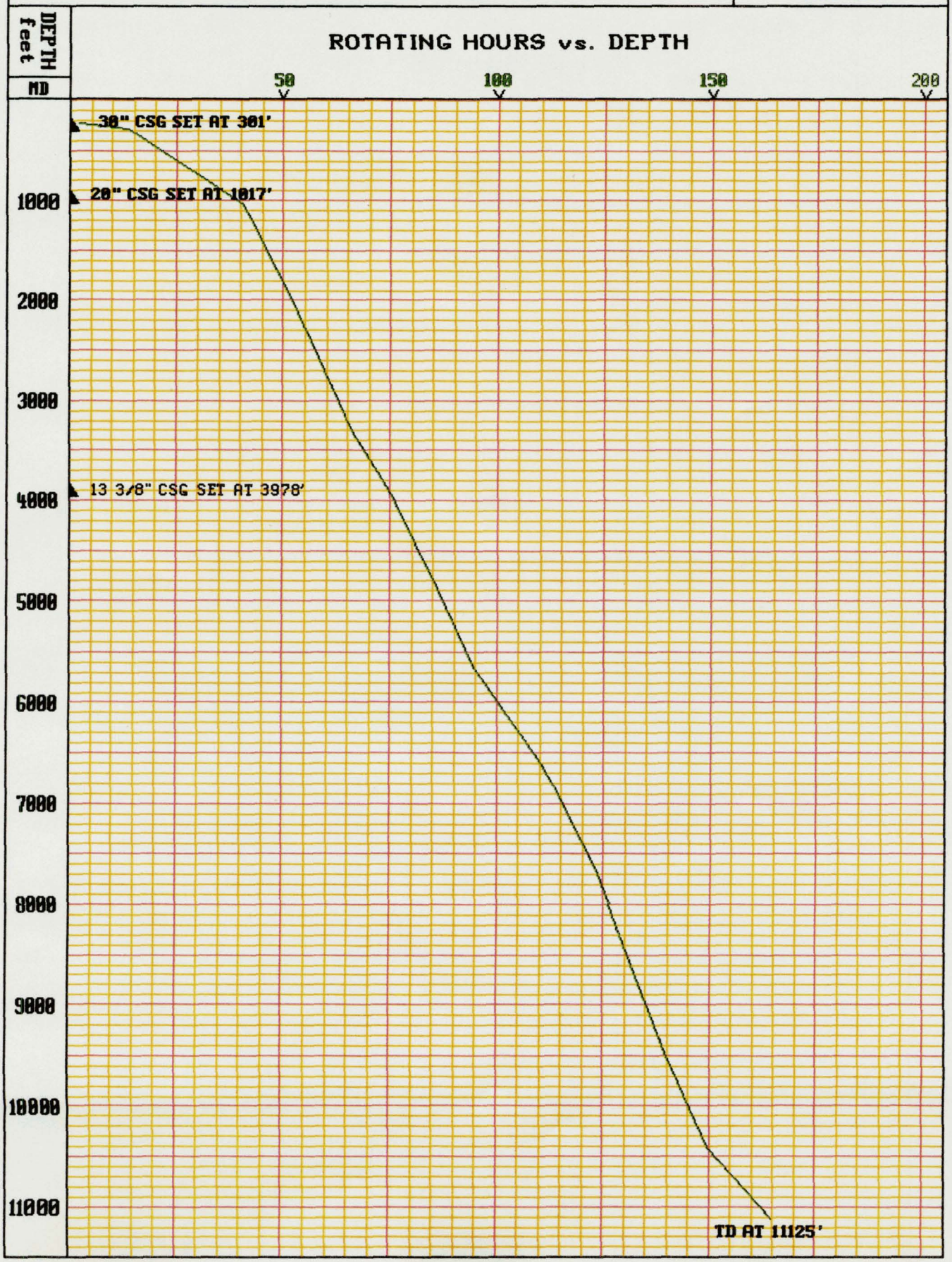
WELL OCS-Y-0865 NO. 1

COMPANY ARCO ALASKA INC.

LOCATION BLOCK 672 BEAUFORT SEA, AK.

SPERRY SUN LOGGING SYSTEMS

ROTATING HRS VS DEPTH



SPERRY-SUN DRILLING SERVICES

A Baroid Company

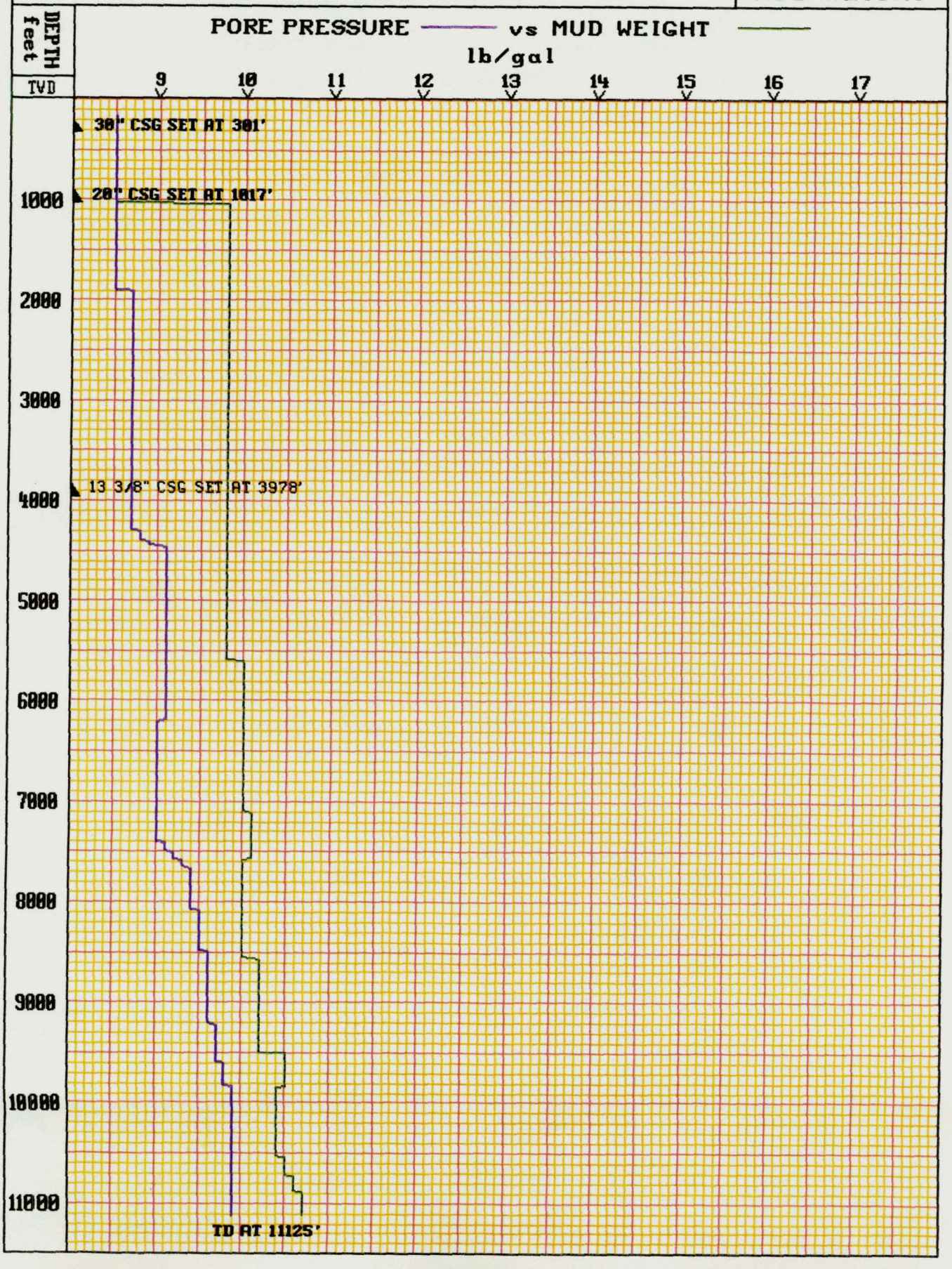
WELL OCS-Y-0865 NO. 1

COMPANY ARCO ALASKA, INC.

LOCATION BLOCK 672 BEAUFORT SEA, AK.

SPERRY SUN LOGGING SYSTEMS

PORE PRESSURE vs MUD WEIGHT



SPERRY-SUN LOGGING SYSTEMS

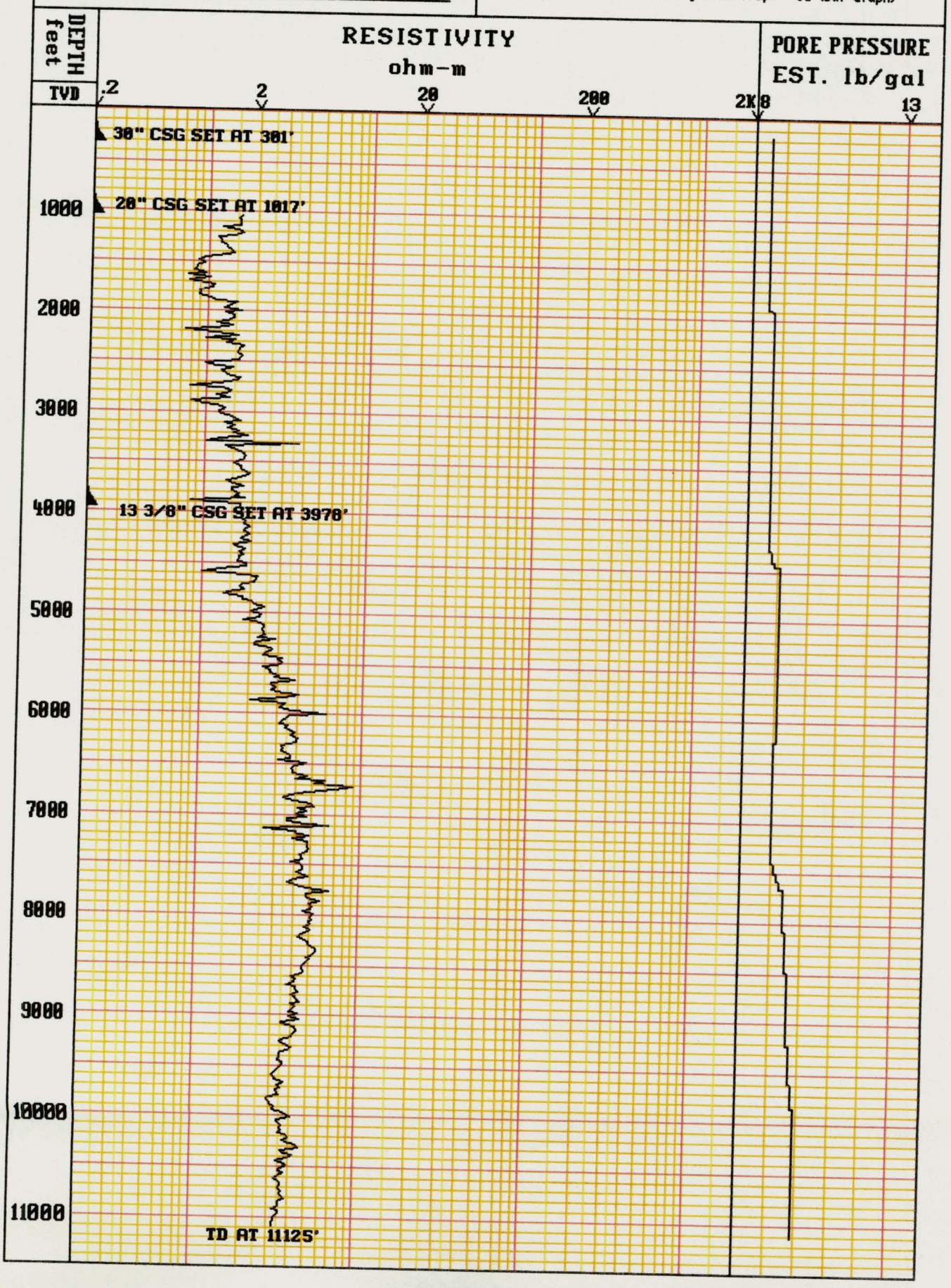
ALASKA DISTRICT

WELL OCS-Y-0865 NO. 1

COMPANY ARCO ALASKA INC.

LOCATION BLOCK 672 BEAUFORT SEA, AK.

NB New Bit	NCB New Core Bit	DTG Down Time Gas
NR No Returns	CO Circulate Out	OBG Off Bottom Gas
DC Depth Corr	CKF Check for Flow	TG Trip Gas
TCL Trip Chlorides	LAT Log After Trip	CG (Bar Graph)

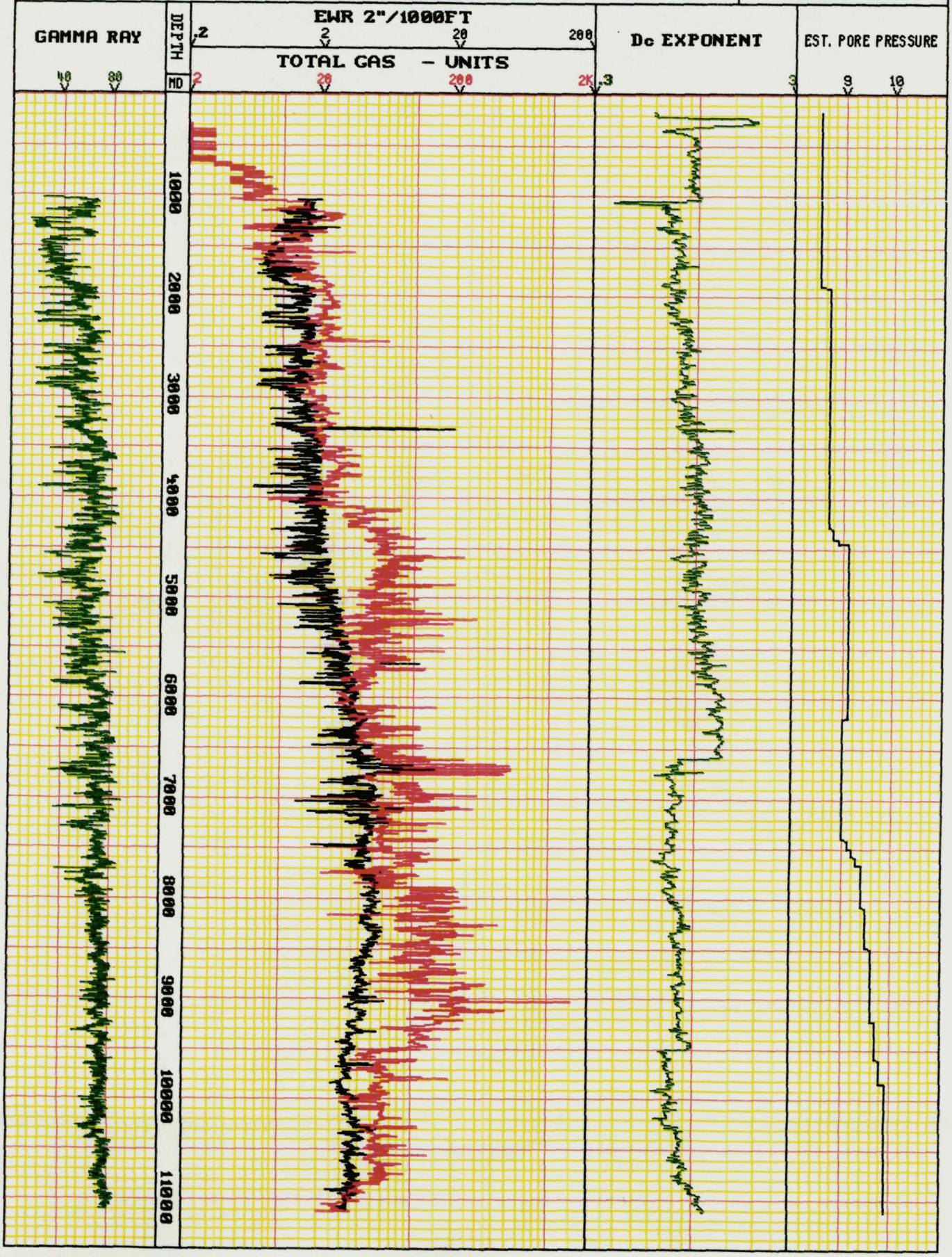


SPERRY-SUN DRILLING SERVICES
LOGGING SYSTEMS

WELL OCS-Y-0865 NO. 1 KUVLUM # 2
COMPANY ARCO ALASKA, INC.
LOCATION NR6-4 BLK 672, BEAUFORT SEA, AK.

BAROID LOGGING SYSTEMS

PRESSURE PARAMETERS

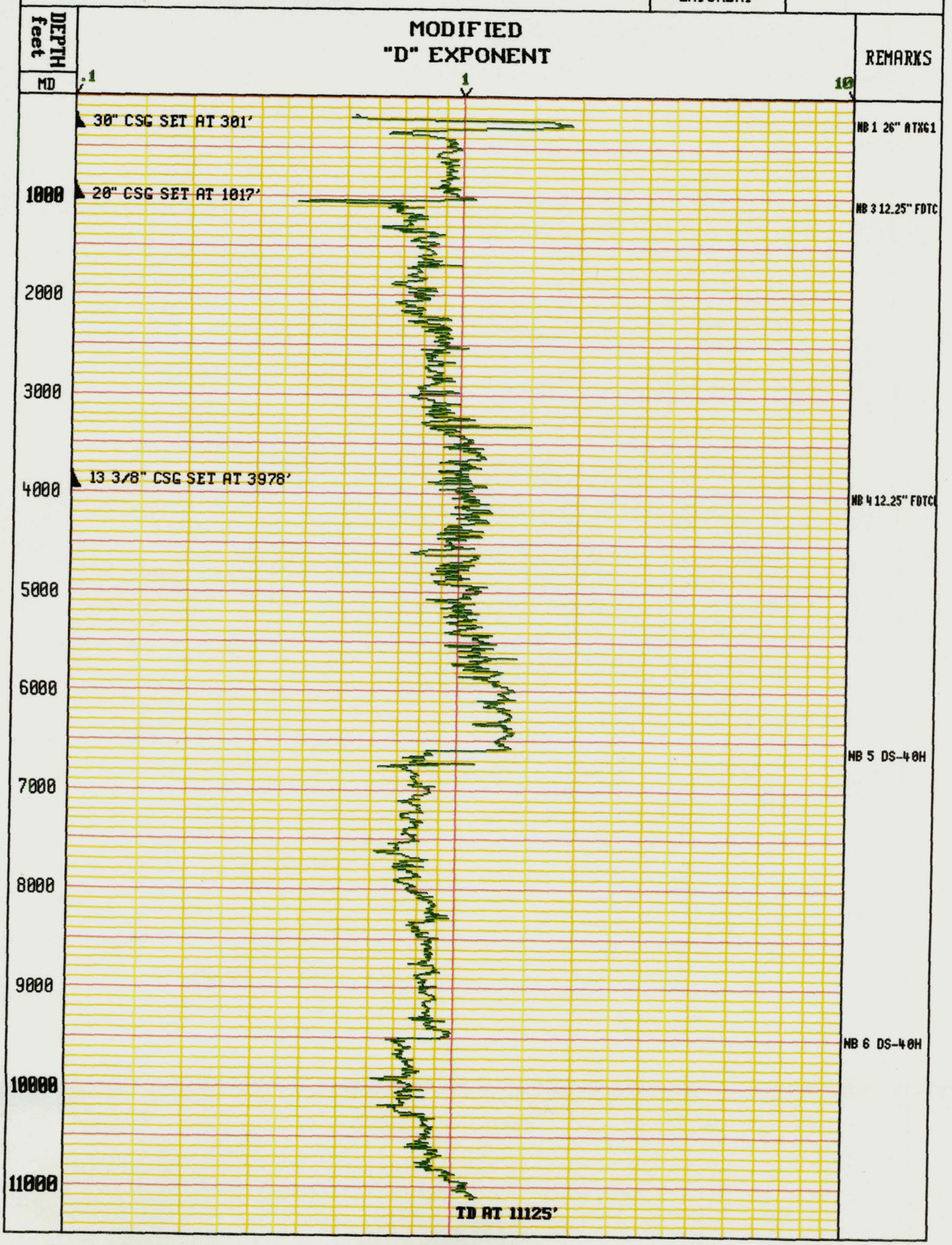


SPERRY-SUN LOGGING SYSTEMS
ALASKA DISTRICT

WELL OCS-Y-0865 NO. 1
COMPANY ARCO ALASKA INC.
LOCATION BLOCK 672 BEAUFORT SEA, AK.

ALASKA
MODIFIED
"D"
EXPONENT

LOGGING SYSTEMS
"Dc"
LOG



SPERRY SUN DRILLING SERVICES

A BAROID COMPANY

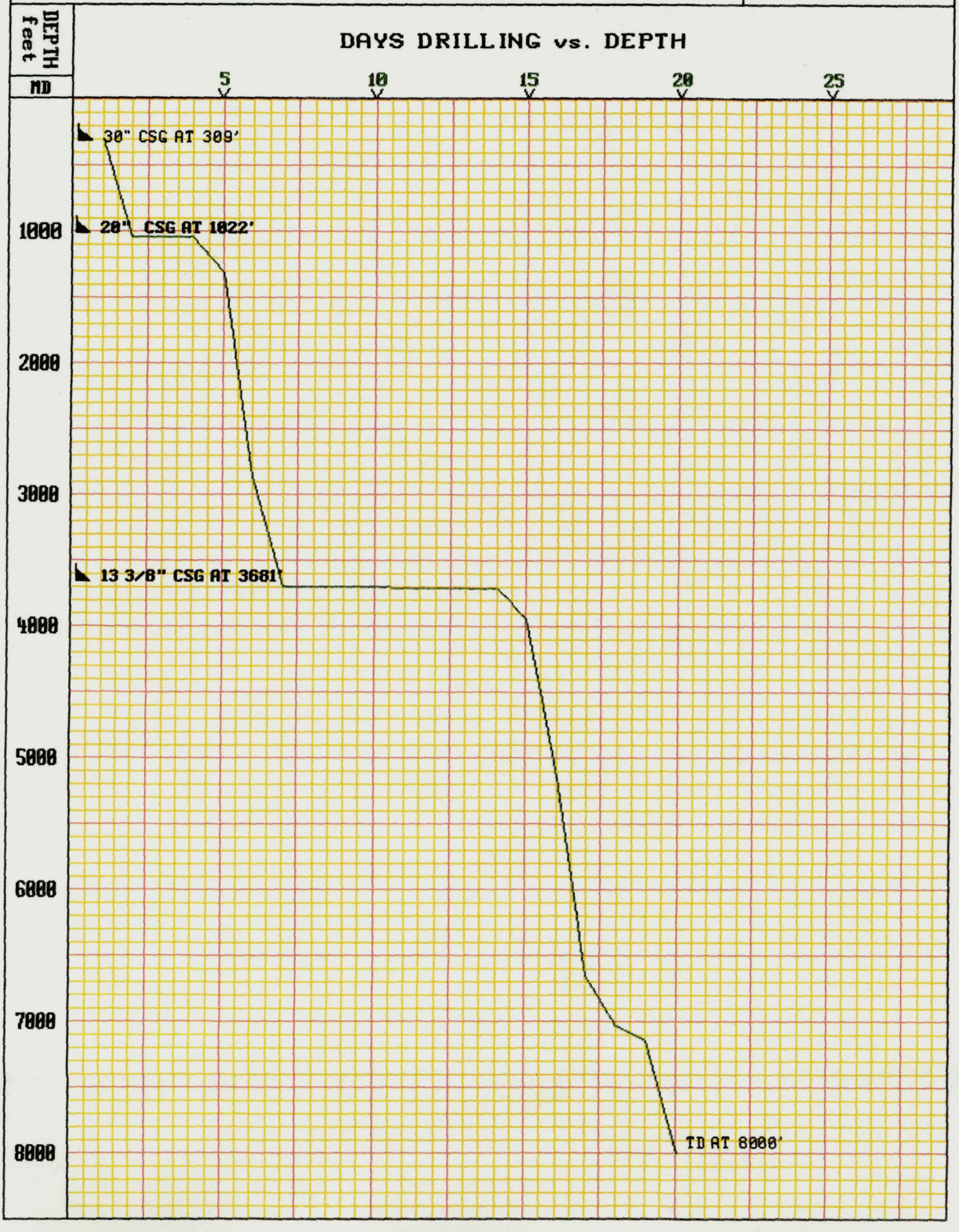
WELL OCS-Y-0866-2 KUVLUM NO. 3

COMPANY ARCO ALASKA, INC.

LOCATION NR6-4 BLK 673, BEAUFORT SEA, AK.

SPERRY SUN LOGGING SYSTEMS

DAYS VS DEPTH



SPERRY SUN DRILLING SERVICES

A BAROID COMPANY

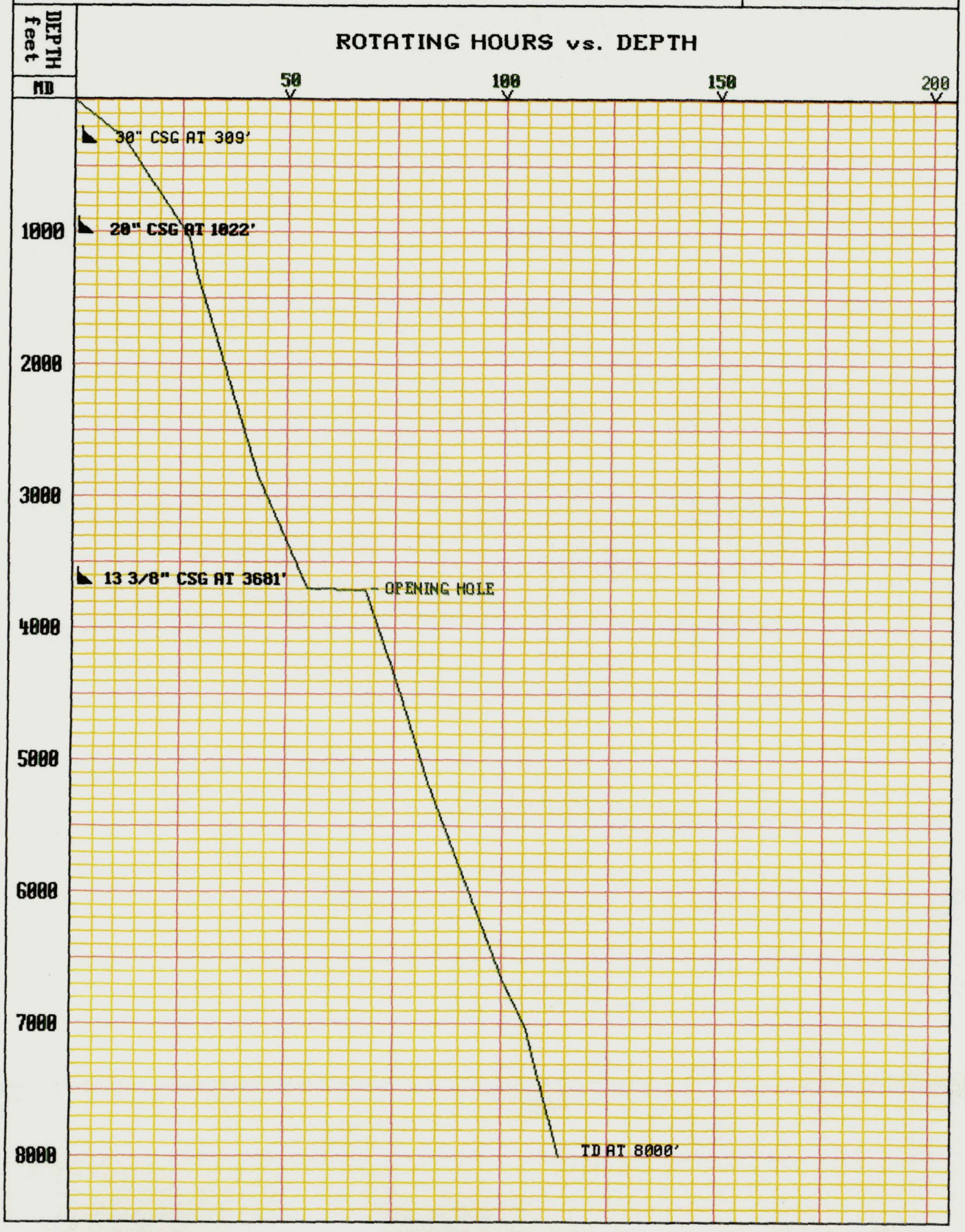
WELL OCS-Y-0866-2 KUVLUM NO. 3

COMPANY ARCO ALASKA INC.

LOCATION NR6-4 BLK 673, BEAUFORT SEA, AK.

SPERRY SUN LOGGING SYSTEMS

ROTATING HRS VS DEPTH



SPERRY-SUN DRILLING SERVICES
ALASKA DIVISION

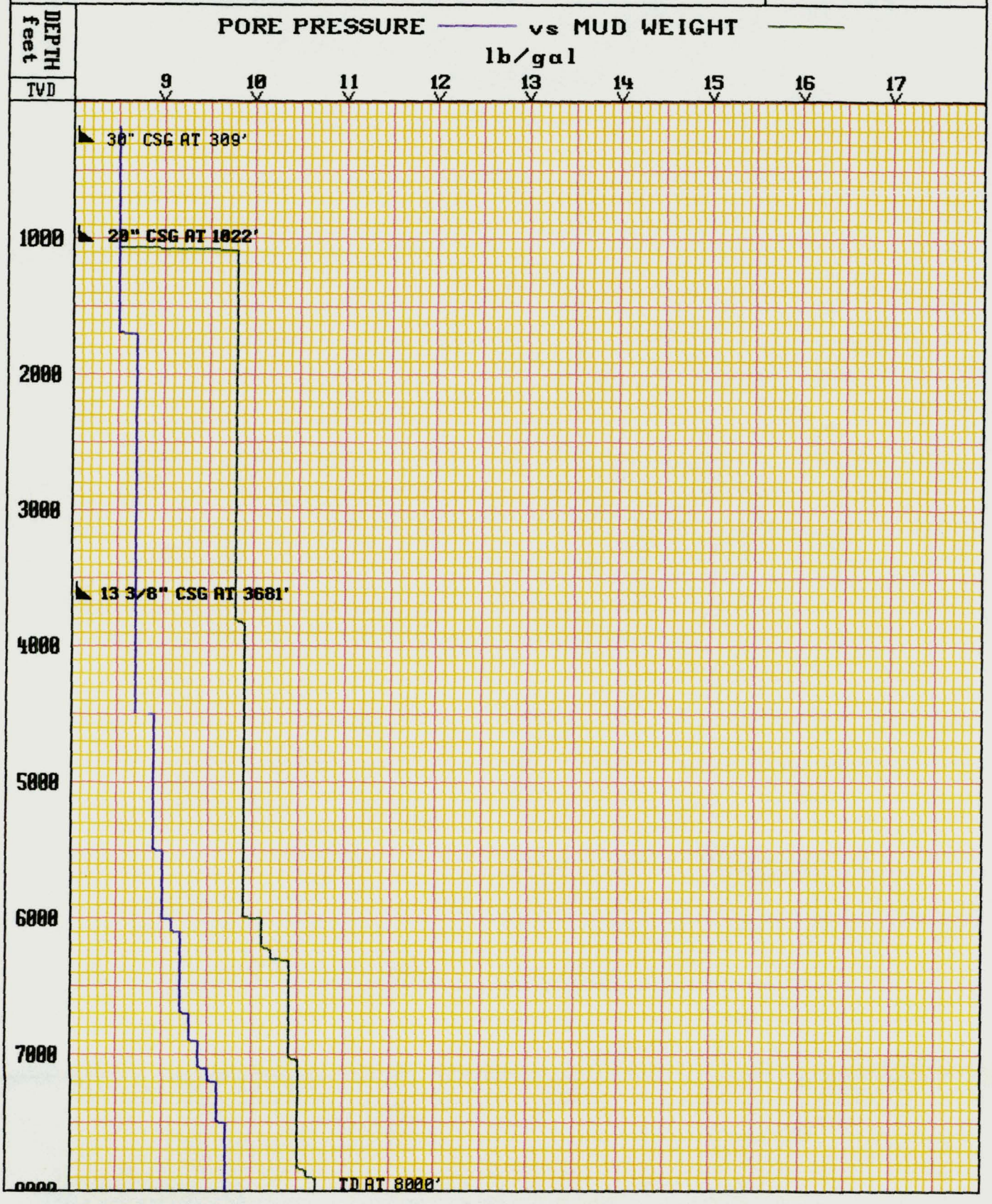
LOGGING SYSTEMS

WELL OCS-Y-0866-2 KUVLUM NO. 3

COMPANY ARCO ALASKA, INC.

LOCATION NR6-4 BLK 673, BEAUFORT SEA, AK.

PORE PRESSURE vs MUD WEIGHT



SPERRY-SUN LOGGING SYSTEMS

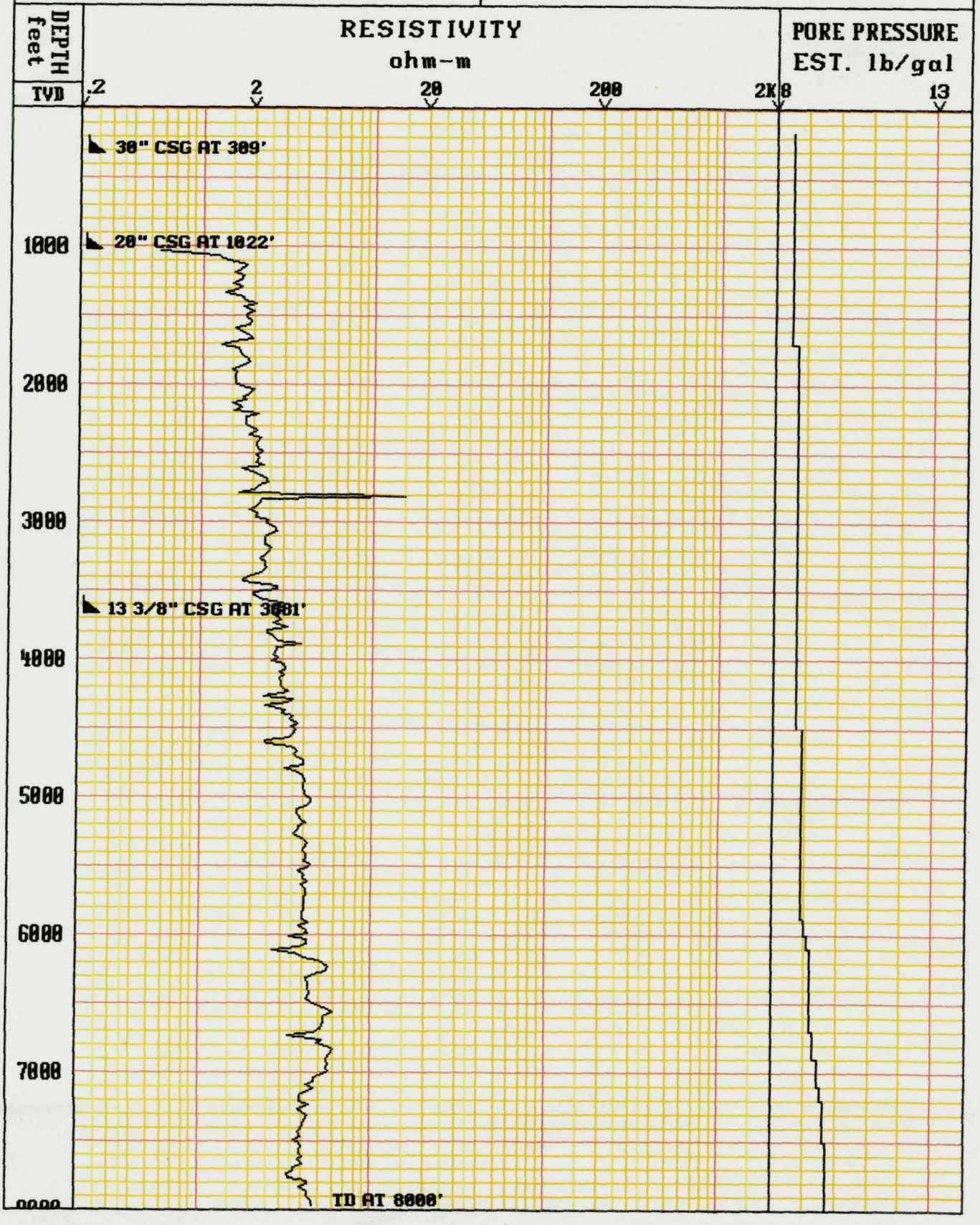
ALASKA DISTRICT

WELL OCS-Y-0866 NO.2 KUVLUM NO. 2

COMPANY ARCO ALASKA, INC.

LOCATION NR6-4 BLK 673, BEAUFORT SEA, AK.

NB New Bit	NCB New Core Bit	DTG Down Time Gas
NR No Returns	CO Circulate Out	OBG Off Bottom Gas
DC Depth Corr	CKF Check for Flow	TG Trip Gas
TCL Trip Chlorides	LAT Log After Trip	CG (Bar Graph)

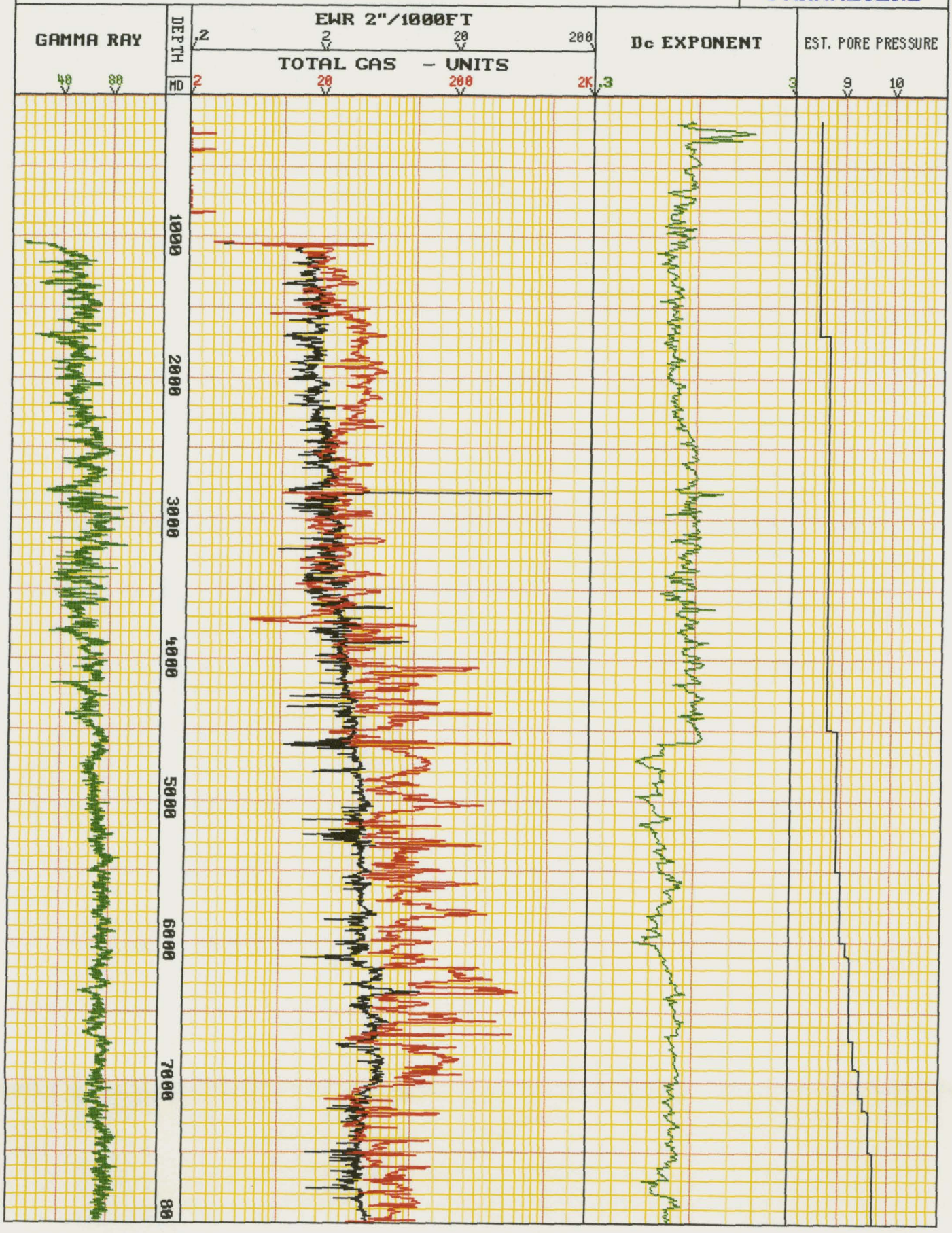


SPERRY-SUN DRILLING SERVICES
LOGGING SYSTEMS

WELL OCSY-Y-0866 #2 - KUVLUM NO. 3
COMPANY ARCO ALASKA, INC.
LOCATION NR6-4 BLK 674, BEAUFORT SEA, AK.

BAROID LOGGING SYSTEMS

PRESSURE PARAMETERS



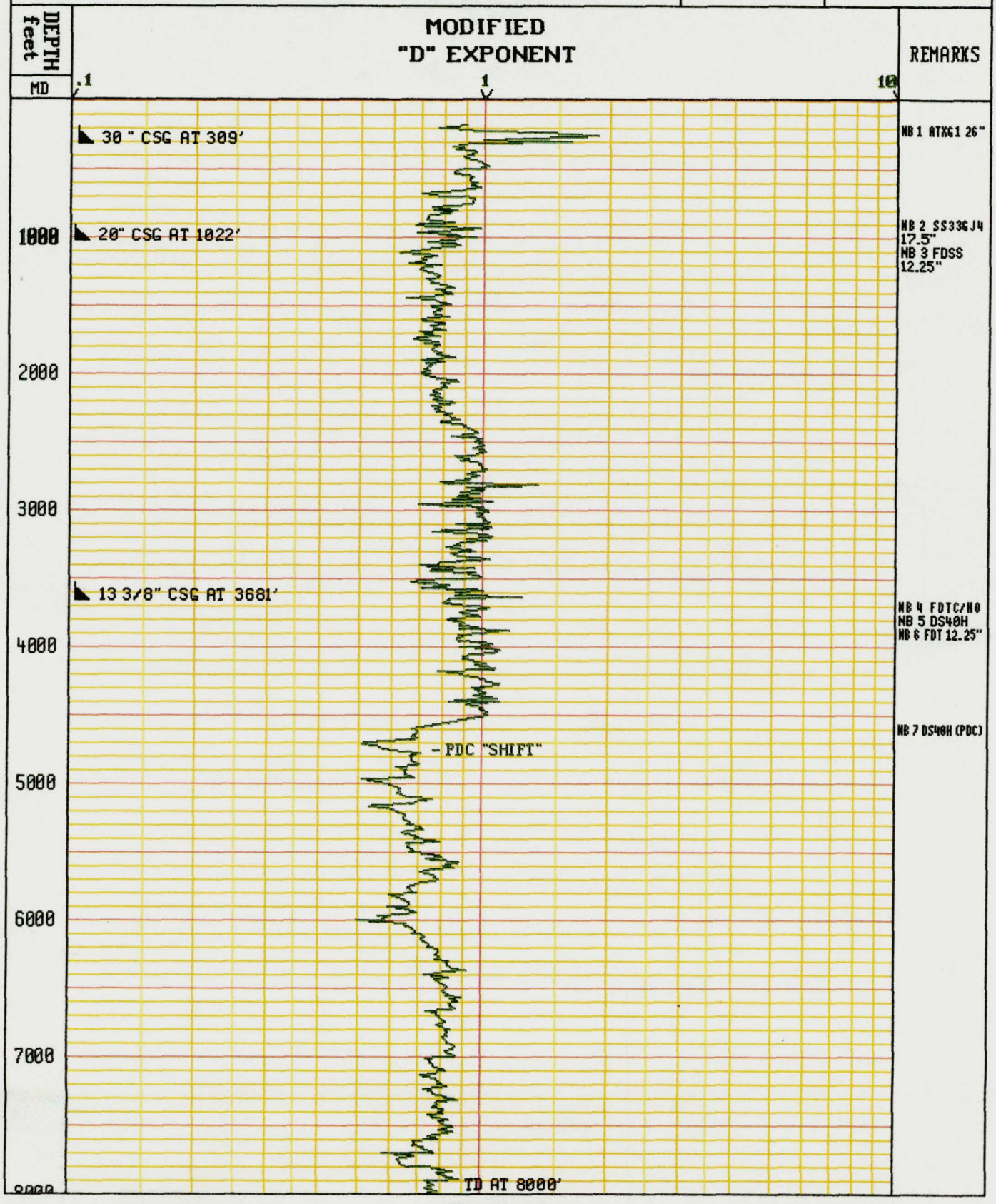
SPERRY-SUN LOGGING SYSTEMS
ALASKA DISTRICT

WELL OCS-Y-0866-2 KUVLUM NO. 3
COMPANY ARCO ALASKA, INC.
LOCATION NR6-4 BLK 673, BEAUFORT SEA, AK.

ALASKA MODIFIED "D" EXPONENT

LOGGING SYSTEMS

"Dc" LOG



sperry-sun
DRILLING SERVICES
LOGGING SYSTEMS

ADT SERVICE
ENGINEERING LOG
50 feet / 1 inch

COMPANY ARCO ALASKA INC.

WELL KUVLUM NO. 2

FIELD BEAUFORT SEA, BLOCK 672

REGION

LOCATION ALASKA, U.S.A.

CO-ORDS

CONTRACTOR CANMAR

RIG/TYPE CDU KULLUK

TOTAL DEPTH 11125' TVD 11125'

SPUD DATE 28 JULY 1993

ELEVATION AND LOGGING DATA

PERMANENT DATUM MEAN SEA LEVEL

ELEVATIONS: K.B. 65'

D.F. 64'

G.L./S.F. 101'

LOG MEASURED FROM K.B.

LOGGED DEPTHS 166 To 11125

LOGGED DEPTHS To

SURV. ENGINEER JOHN PATTON UNIT 2215

HOLE DATA

21 (RISER)	To 171	17.5	To 3978
30"	To 301	12.25	To 11125
26"	To 1017		To

CASING DATA

30"	To 301		To
20"	To 1017		To
13 3/8"	To 3978		To

MUD TYPES

SEA WATER	To	1017
GENERIC #2	To	11125
	To	
	To	

LITHOLOGY SYMBOLS

Coal
Tuff
Chert
Limestone
Sandstone
Sand
Gravel
Conglom.

ABBREVIATIONS

DRILLING DATA

NB	New Bit	LAT	Logged After Trip
RRB	Rerun Bit	G	Gas Units
TB	Turbo Drill	BG	Background Gas
PDCB	Polycrystalline Diamond Compound Bit	TG	Trip Gas
		STG	Short Trip Gas
		CG	Connection Gas
CB	Core Bit	DST	Drill Stem Test
DB	Diamond Bit	DS	Direction Survey
WOB	Weight on Bit	DC	Depth Correction
RPM	Revs Per Minute	C	Carbide Te
CO	Circulate Out	CKF	Check for
PR	Partial Returns	FLT	Flowlin
NR	No Returns	BHT	Bottom

MUD DATA

W	Mud Density	PV	Plastic
V	Funnel Viscosity	YP	Yield P
FL	Filtrate Loss	S	Sulfur
FC	Filter Cake	C	Cake
CL	Salinity	RM	Mud Re
PH	Hydrogen Ion Content	RMF	Filtrate

ENGINEERING DATA

Ct Core No. / recovery

DST.1 Drill Stem Test No. 1

Gas Tracer
Gas
Oil tracer
Oil

LOGGING ENGINEERS: RAY FRENCH
JUSTIN PANTER

OTHER SERVICES:

Dolomite
Clay
Shale
Siltstone

Sidewall Core
RFT Interval Tester
E-LOG Wireline Log Run
LOT Leakoff Test
PIT Pressure Integrity Test
Water
Salt Water
Fresh Water
Hydrocarbons smell
H_2S smell

SPERRY SUN DRILLING SERVICES
LOGGING SYSTEMS A Baroid Company

WELL OCS-Y-0865 NO. 1
COMPANY ARCO ALASKA, INC.
LOCATION BLOCK 672, BEAUFORT SEA, ALASKA

LEGEND

NB New Bit	NCB New Core Bit	CKF Check for Flow
NR No Returns	CO Circulate Out	LAT Log after Trip
TG Trip Gas	CG Connection Gas	DST Drill Stem Test
DC Depth Corr	STG Short Trip Gas	SVY Direc Survey

Clay Shale Siltstone Sandstone Gravel

LOGGING SYSTEMS ADT SERVICE

ENGINEERING LOG

CONN TIME (sec) —— (bar graph) 1K 500
TEMP OUT --- 100 50
DRAG —— 100 50

WOB (KLBS) —— 50 25
RPM --- 200 100
TORQUE (AMPS) --- 500 250
TORQ DEV. --- 100 50

FLOW IN (GPM) —— 1K 500
STND PIPE PRES -- 2400 1200
MUD WT IN (PPG) --- 10 10
EST PP (PPG) --- 12 10

ROP (FT/HR) —— 600 400 0
GAMMA (AAPI) --- 0 37.5 75
"Dc" EXPONENT ----- 0 1.5 3
SHALE DENS —— 1.8 2.2 2.6

CONN LENGTH —— (bar graph) 0 100 200
MAX GAS UNITS --- 0 500 1K
EWR 0 10 20

DEPTH-feet MD

LITHOLOGY

REMARKS

200

250

PERMANENT DATUM
MEASURED FROM MSL:
KB: 85', DF: 84'
MEAN SEA LEVEL: 101'
MUD LINE: 186' BELOW KB
LOGS MEASURED FROM KB
SPUD IN 7-28-93
DRILLING GLORY HOLE

JETTING IN 30" CONDUCTOR
NO RETURNS
7-28-93

21-21-21-22 JETS IN DEPTH @ 226'

7-28-93

30" CSG

DRILLING 26" HOLE
WITH NO RETURNS

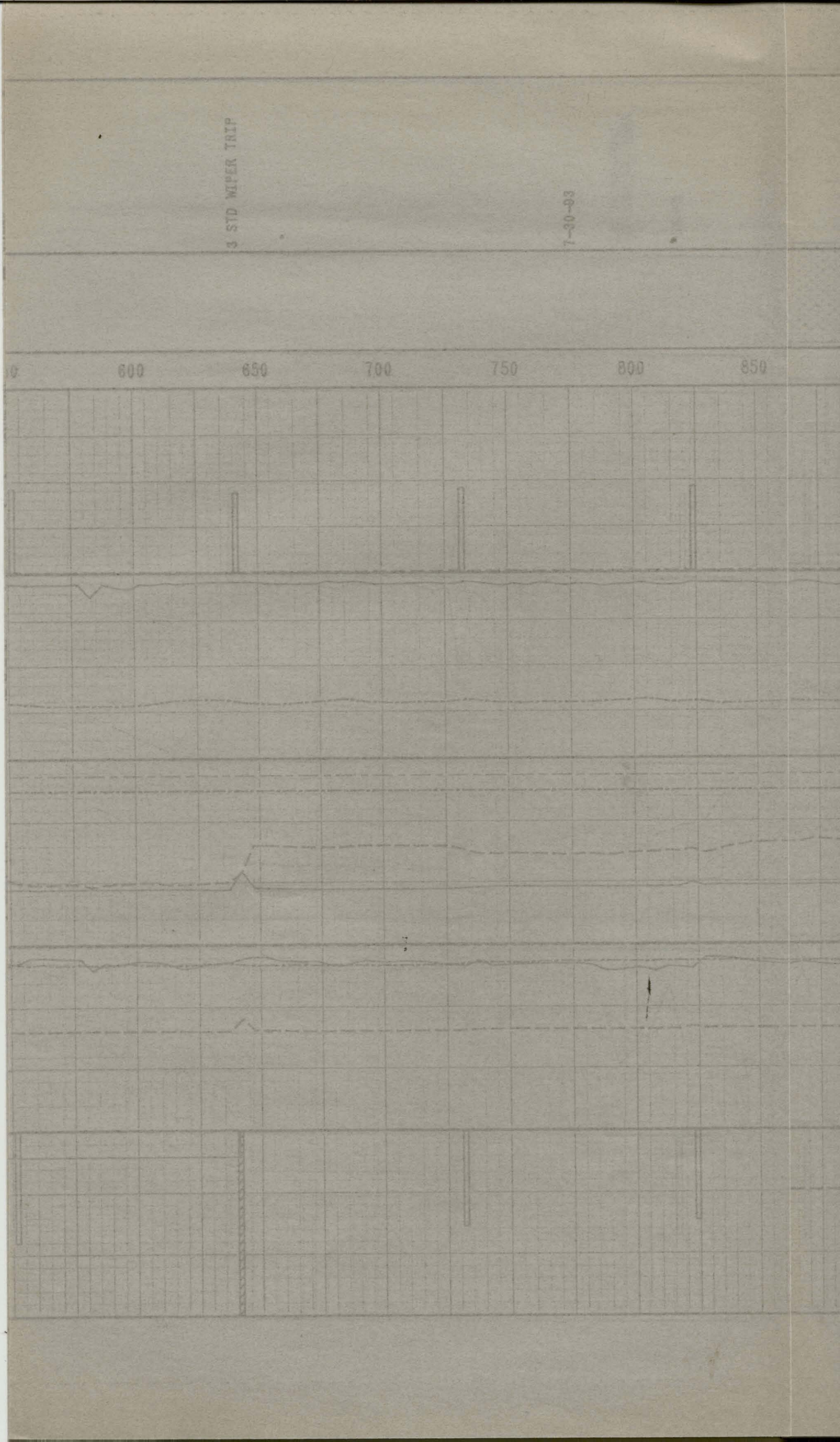
300

350

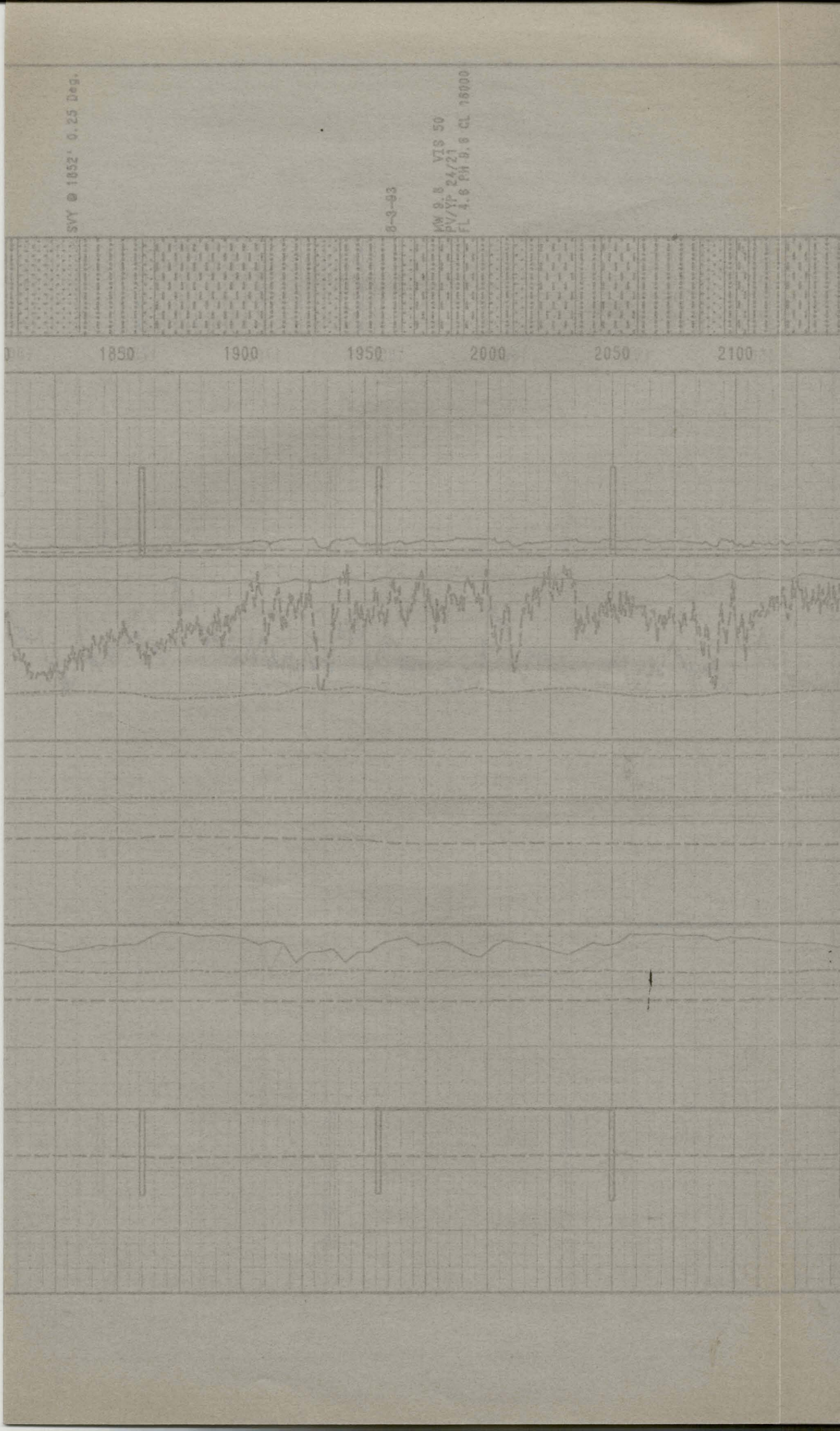
400

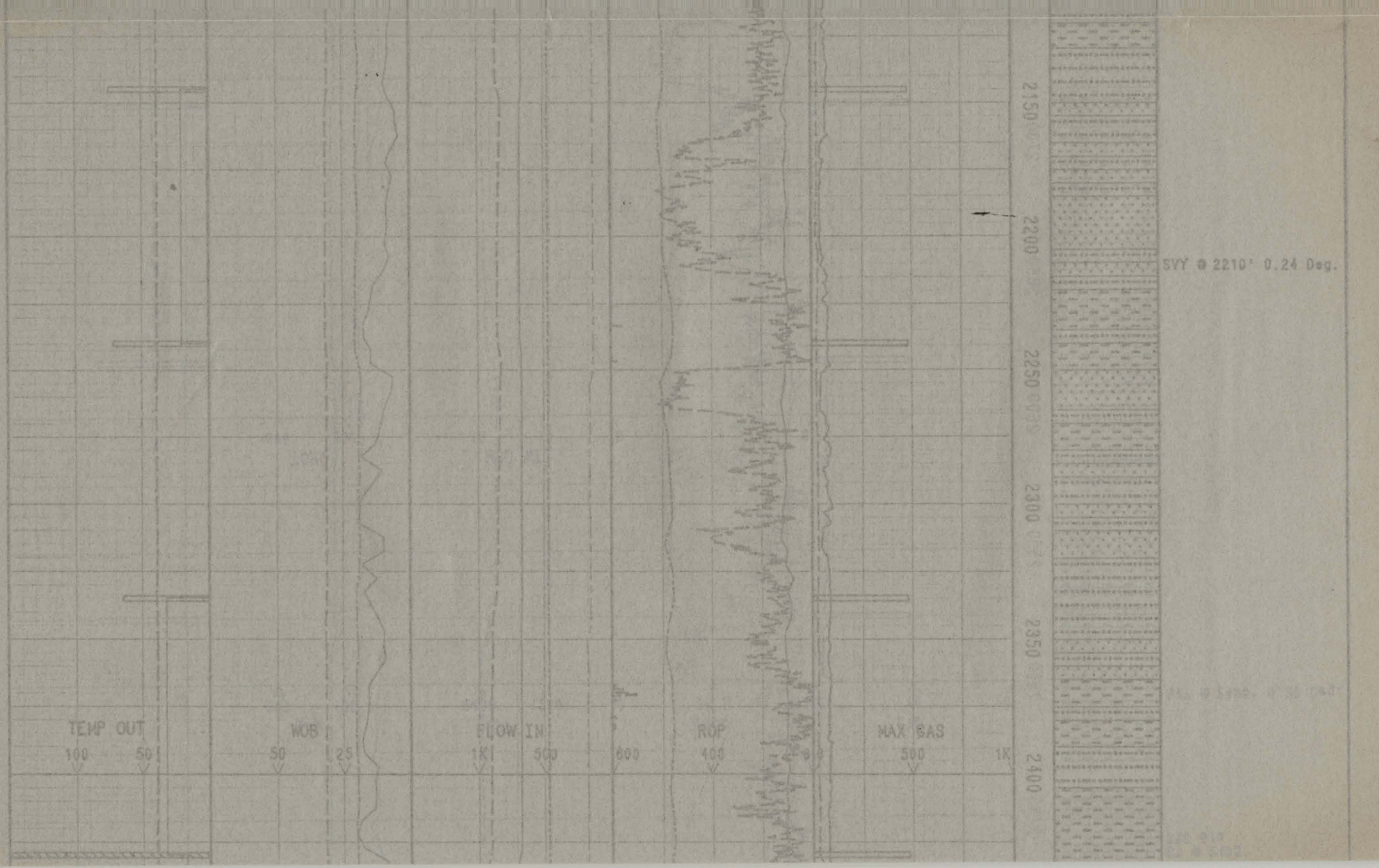
450

500

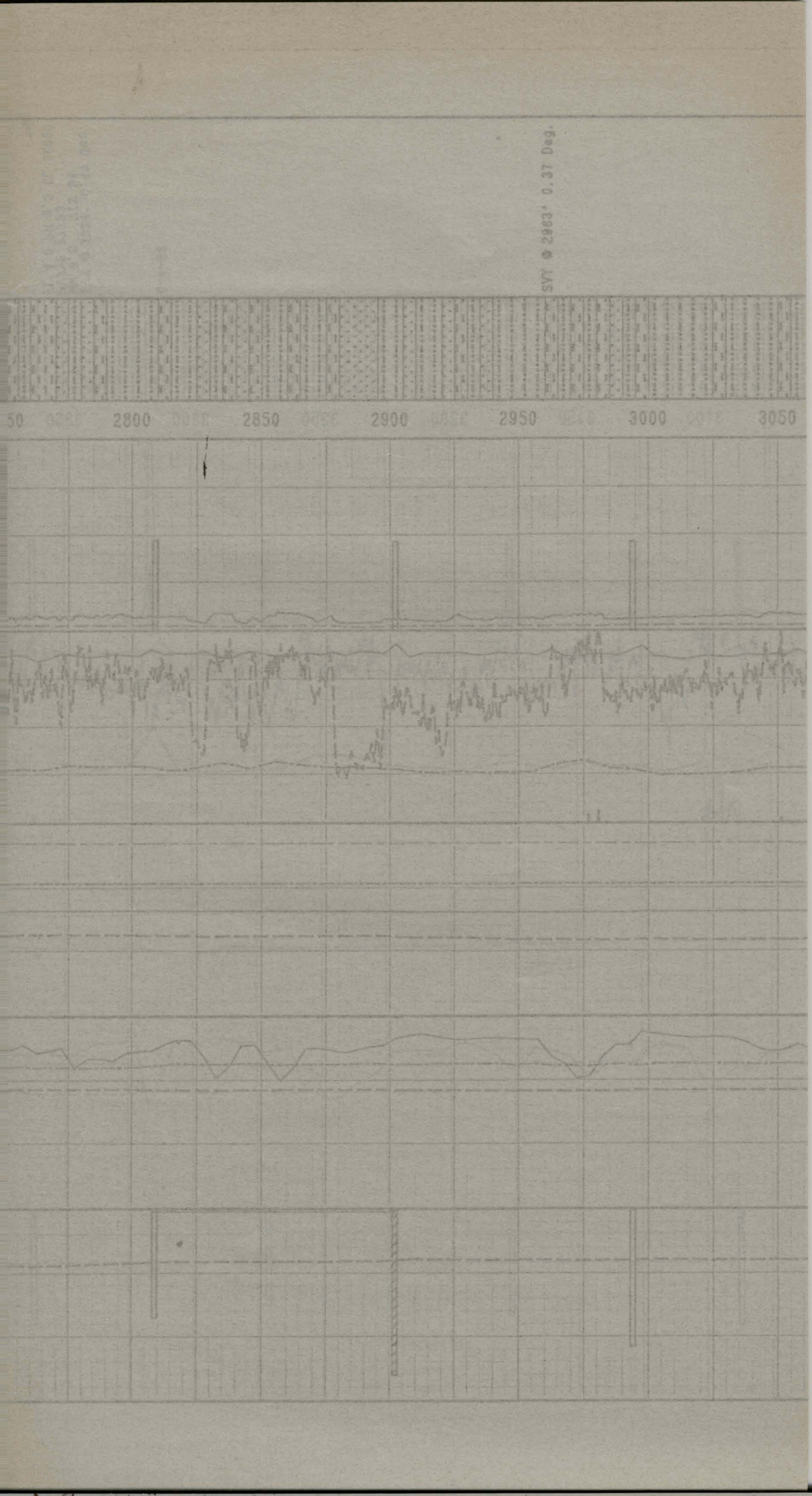

3 STD WIPER TRIP
7-30-03
0
600
650
700
750
800
850

900
950
1000
1050
1100
1150
20" CSG
DRILLED TO 1030'
RUN 20" OD 18.75"ID
133 LB/FT CSG @ 118'
LOT=12.9 PPG EMW
7-30/8-2-45
NB 2 17.5" SS33SGJ4
18-18-18-11 JETS
IN DEPTH @ 1030'
NB 3 12.25" FDTC
14-14-14-10
IN DEPTH @ 1040'
MW 9.8 VIS 50
PV/YP 19/28
FL 4.8 PH 9.0 CL 17000

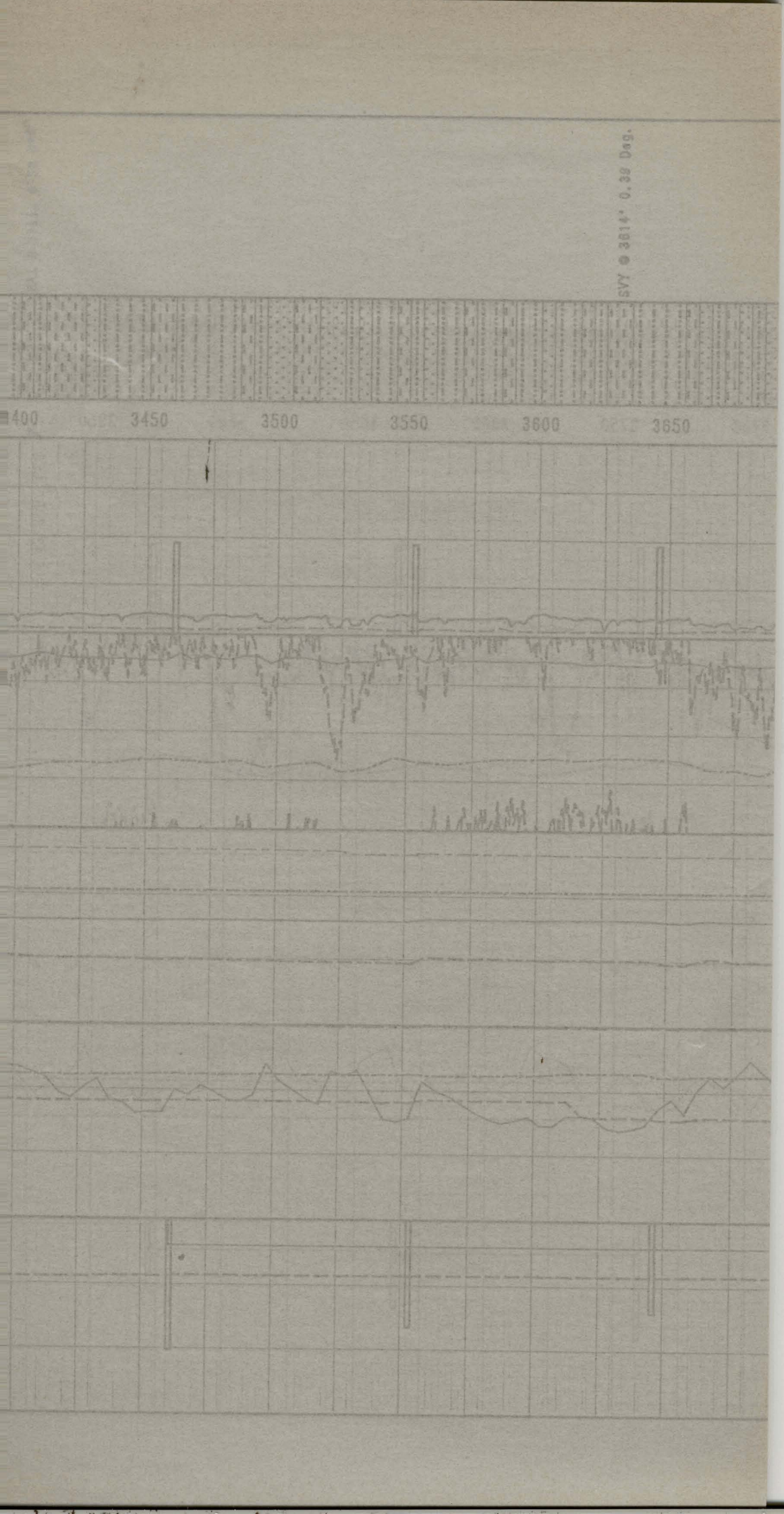

SVY @ 1852' 0.25 Deg.
8-3-93
VIS 50
PV/VP 24/21
FL 4.6 PW 8.8 CL 16000
1850
1900
1950
2000
2050
2100

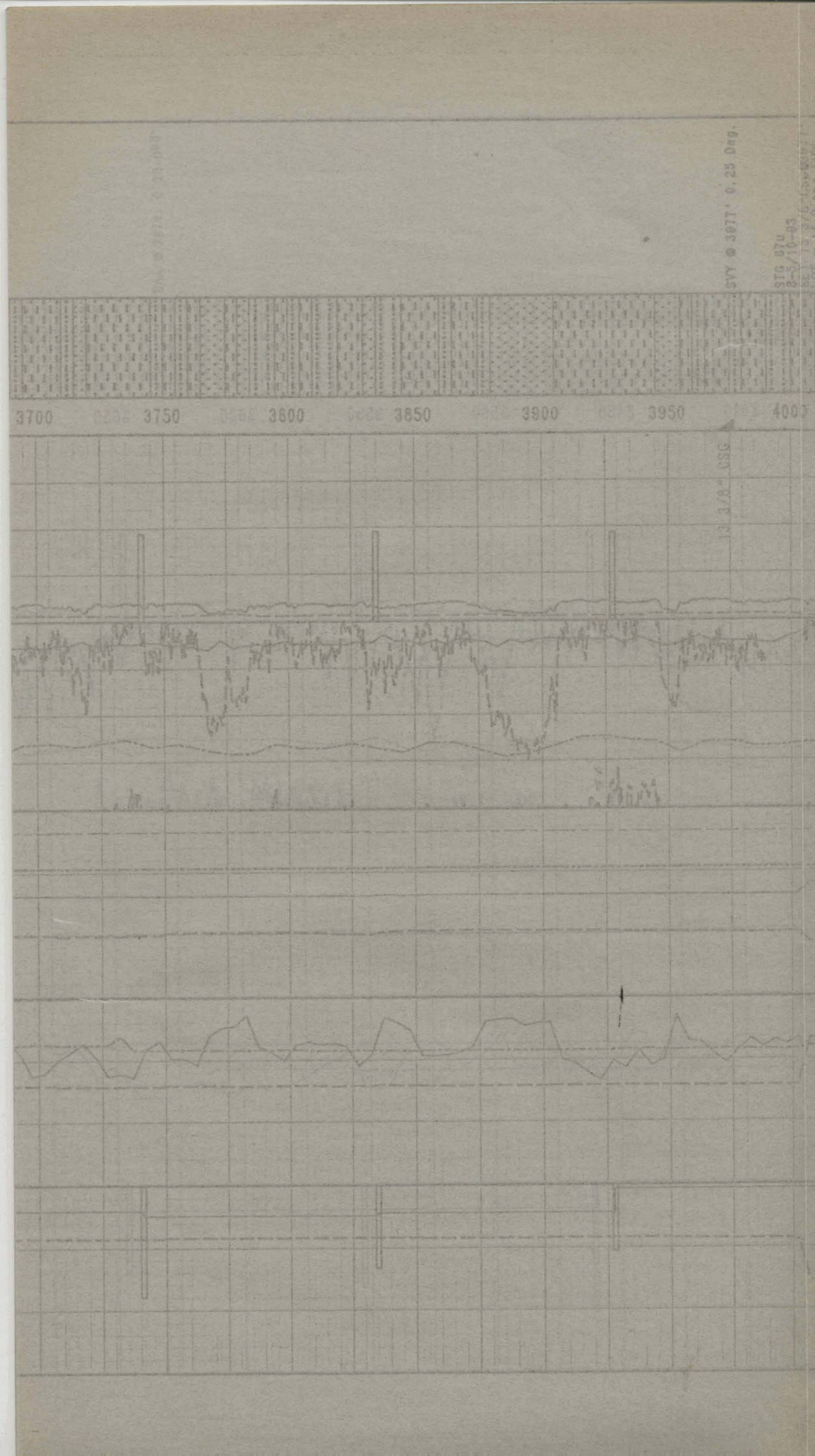

TEMP OUT
100
50
WOB
50
25
FLOW IN
1K
500
ROP
600
400
MAX GAS
500
1K
2150
2200
2250
2300
2350
2400
SVY @ 2210' 0.24 Deg.

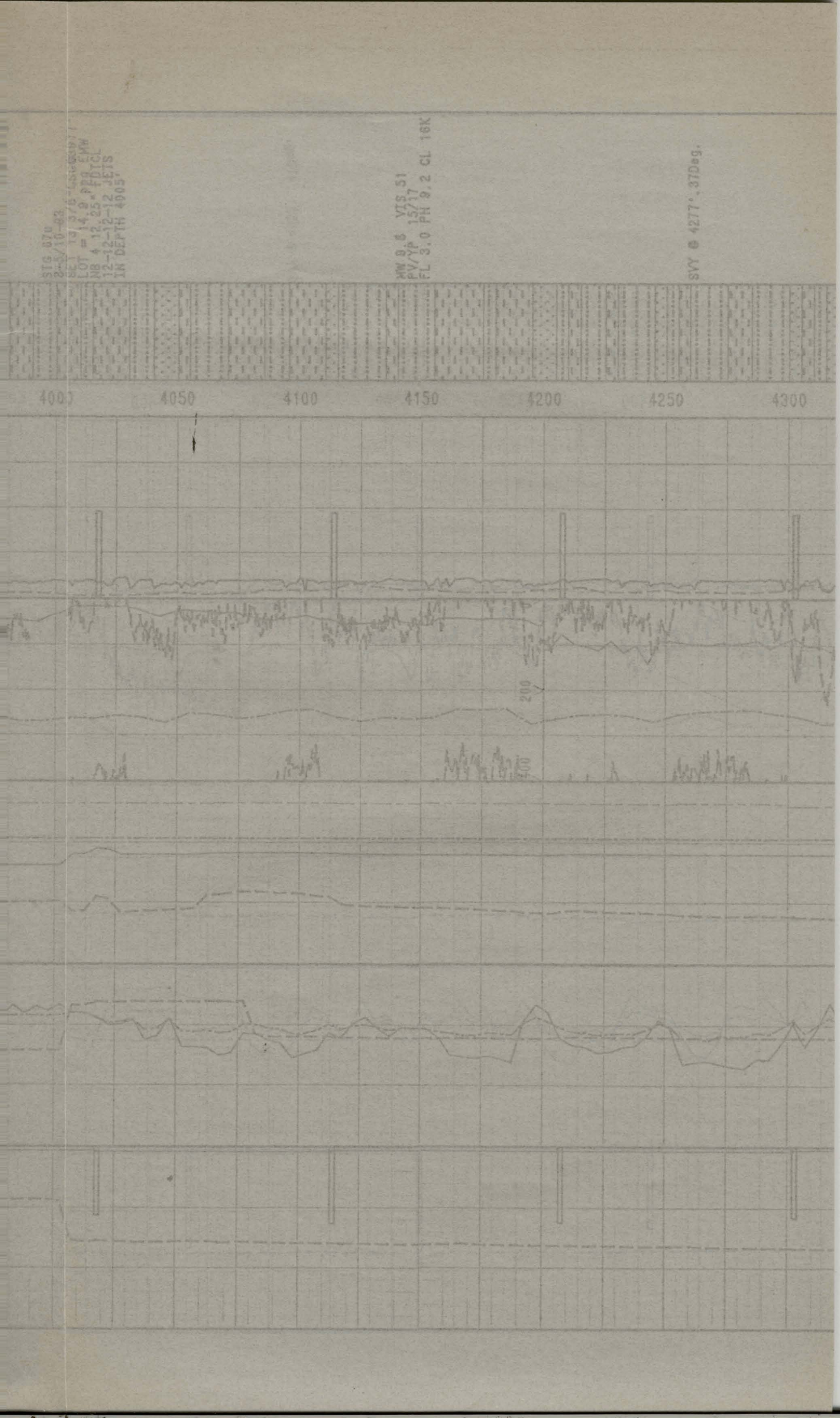

RPM
200
100
SPP
2400
1200
0
GAMMA
37.5
75
0
EWR
10
20
TORQ
500
250
MUD WT
13
10
0
"Dc" EXP
1.5
3
2450
2500
2550
2600
2650
2700
2750
ST @ 2435'
STG 610
SVY @ 2495' 0.23 Deg.

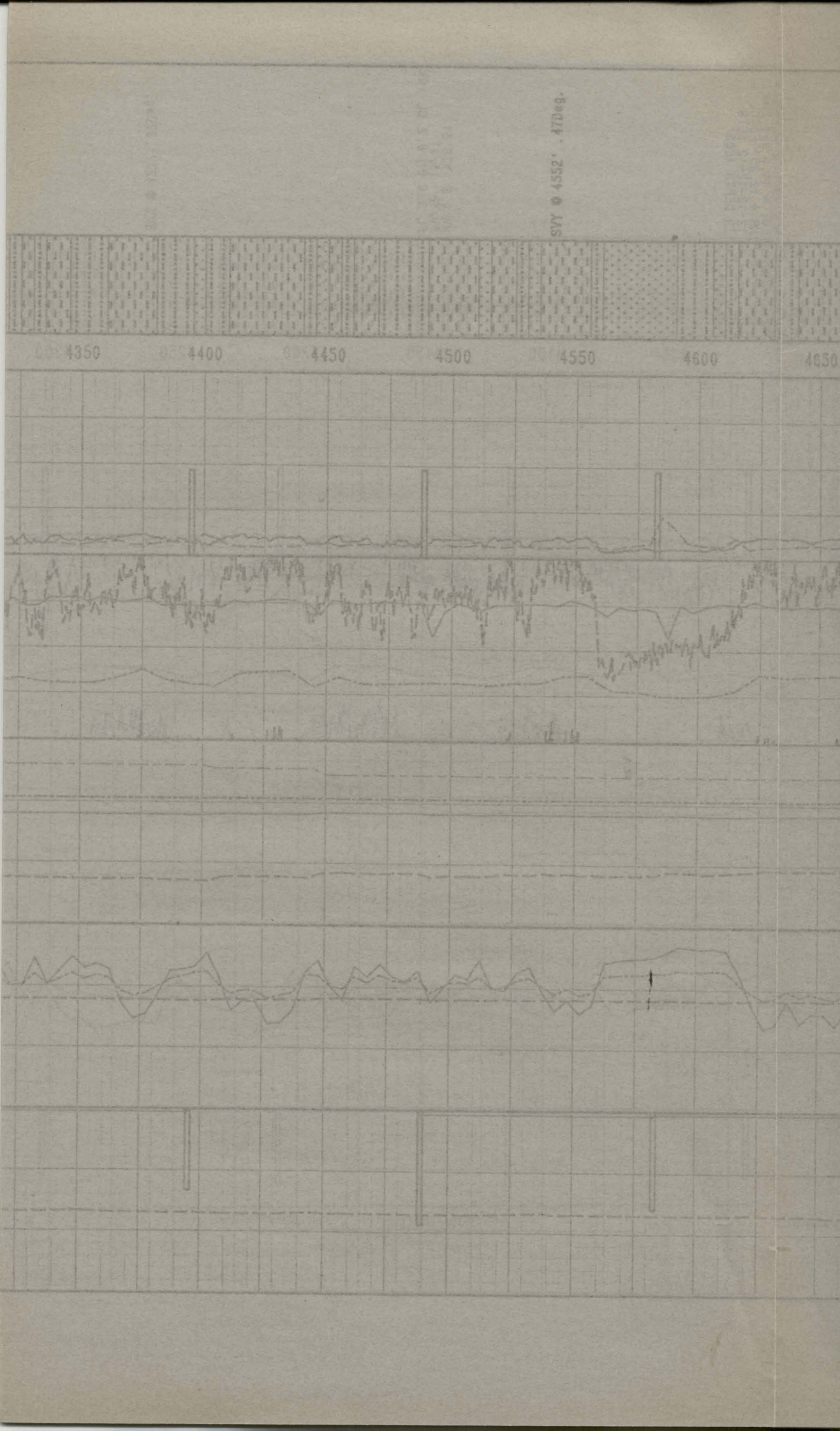

SVY @ 2863', 0.37 Deg.
50
2800
2850
2900
2950
3000
3050

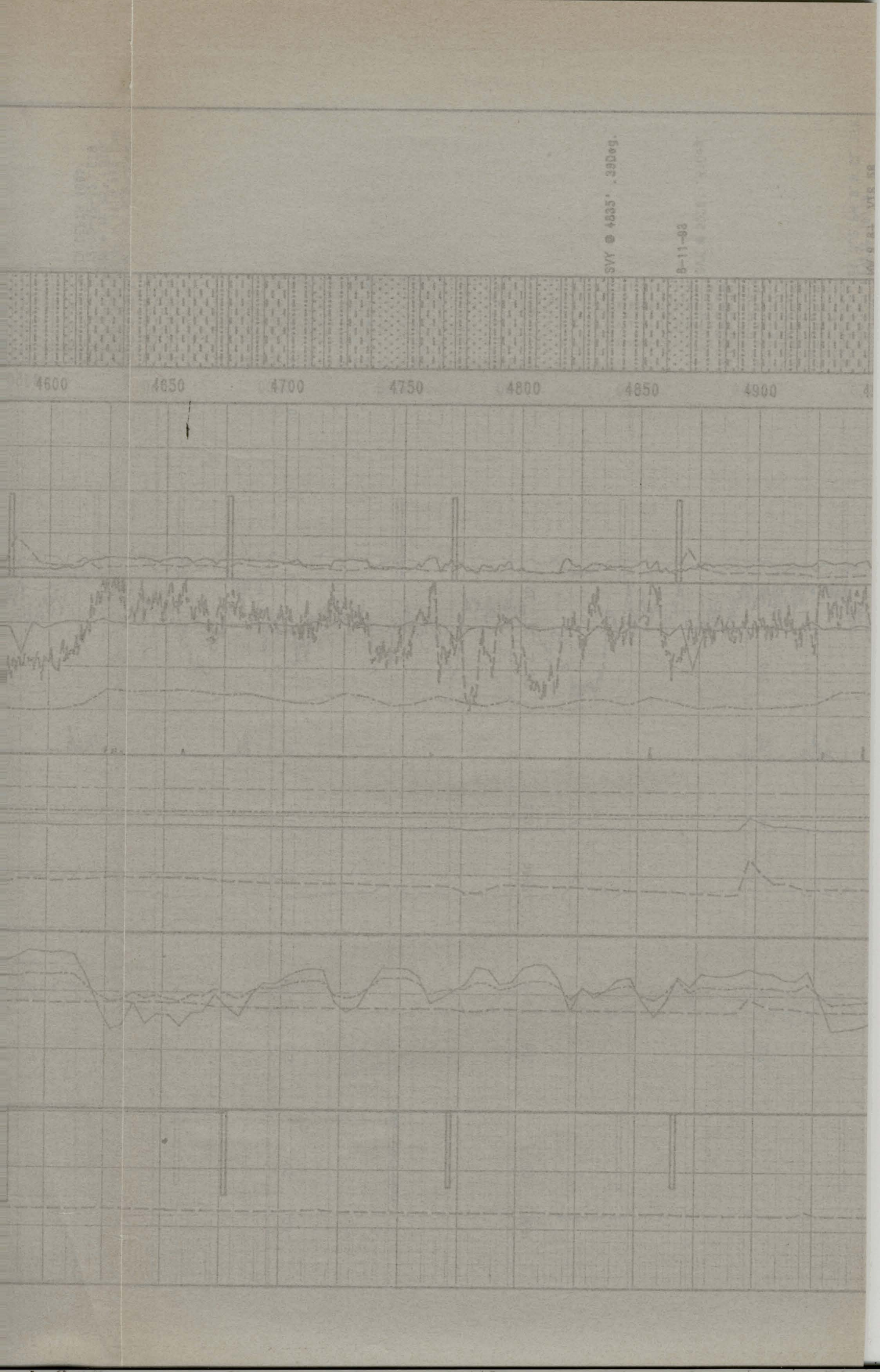
3100
3150
3200
3250
3300
3350
8-4-93
SVY @ 3334' 0.40 Deg.
MW 9.8 VIS 54
PV/YP 27/23
FL 4.0 PH 8.5 CL 16000

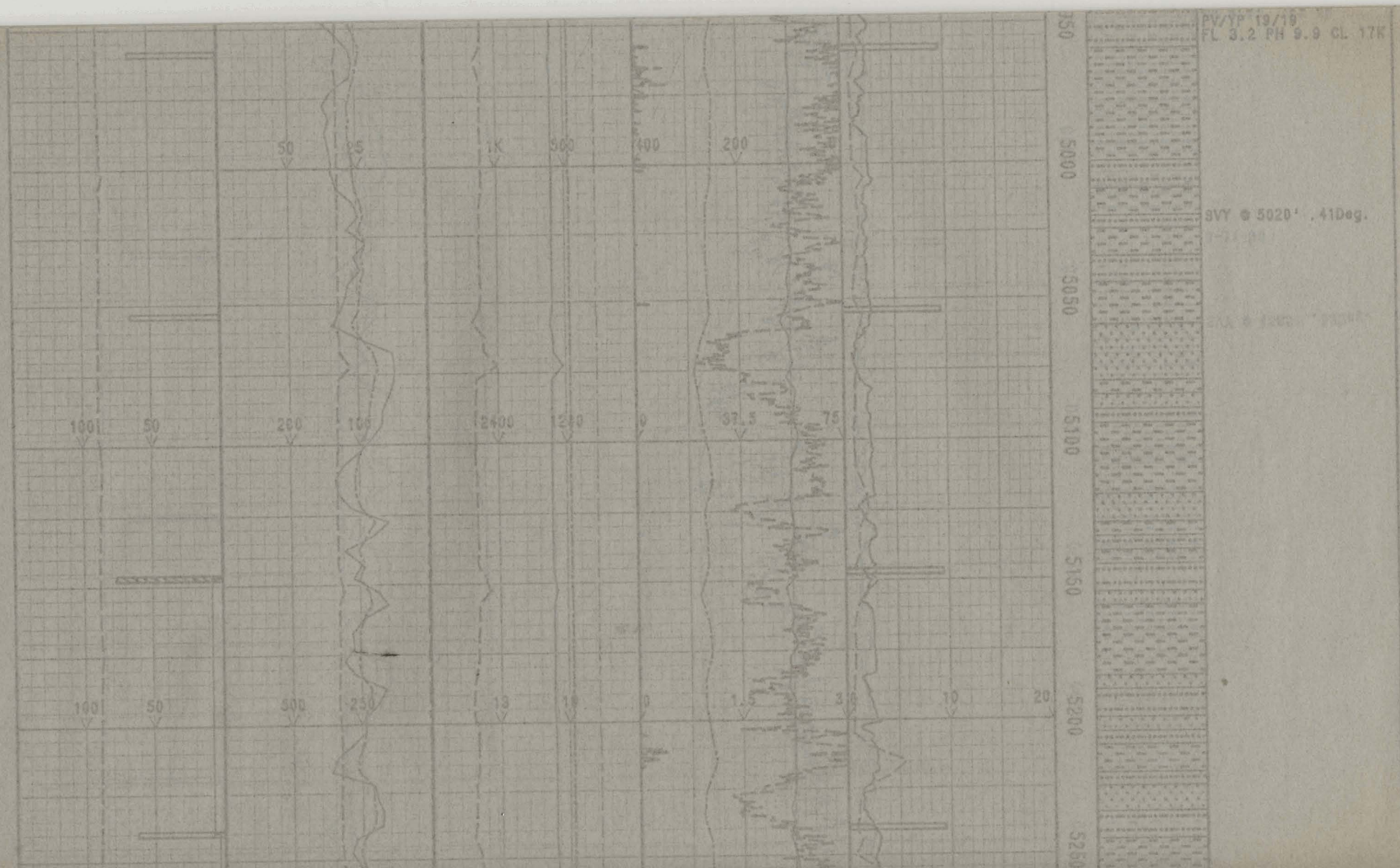

SVY @ 3614' 0.38 Deg.
3400
3450
3500
3550
3600
3650

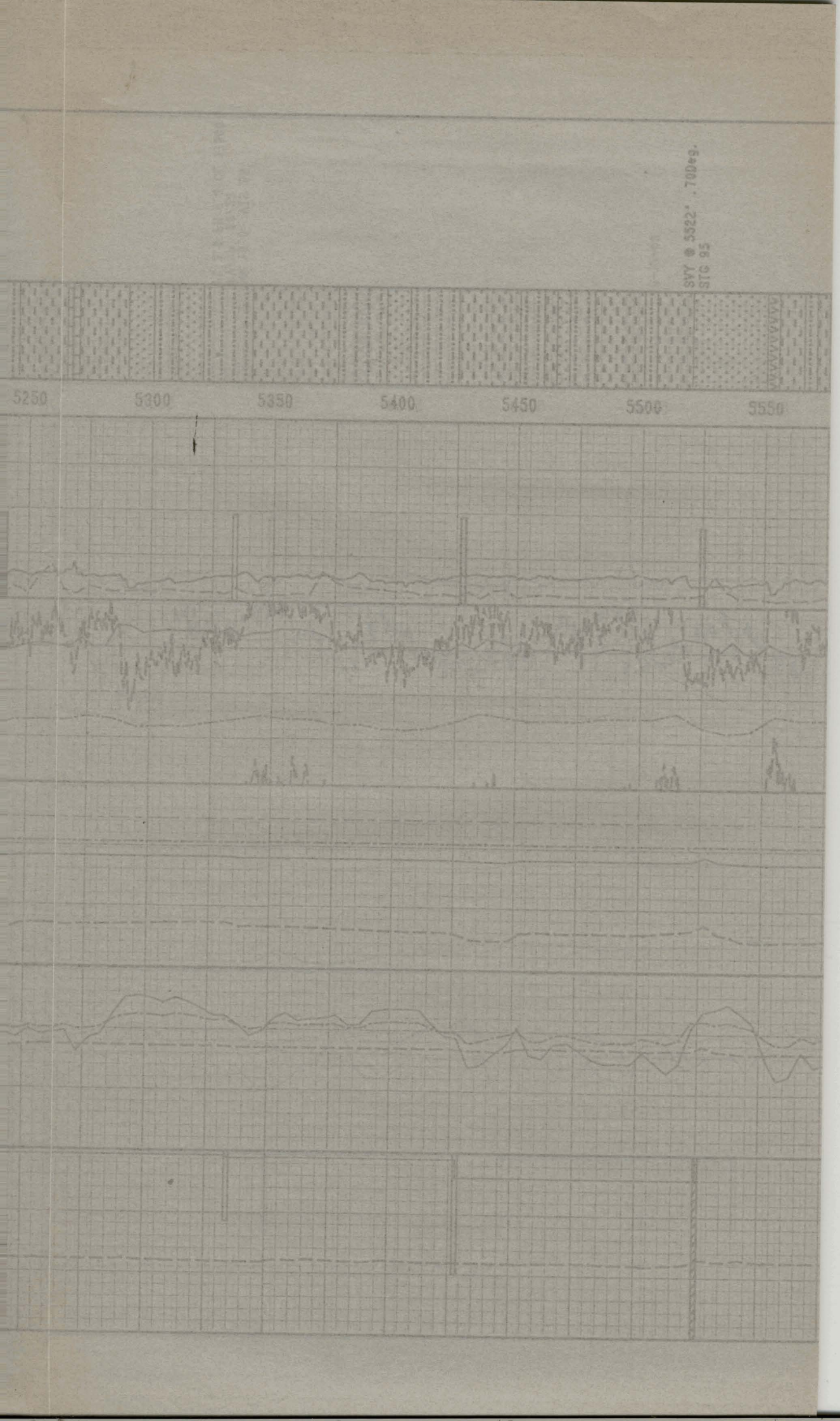

SVY @ 3077' 0.25 Deg.
STG 07u
3700
3750
3800
3850
3900
3950
4000
13 3/8" CSG

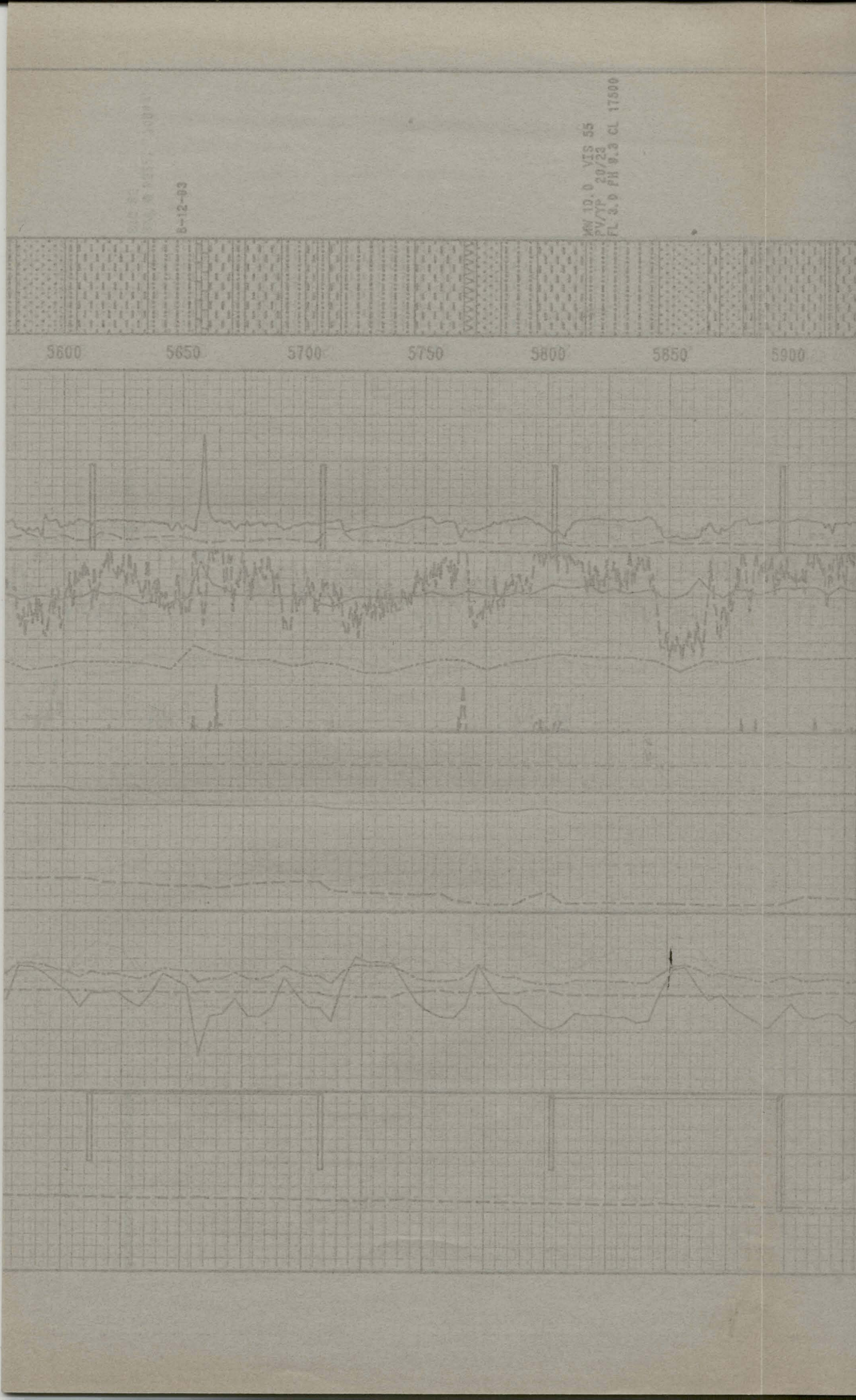

STG 070
8-5/16-63
ELT 13 3/8"
LOT = 14.8 PPG EMW
NB 4 12.25" PDTCL
12-12-12-12 JETS
IN DEPTH 4005'
MW 9.6 VIS 51
PV/YP 15/17
FL 3.0 PH 9.2 CL 16K
SVY @ 4277', 37Deg.
4000
4050
4100
4150
4200
4250
4300
200

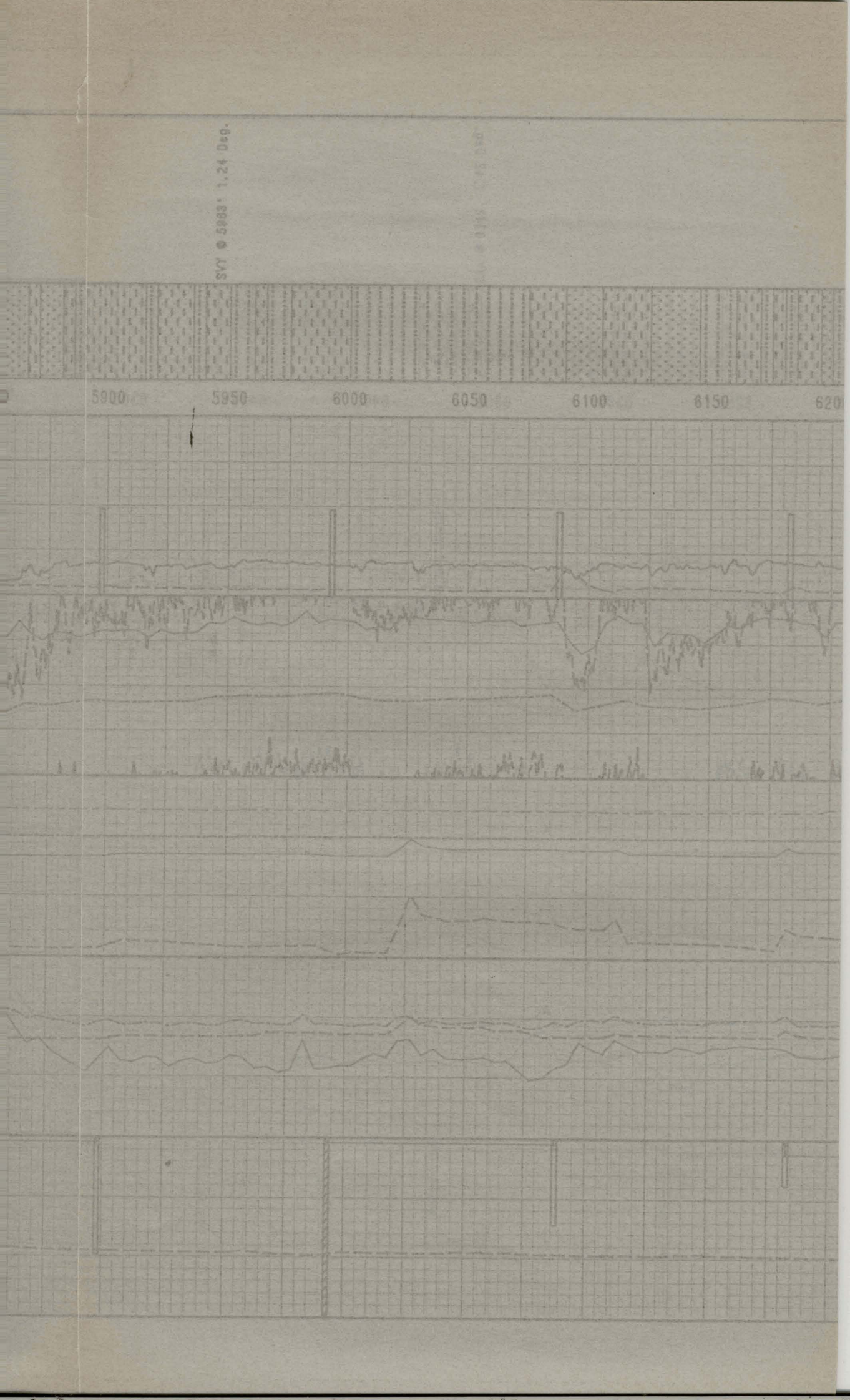

SVY @ 4552', .47Deg.
4350
4400
4450
4500
4550
4600
4650

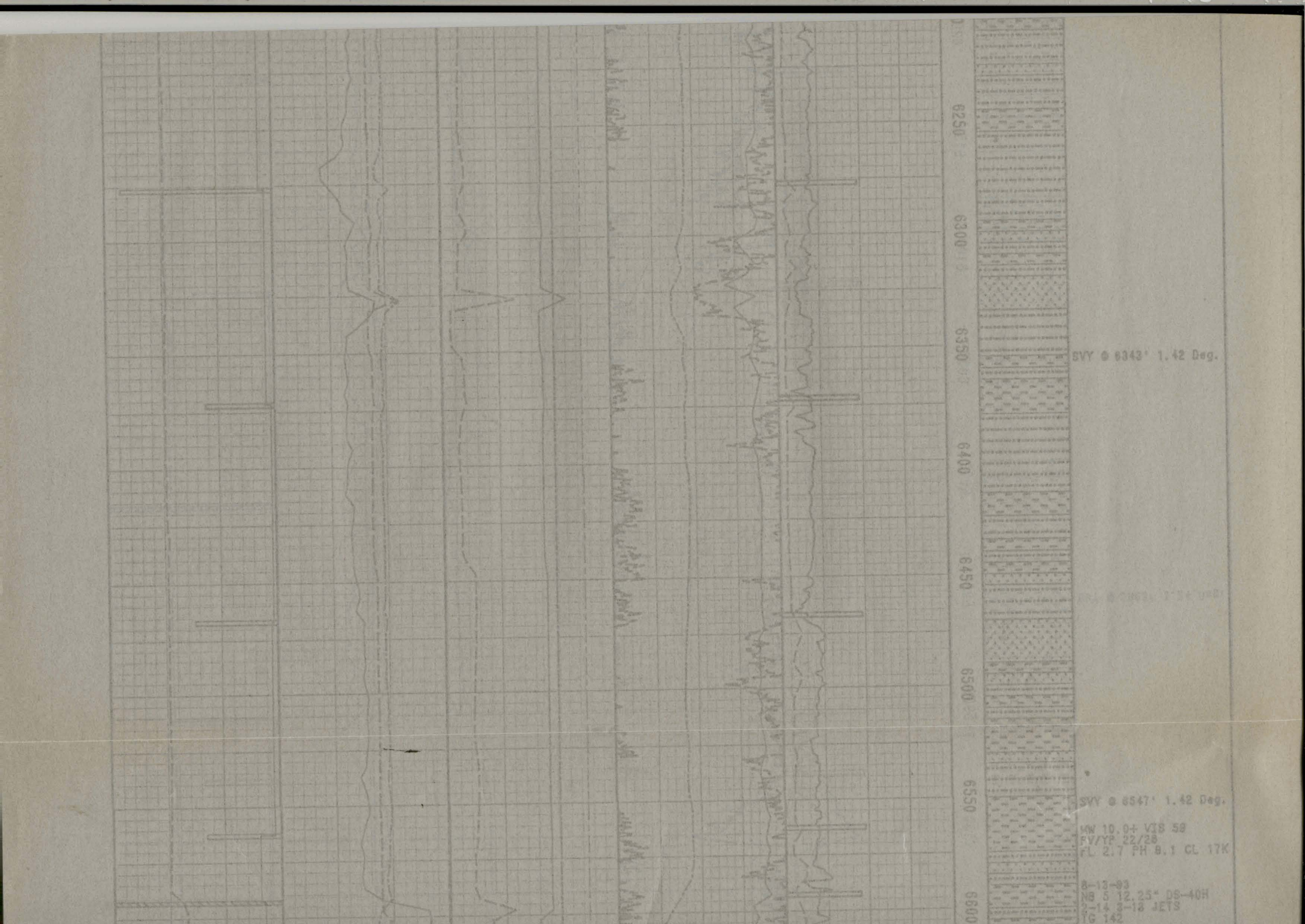

SVY @ 4835', 390deg.
8-11-93
4600
4650
4700
4750
4800
4850
4900

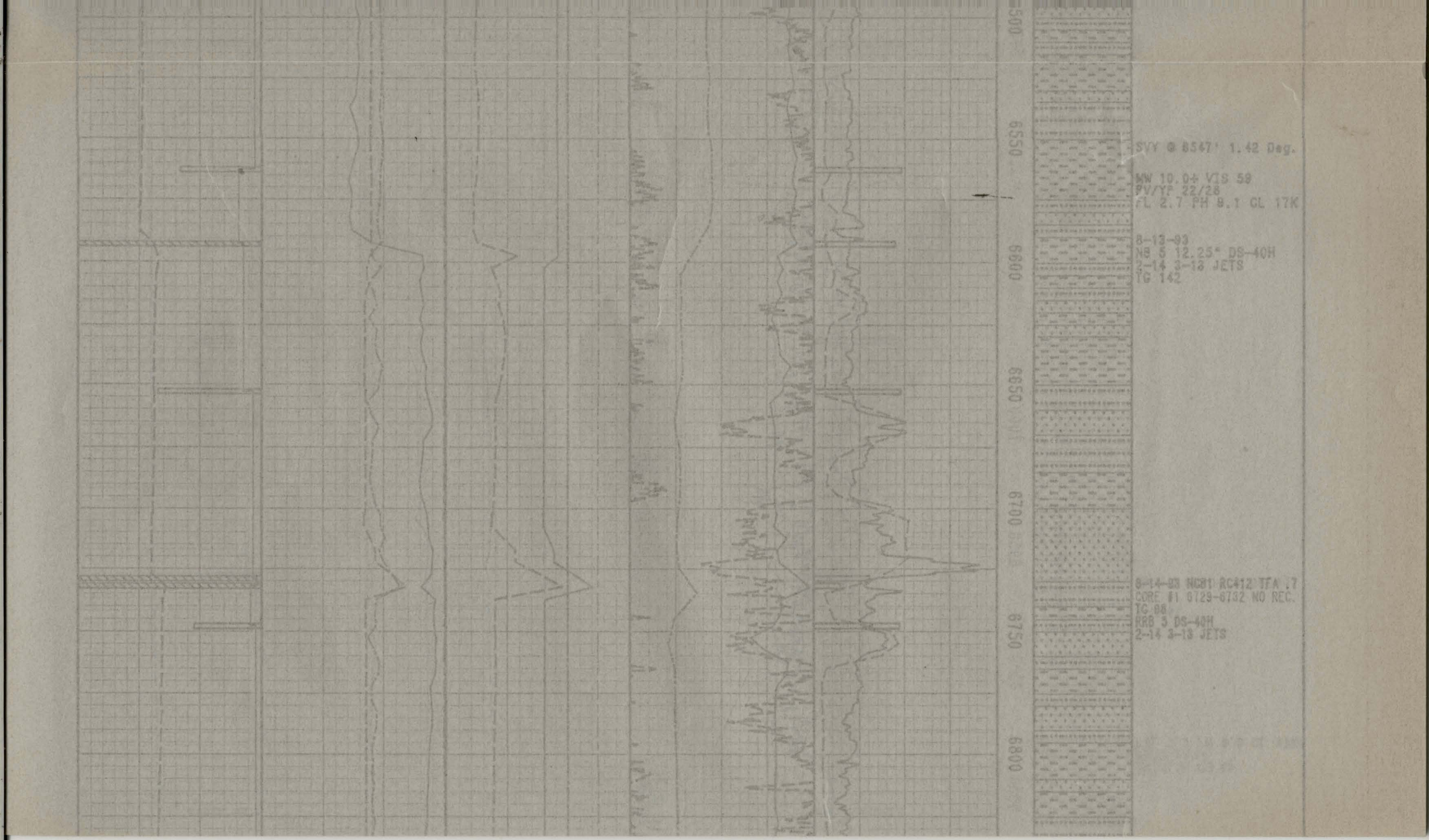

PV/YP 19/19
FL 3.2 PH 9.9 CL 17K
SVY @ 5020' .41Deg.
50
25
1K
500
400
200
100
50
200
100
2400
200
0
37.5
75
100
50
500
250
13
10
0
1.5
3
10
20
5000
5050
5100
5150
5200

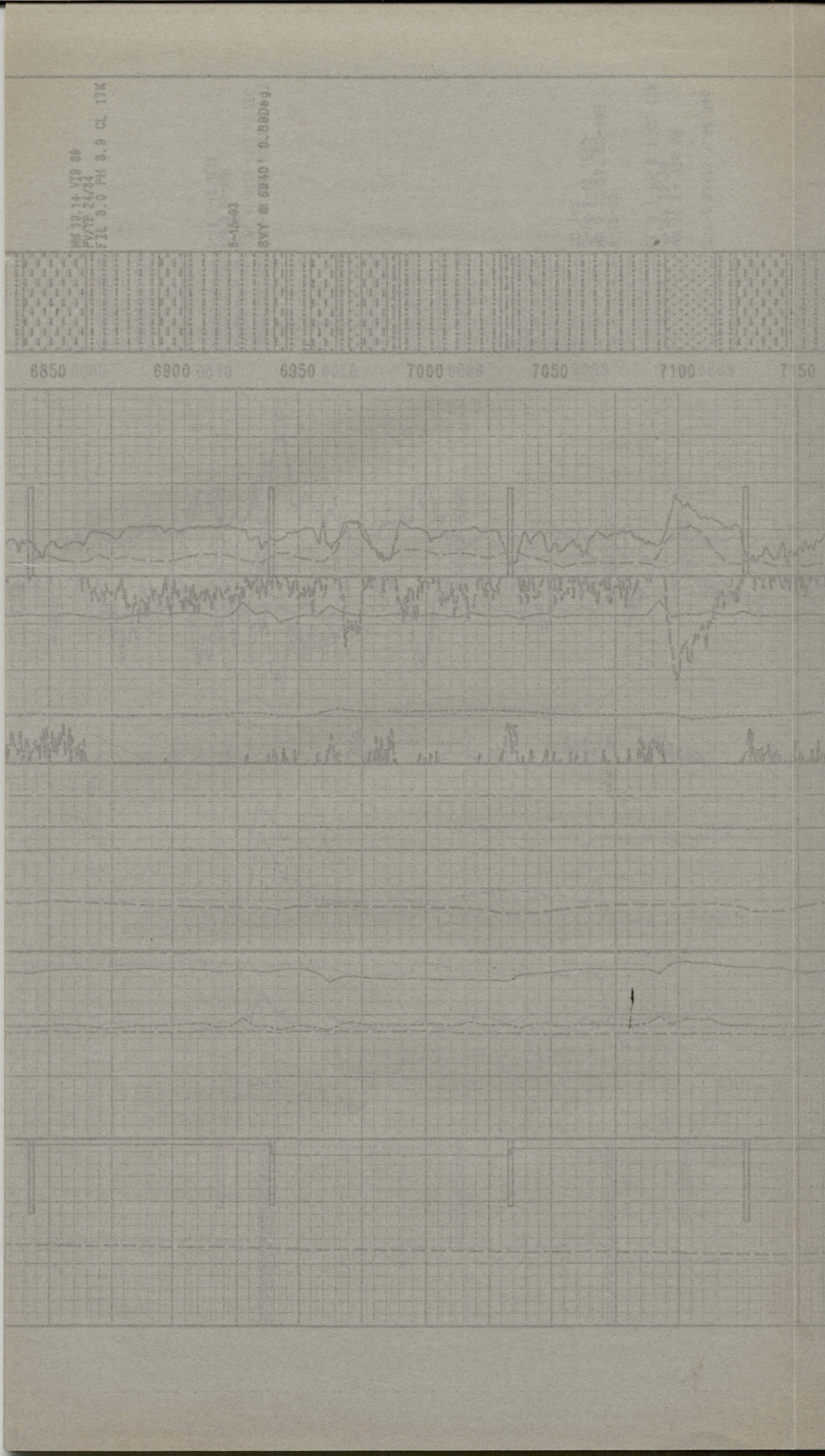

SVY @ 5522' .70deg.
STG 95
5250
5300
5350
5400
5450
5500
5550

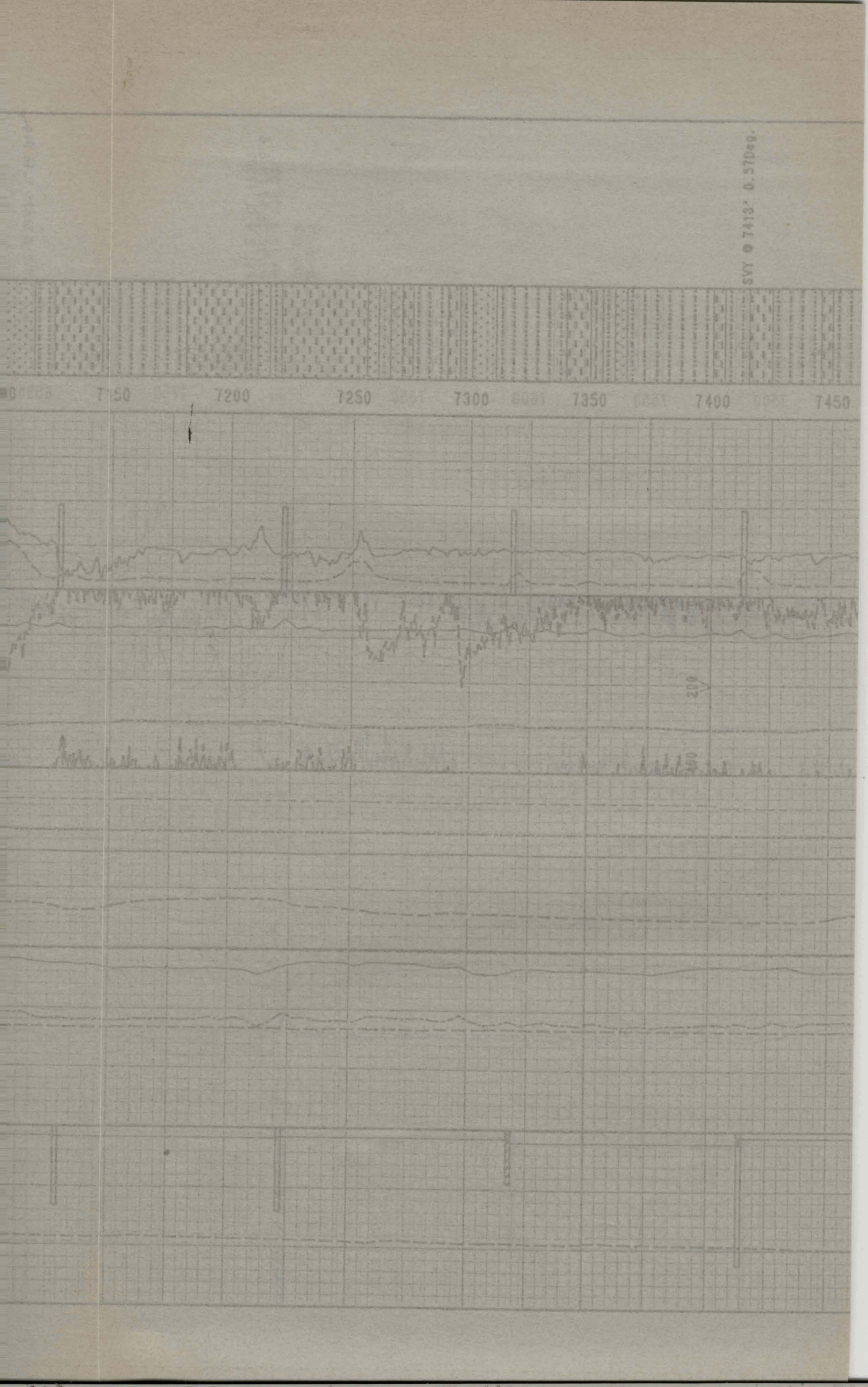

8-12-03
MW 10.0 VIS 55
PV/YP 20/23
FL 3.0 PH 9.3 CL 17500
5600
5650
5700
5750
5800
5850
5900

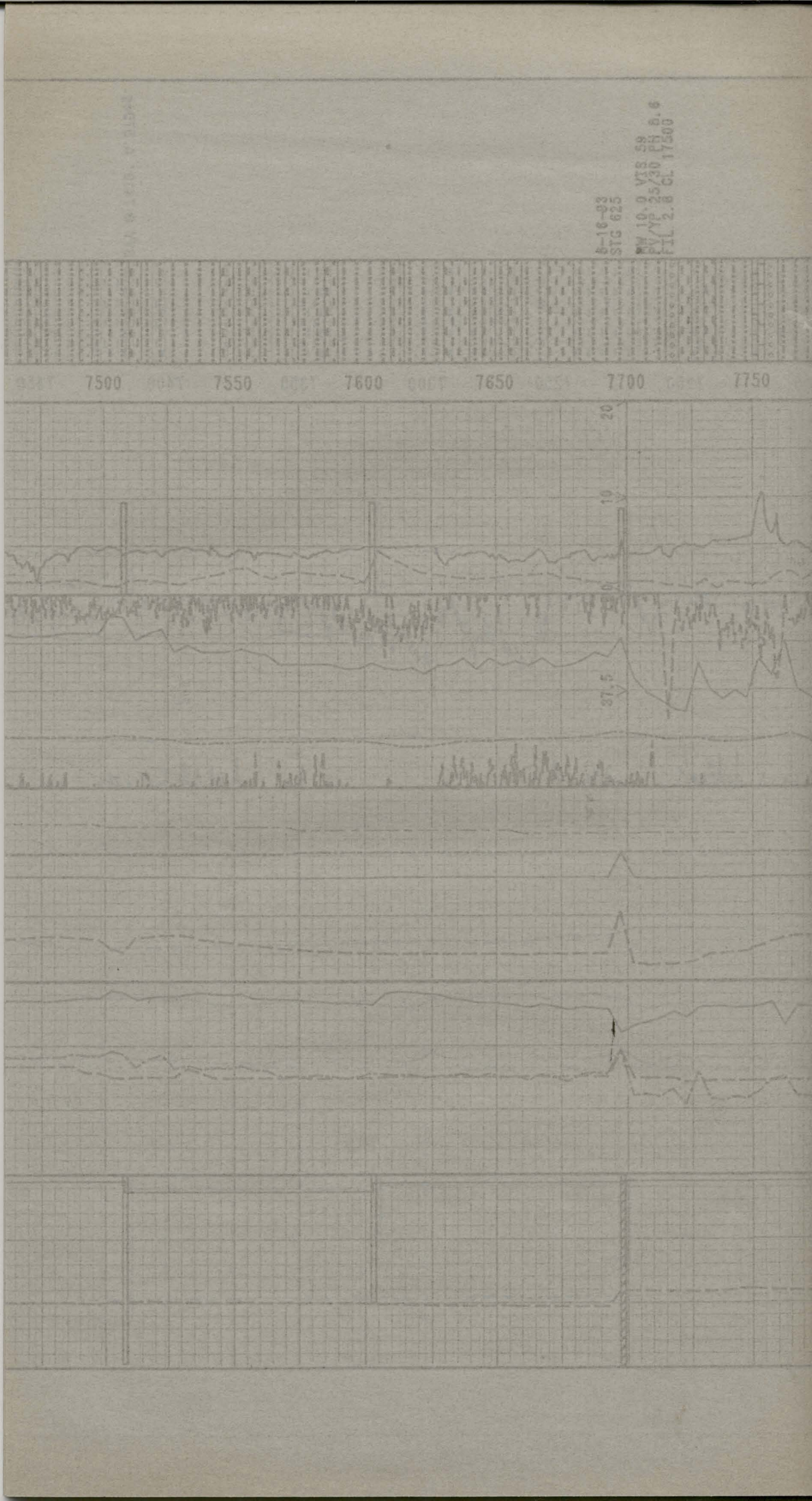

SV7 @ 5983' 1.24 Deg.
5900
5950
6000
6050
6100
6150

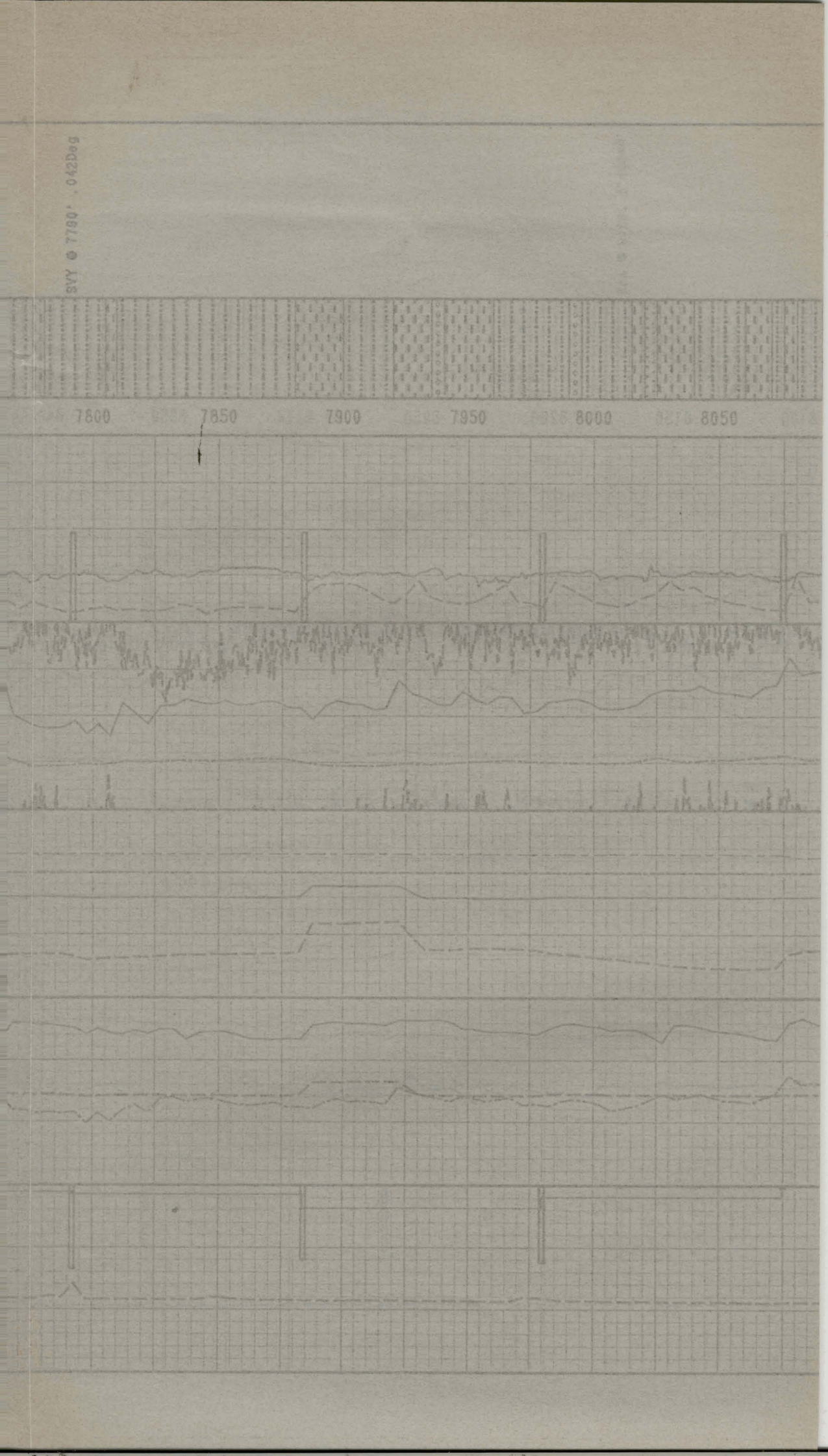

8250
8300
8350
8400
8450
8500
6550
6600
SVY @ 8343' 1.42 Deg.
SVY @ 8547' 1.42 Deg.
MW 10.0+ VIS 58
PV/YP 22/28
fL 2.7 PH 8.1 CL 17K
8-13-93
NB 5 12.25" DS-40H
3-14 3-18 JETS
TG 142

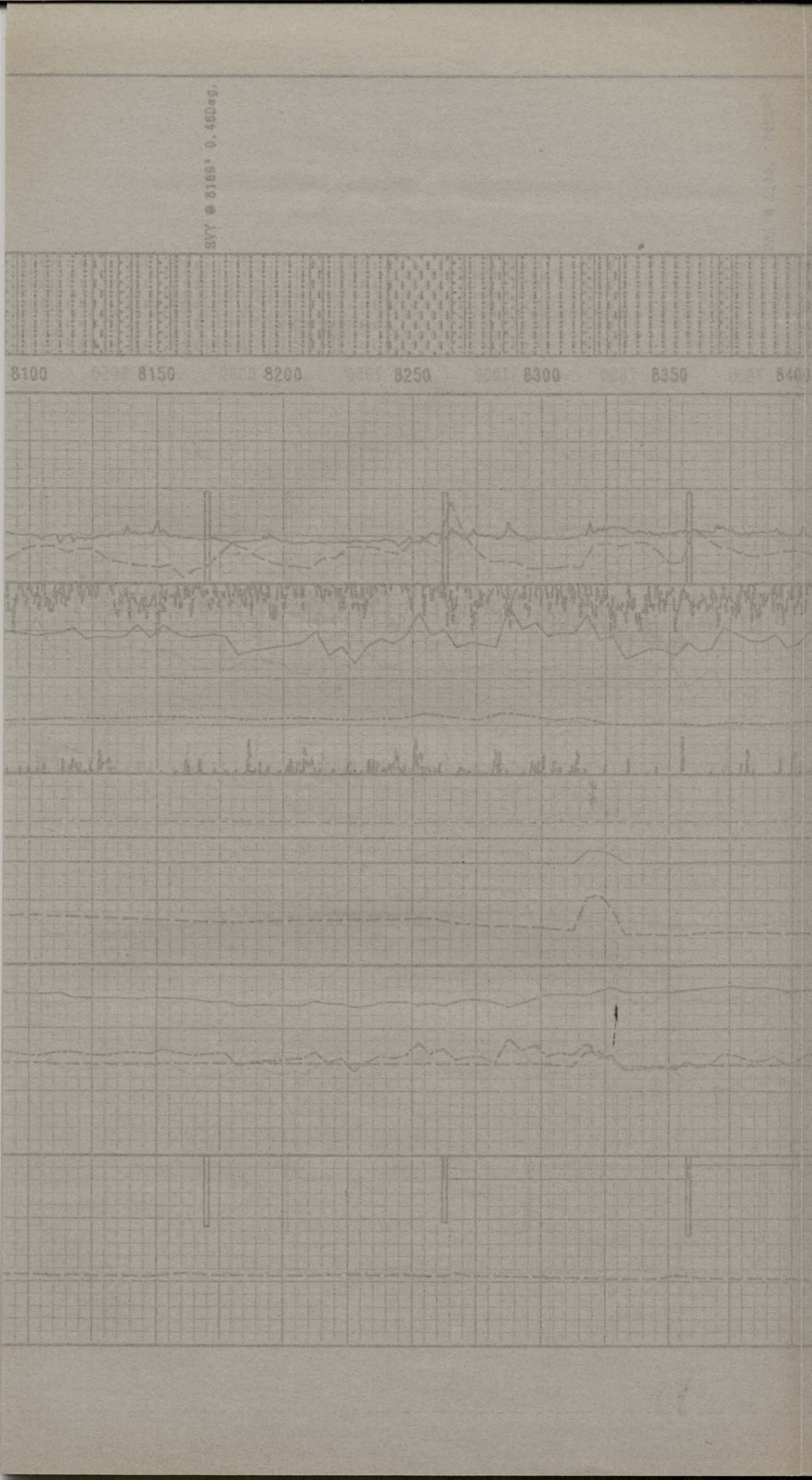

6500
6550
6600
6650
6700
6750
6800
SVY @ 8547' 1.42 Deg.
MW 10.04 VIS 59
PV/YP 22/28
FL 2.7 PH 9.1 CL 17K
8-13-93
NB 5 12.25" DS-40H
2-14 3-13 JETS
TG 142
8-14-93 NB#1 RC412 TFA .7
CORE #1 6729-6732 NO REC.
TG 88
RRB 3 DS-40H
2-14 3-13 JETS

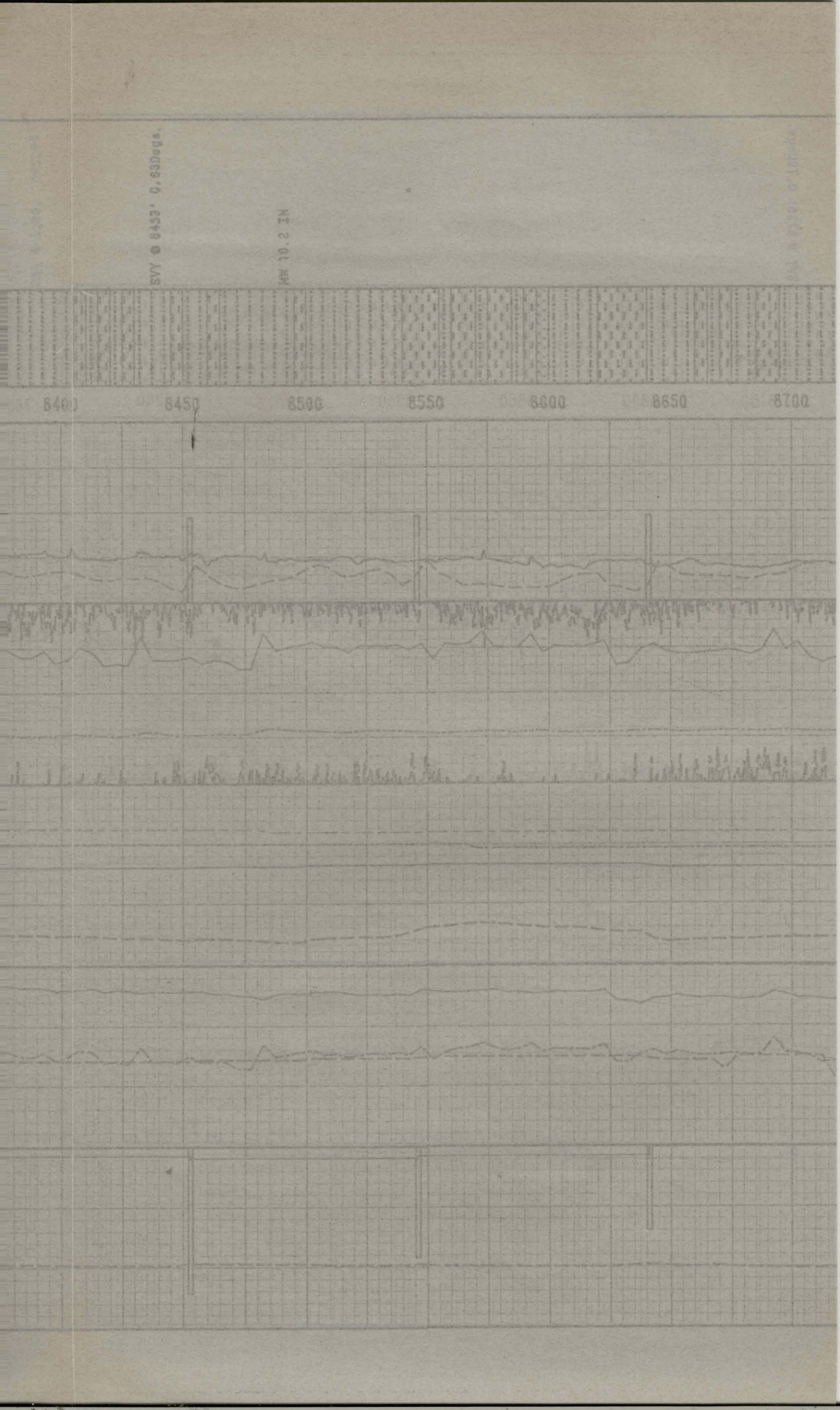

MW 10.14 VIS 60
PV/YP 24/34
FIL 3.0 FH 8.0 CL 17K
6-15-03
SVY @ 6940' 0.88Deg.
6850
6900
6950
7000
7050
7100

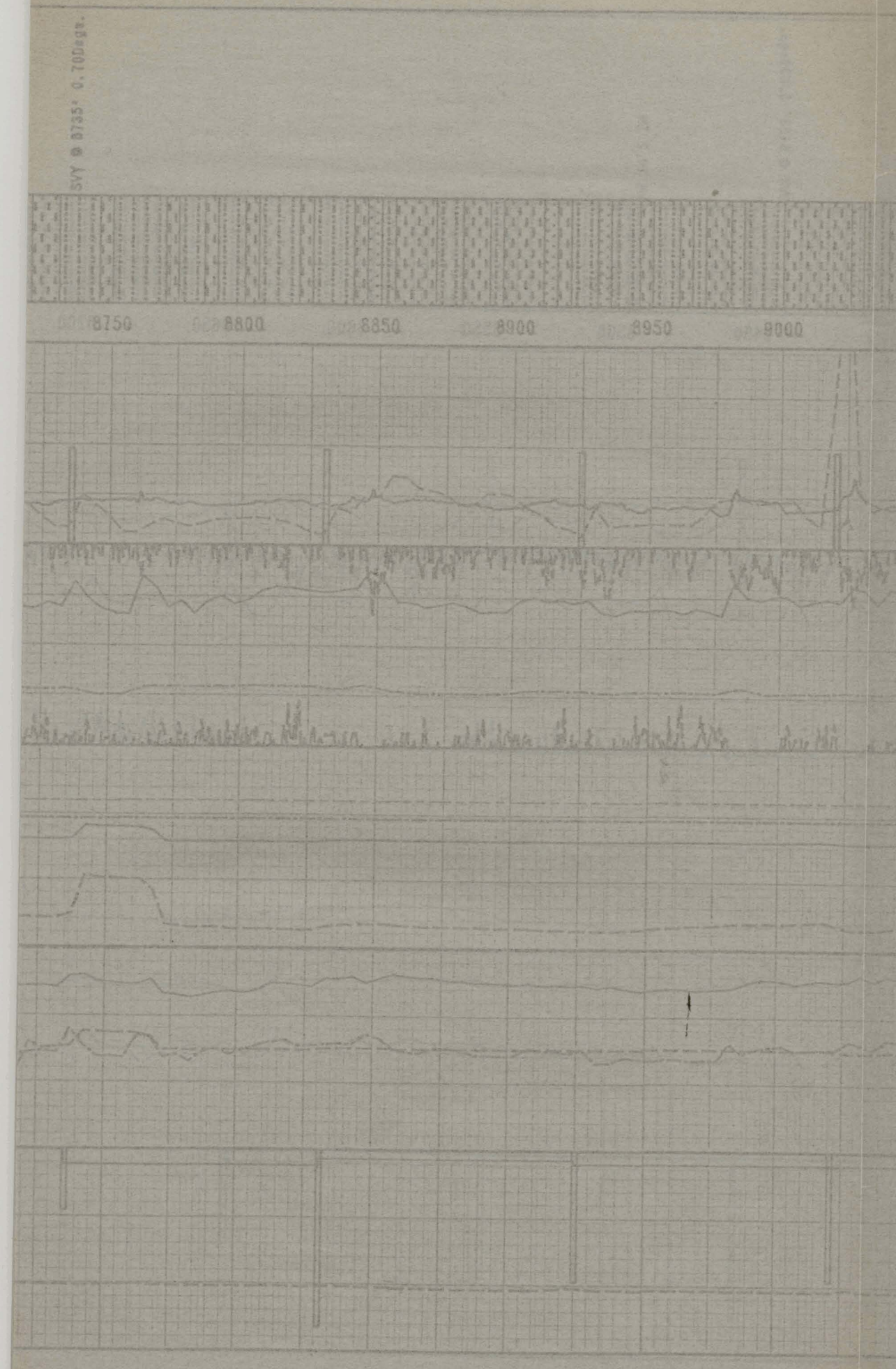

SVY @ 7413' 0.57deg.
7150
7200
7250
7300
7350
7400
7450
200
100


6-16-83
STG 625
7500
7550
7600
7650
7700
7750
20
19
37.5


SVY @ 7780', 042Deg
7800
7850
7900
7950
8000
8050

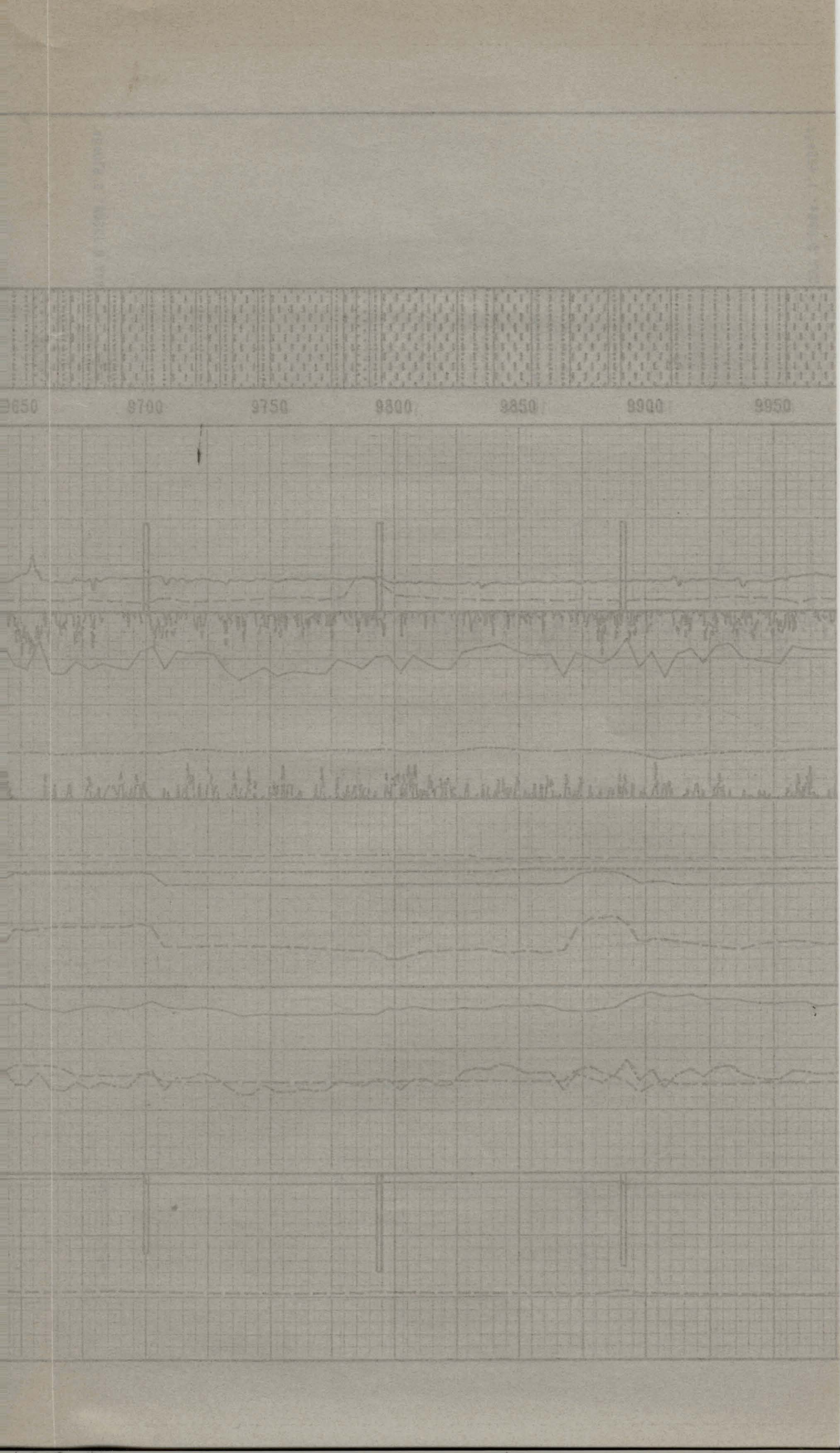

SVY @ 8168: 0.460mV
8100
8150
8200
8250
8300
8350

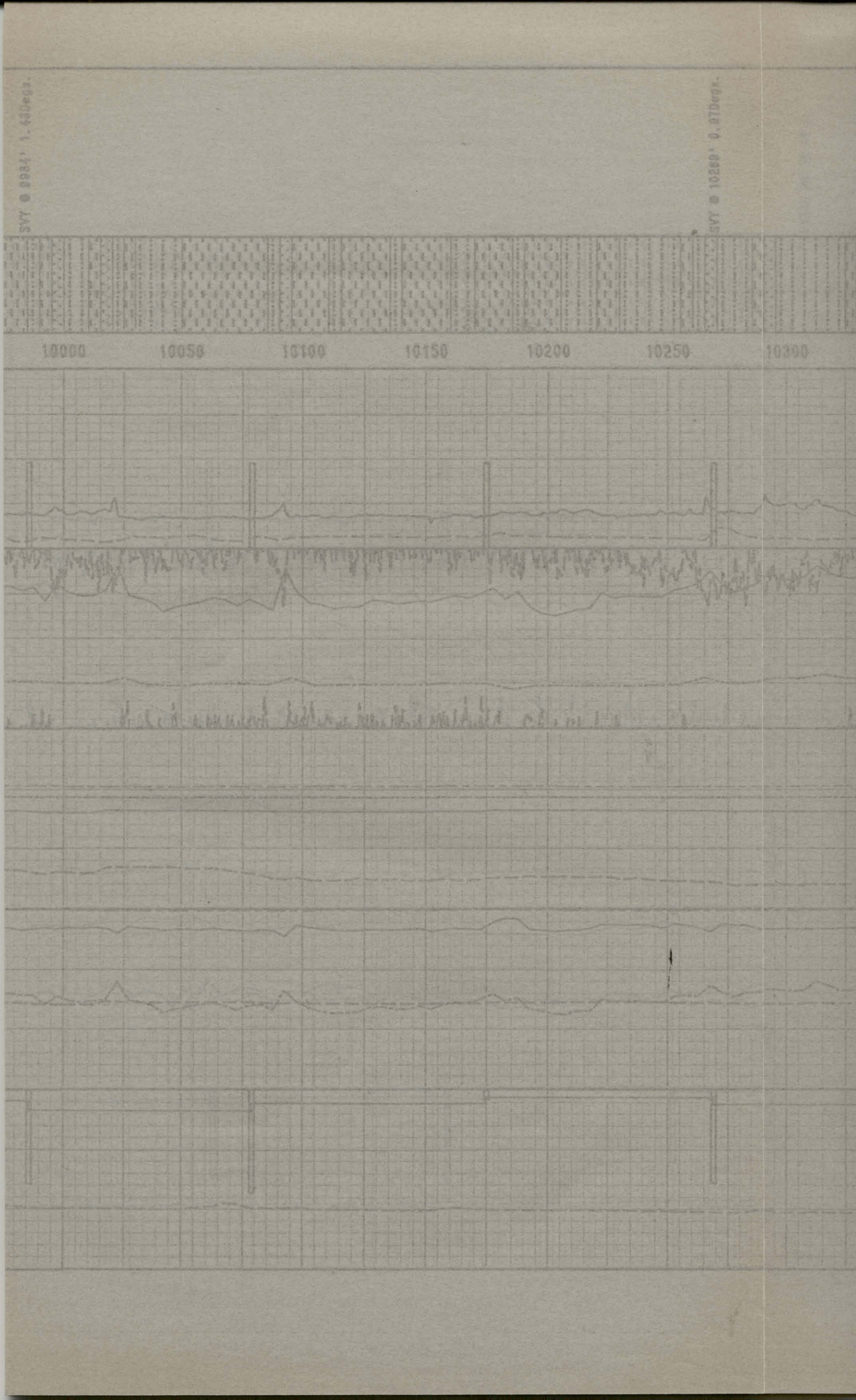

SVY @ 8453' 0.68Degs.
AM 10.2 IN
8400
8450
8500
8550
8600
8650
8700


SVY @ 8735' 0.70Degs.
8750
8800
8850
8900
8950
9000

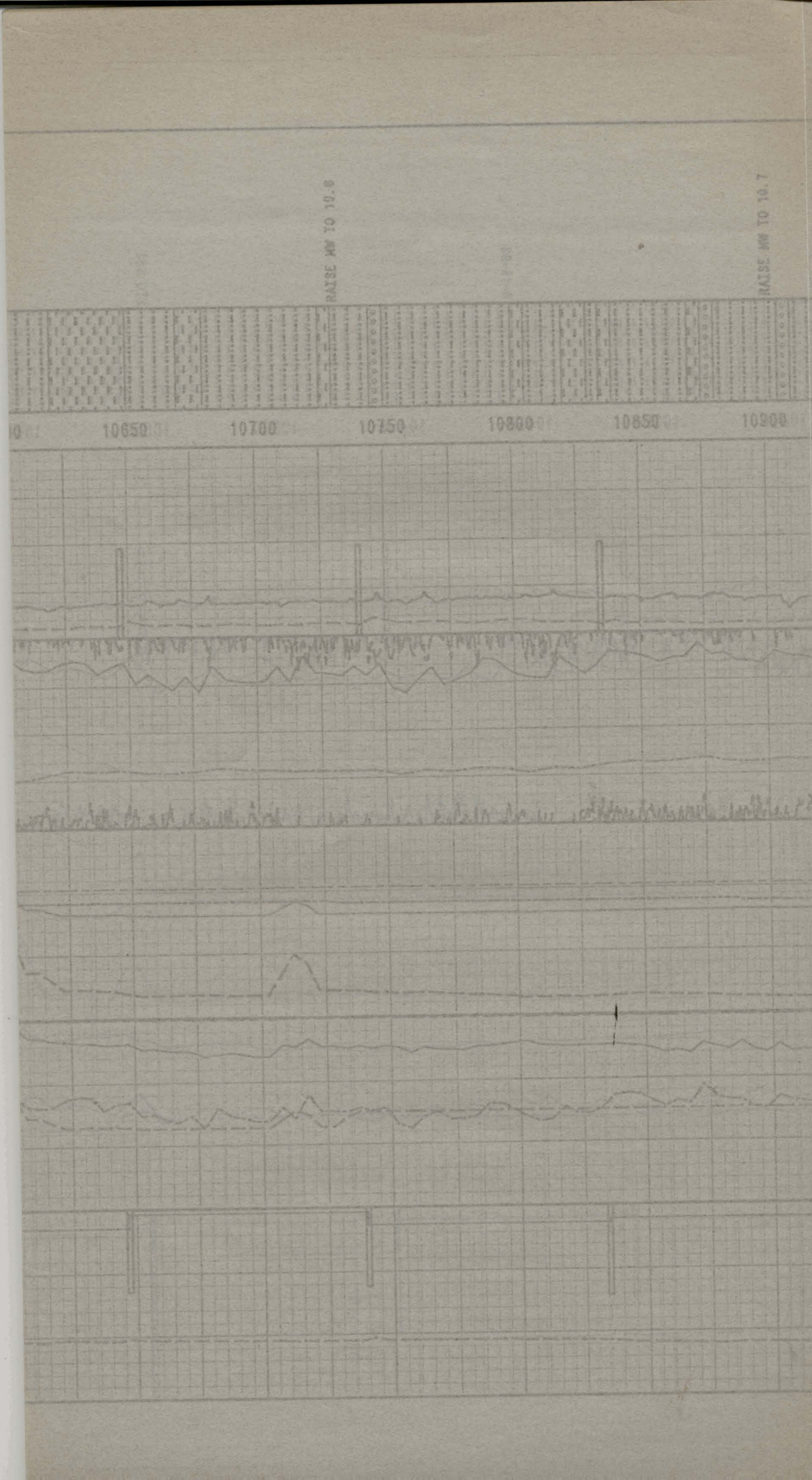

9050
9100
9150
9200
9250
9300

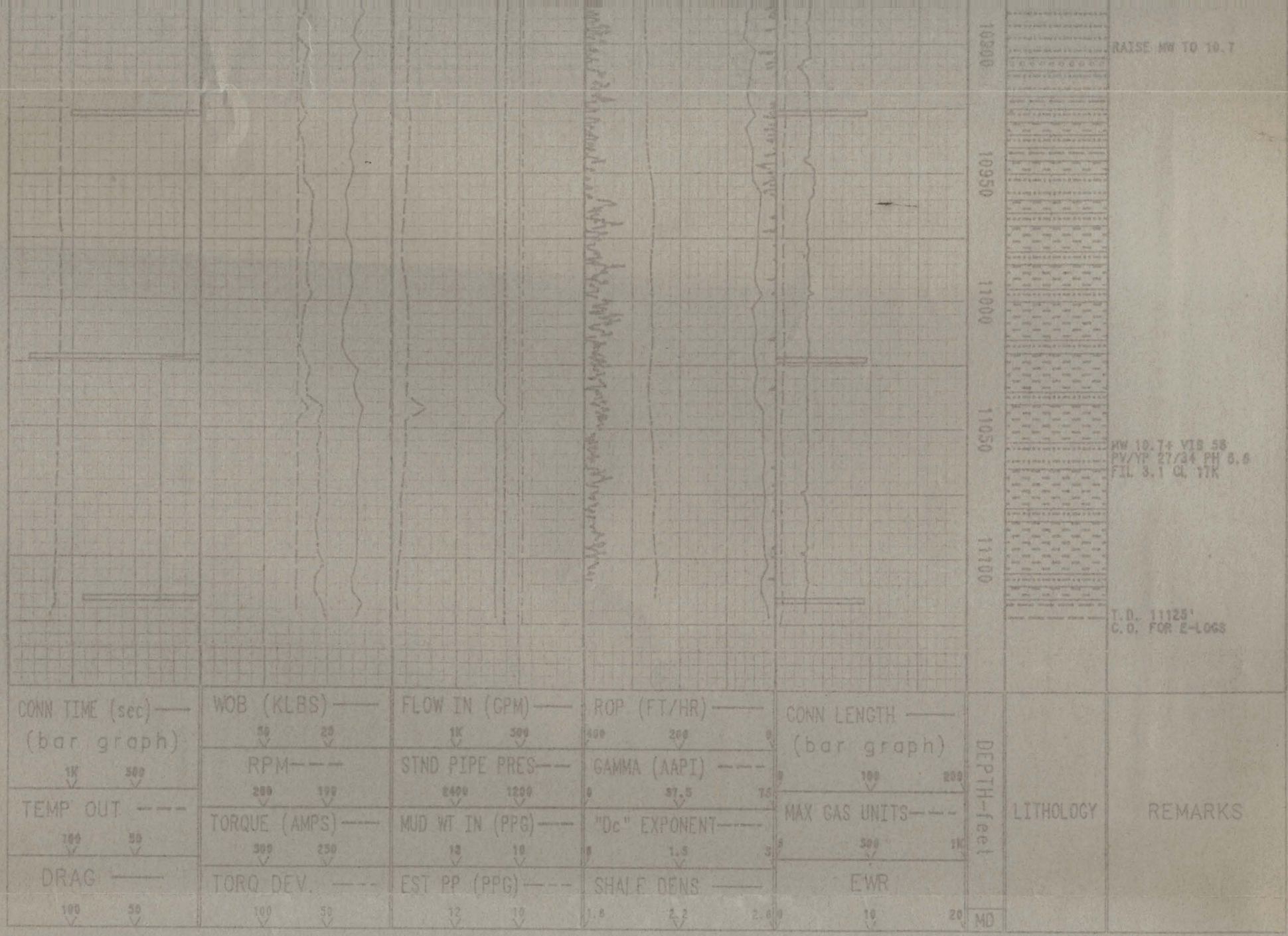

9400
9450
9500
9550
9600
9650


9650
9700
9750
9800
9850
9900
9950


SVY @ 9984' 1.430degs.
SVY @ 10260' 0.870degs.
10000
10050
10100
10150
10200
10250
10300


3-19-93
STG 883
10300
10350
10400
10450
10500
10550


RAISE MW TO 10.8
RAISE MW TO 10.7
10650
10700
10750
10800
10850
10900


10900
10950
11000
11050
11100
RAISE MW TO 10.7
MW 10.7+ VIS 58
PV/YP 27/34 PH 8.6
FIL 3.1 CL 17K
T.D. 11125'
C.O. FOR E-LOGS
CONN TIME (sec)
(bar graph)
1K 500
TEMP OUT
100 50
DRAG
100 50
WOB (KLBS)
50 25
RPM
200 100
TORQUE (AMPS)
300 250
TORQ DEV.
100 50
FLOW IN (GPM)
1K 500
STND PIPE PRES
2400 1200
MUD WT IN (PPG)
13 10
EST PP (PPG)
13 10
ROP (FT/HR)
400 200 0
GAMMA (AAPI)
0 37.5 75
"Dc" EXPONENT
0 1.5 3
SHALE DENS
1.8 2.2 2.6
CONN LENGTH
(bar graph)
0 100 200
MAX GAS UNITS
0 500 1K
EWR
0 10 20
DEPTH-feet
MD
LITHOLOGY
REMARKS

sperry-sun
DRILLING SERVICES
LOGGING SYSTEMS

COMPANY ARCO ALASKA INC.
WELL KUPARUK NO. 2
FIELD BEAUFORT SEA, BLOCK 672
REGION
LOCATION ALASKA, U.S.A.
CO-ORDS
CONTRACTOR CANRAR
RIG/TYPE CDU KULLUK
TOTAL DEPTH 11125' TVD 11125
SPUD DATE 28 JULY 1993

ELEVATION AND LOGGING DATA
PERMANENT DATUM MEAN SEA LEVEL
ELEVATIONS: K.B. 65
D.F. 64
G.L./S.F. 101
LOG MEASURED FROM K.B.
LOGGED DEPTHS 166 To 11125
LOGGED DEPTHS To
SUPV. ENGINEER JOHN PATTON UNIT 2215

HOLE DATA

21 (RISER)	To 171	17.5	To 3878		
30"	To 301	12.25	To 11125		
26"	To 1017		To		

CASING DATA

30"	To 301		To
20"	To 1017		To
13 3/8	To 3878		To

MUD TYPES

SEA WATER	To	1017
GENERIC #2	To	11125
	To	
	To	

LITHOLOGY SYMBOLS

Coal, Tuff, Chert, Limestone, Sandstone, Sand, Gravel, Conglom

ABBREVIATIONS

DRILLING DATA

NB	New Bit	LAT	Logged After Trip
RRB	Rerun Bit	U	Gas Units
TB	Turbo Drill	BG	Background Gas
PDCB	Polycrystalline Diamond Compound Bit	TG	Trip Gas
		STG	Short Trip Gas
		CG	Connection Gas
CB	Core Bit	DST	Drill Stem Test
DB	Diamond Bit	DS	Direction Survey
WOB	Weight on Bit	DC	Depth Correction
RPM	Revs Per Minute	C	Carbide Test
CO	Circulate Out	CKF	Check for Flow
PR	Partial Returns	FLT	Flowline Temp.
NR	No Returns	BHT	Bottomhole Temp.

MUD DATA

W	Mud Density	PV	Plastic Viscosity
V	Funnel Viscosity	YP	Yield Point
FL	Filtrate Loss	S	Solids Content
FC	Filter Cake	O	Oils
CL	Salinity	RM	Mud Resistivity
PH	Hydrogen Ion Content	RMF	Filtrate Resistivity

ENGINEERING DATA

C1 Core No. 1 Recovery

DST 1 Drill Stem Test No. 1

Gas Traces, Gas, Oil Traces, Oil

500

550

600

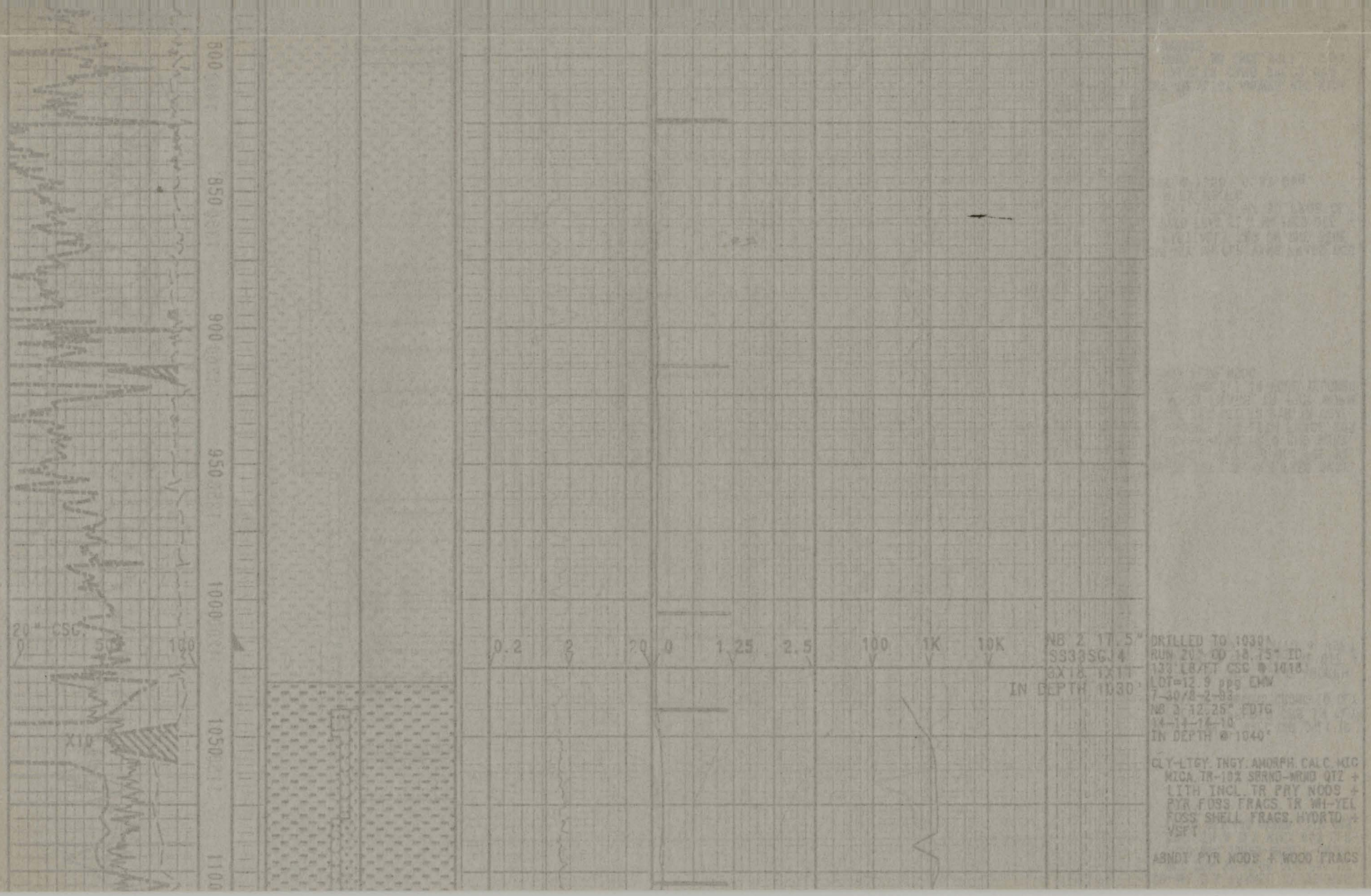
650

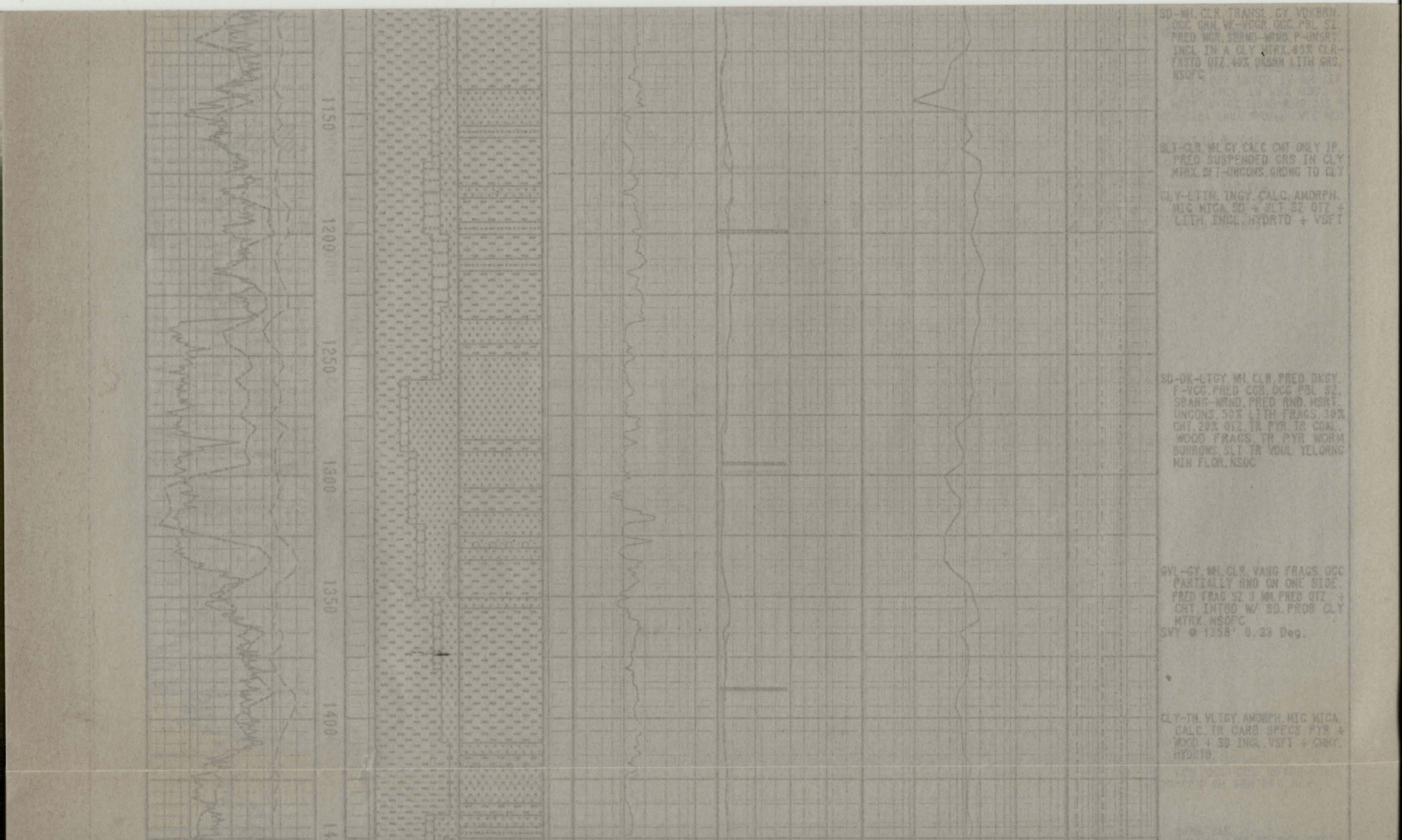
700

750

1 STD WIPER TRIP

7-30-03


800
850
900
950
1000
1050
1100
20" CSG.
0
50
100
X10
0.2
2
20
0
1.25
2.5
100
1K
10K
IN DEPTH 1030'
NB 2 17.5"
SS33SCJ4
8X18 12IT
DRILLED TO 1030'
RUN 20" OD 18.75" ID
133' L8/ET CSG @ 1018'
LOT=12.9 PPG EMW
7-30/8-2-83
NB 3 12.25" FDTG
14-14-14-10
IN DEPTH @ 1040'
CLY-LTGY. TNGY. AMORPH. CALC. MIC
MICA. TR-10% SBRND-MRND QTZ +
LITH INCL. TR PRY NODS +
PYR FOSS FRAGS. TR WH-YEL
FOSS SHELL FRAGS. HYDRTD +
VSFT
ABNDT PYR NODS + WOOD FRAGS


1150
1200
1250
1300
1350
1400
SD-WH, CLR, TRANSL, GY, VDKBRN, OCC GRN, VF-VCGR, OCC PBL SZ, PRED WCR, SBRND-WRND, P-UNSRT, INCL IN A CLY MTRX, 60% CLR-FRSTD QTZ, 40% DRKBRN LITH GRS, NSOFC
SLT-CLR, WH, GY, CALC CMT ONLY IP, PRED SUSPENDED GRS IN CLY MTRX, SFT-UNCONS, GRDNG TO CLY
CLY-LTTN, INGY, CALC, AMORPH, MIC MICA, SD + SLT SZ QTZ, + LITH INCL, HYDRTD + VSFT
SD-DK-LTGY, WH, CLR, PRED DKGY, F-VCG, PRED CGR, OCC PBL SZ, SBANG-WRND, PRED RND, MSRT, UNCONS, 50% LITH FRAGS, 30% CHT, 20% QTZ, TR PYR, TR COAL, WOOD FRAGS, TR PYR WORM BURROWS, SLI IR VDUL YELORNG MIN FLOR, NSOC
GVL-GY, WH, CLR, VARG FRAGS, OCC PARTIALLY RND ON ONE SIDE, PRED FRAG SZ 3 MM, PRED QTZ + CHT, INTGD W/ SD, PROB CLY MTRX, NSOFC
SVY @ 1358' 0.33 Deg.
CLY-TN, VLTGY, AMORPH, MIC MICA, CALC, TR CARB SPECS, PYR + WOOD + SD INCL, VSFT + CHNY, HYDRTD

HYDRTD.

1450

SD-WH, BLK, DKGY, CLR, M-CGR, OCC PBL SZ, SBRD-ANG, P-MSRT, UNCONS, 40% LITH FRAGS, 30% CHT, 30% QTZ, PXR INCL, TR WOOD, TR COAL, TR DUL YEL MIN FLOR.

1500

CLY-TN, LTGY, AMORPH, MIC MICA, CARB SPECS IP, CALC, TR WOOD, HYDRTD, VSFT.

1550

ABD CALC + SHL FRAGS.

1600

SD-CLR, WH, BRN, BLK, M-CGR, SBRD-ANG, MSRT, UNCONS, 50% QTZ, 20% LITH FRAGS, 30% CHT, TR PYR, TR CALC + SHL FRAGS, NSCFC.

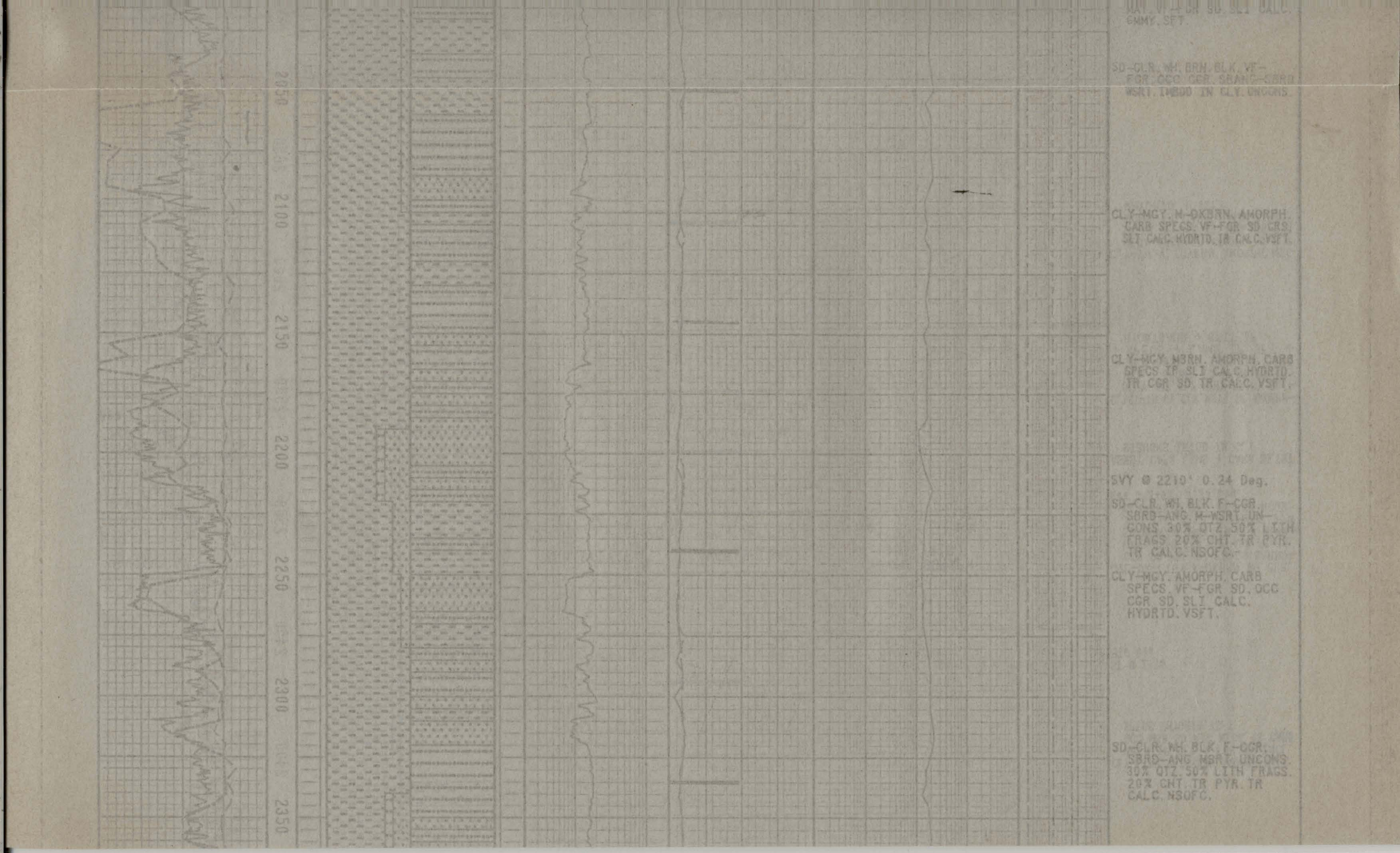
1650

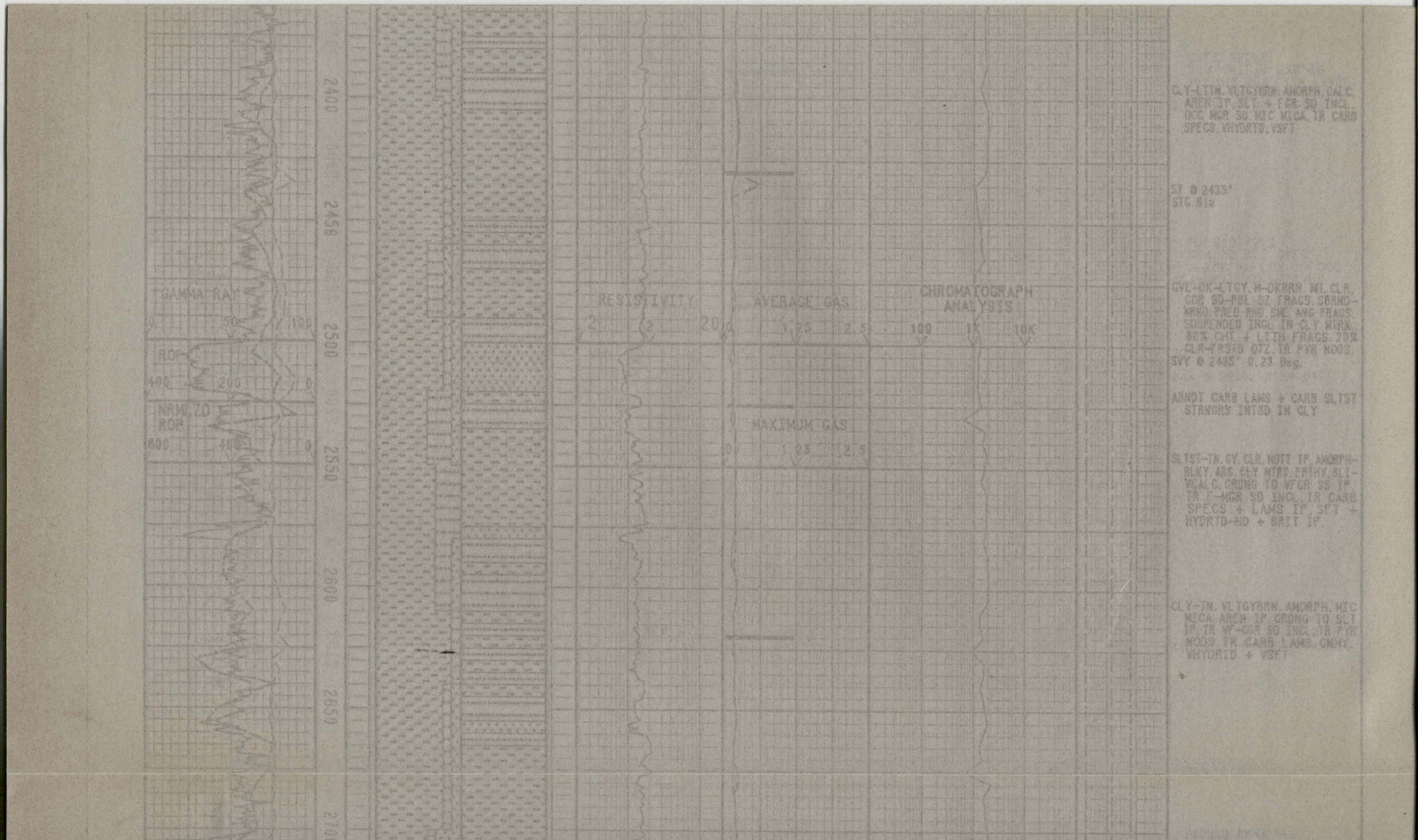
SLTST-TN, LTBRN, M-DKGY, BLKY, CARB LAMS IP, INTBD W/SD IP, CALC, TR PYR, TR CALC + SHL FRAGS, FRM.

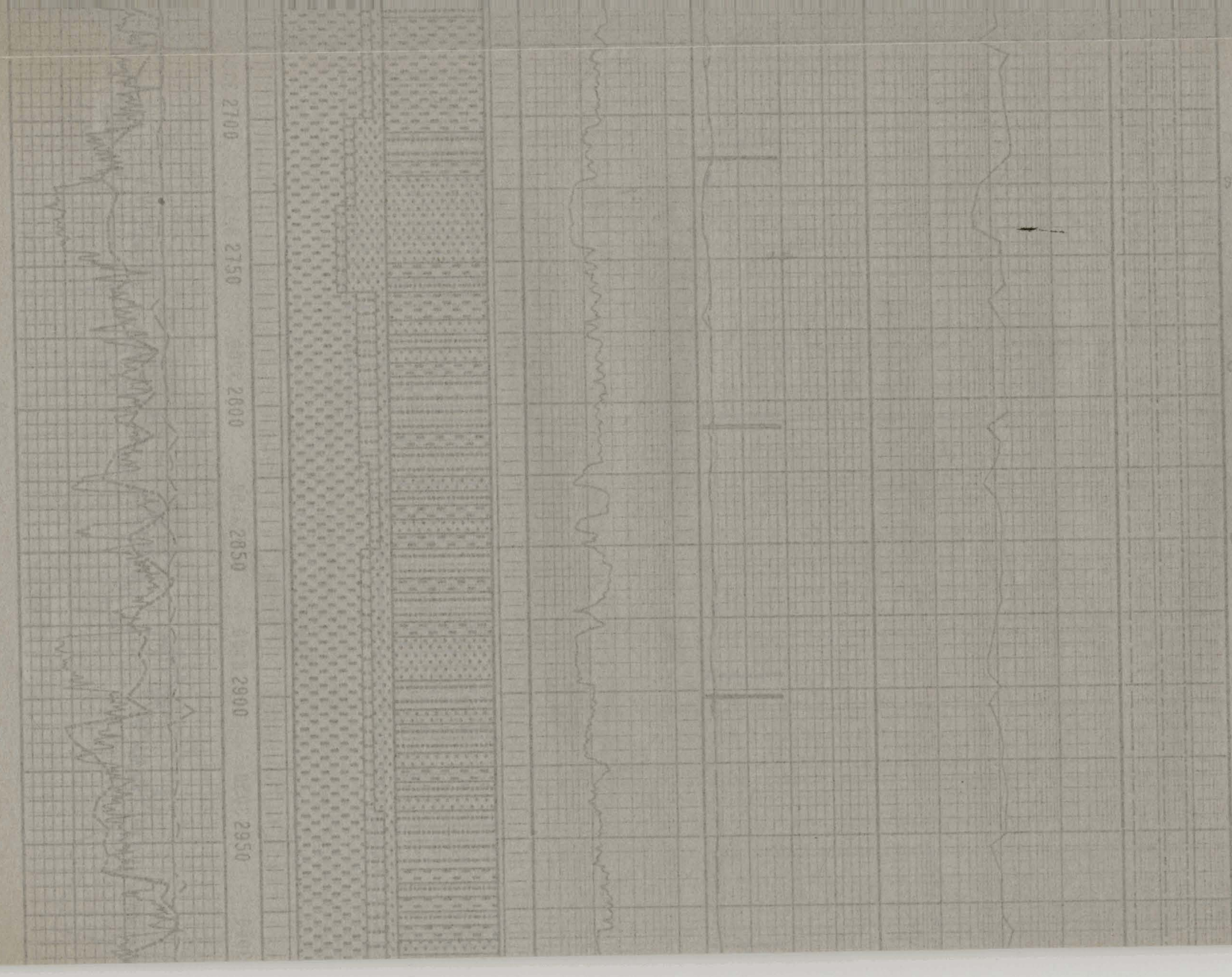
1700

ABD TUFF--TN, BUFF, AMORPH, INTBD W/SD GRS, FRM-HD.


1750
1800
1850
1900
1950
2000
2050
CLY-LT-MGY, AMORPH, CARB MAT IP, CALC, HYDRTD, VSFT, ABD SH FRAGS, ABD PYR.
SLT-LT-MGY, CARB SPECS IP, CALC F SD GRS IN CLY MTRX, GRDG TO CLY.
SVY @ 1852' 0.25 Deg.
ABD SHL FRAGS + CALC.
SD-WH, BRN, BLK, GN, F-CGR, RNDD-ANG, M-PSRT, UNCONS, 40% QTZ, 40% LITH FRAGS, 20% CHT, TR PYR, TR CALC, TR DUL YEL-ORG MIN FLOR, NSOFC.
CLY-M-DKGY, AMORPH, CARB SPECS, VFGR SD, HYDRTD, GMMY, VSFT.
8-3-93
MW 9.8 VIS 50
PV/YP 24/21
FL 4.8 PH 9.8 Cl 18000
CLY-M-DKGY, AMORPH, CARB MAT, VF-FGR SD, SLI CALC, GMMY, SFT.
SD-CLR, WH, BRN, BLK, VF-FGR, OCC CGR, GRANU-GRNR, WSRT, IMBDD IN CLY, UNCONS.


2050
2100
2150
2200
2250
2300
2350
MAT. VF-GR SD. SLI CALC. CMMY. SFT.
SD-CLR, WH, BRN, BLK, VF-FGR, OCC CGR, SBANG-SBRD WSRT, IMBDD IN CLY, UNCONS.
CLY-MGY, M-DKBRN, AMORPH. CARB SPECS, VF-FGR SD, CRS, SLI CALC, HYDRTD, TR CALC, VSFT.
CLY-MGY, MBRN, AMORPH, CARB SPECS, TR, SLI CALC, HYDRTD, TR CGR SD, TR CALC, VSFT.
SVY @ 2210' 0.24 Deg.
SD-CLR, WH, BLK, F-CGR, SBRD-ANG, M-WSRT, UNCONS 30% QTZ, 50% LITH FRAGS 20% CHT, TR PYR, TR CALC, NSOFC.
CLY-MGY, AMORPH, CARB SPECS, VF-FGR SD, OCC CGR SD, SLI CALC, HYDRTD, VSFT.
SD-CLR, WH, BLK, F-CGR, SBRD-ANG, MSRT, UNCONS 30% QTZ, 50% LITH FRAGS, 20% CHT, TR PYR, TR CALC, NSOFC.


GAMMA RAY
0
50
100
ROP
400
200
0
NRML 2D ROP
800
400
0
2400
2450
2500
2550
2600
2650
2700
RESISTIVITY
2
2
20
AVERAGE GAS
0
1.25
2.5
MAXIMUM GAS
0
1.25
2.5
CHROMATOGRAPH ANALYSIS
100
1K
10K
CLY-LTTN. VLTGYBRN. AMORPH. CALC. AREN IP. SLT + FGR SD INCL. OCC MGR SD. MIC MICA. TR CARB SPECS. VHYDRTD, VSFT
ST @ 2435'
STG 81u
GVL-DK-LTGY. M-DKBRN. WH. CLR. CGR SD-PBL SZ FRAGS. SBRND-RNDD. PRED RND SME. ANG FRAGS. SUSPENDED INCL IN CLY MTRX. 80% CHT + LITH FRAGS. 20% CLR-FRSTD QTZ. TR PYR NODS.
SVY @ 2485' 0.23 Deg.
ABNDT CARB LAMS + CARB SLTST STRNGRS INTBD IN CLY
SLTST-IN. GY. CLR. MOTT IP. AMORPH-BLKY ARG. CLY MTRX. FRTHY. SLI-VCALC. GRDNG TO VFGR SS IP. TR F-MGR SD INCL. TR CARB SPECS + LAMS IP. SFT + HYDRTD-MD + BRIT IP.
CLY-IN. VLTGYBRN. AMORPH. MIC MICA. AREN IP. GRDNG TO SLT IP. TR VF-CGR SD INCL. TR PYR NODS. TR CARB LAMS. CMMY. VHYDRTD + VSFT



SD-LT-DKGY,CLR,WH,M-CGR,PRED CGR,SBANG-WRND,PRED SBRND,MSRT,UNCONS,POSS CLY MTRX,60% CHT + LITH FRAGS, 40% CLR-FRSTD QTZ,PYR NODS, NSOFC

CLY-LT-MGY,MBRN,AMORPH, MIC MICA,TR VF-FGR SD INCL,OCC CGR SD,CALC, TR PYR,TR CALC FORAMS,HYDRTD,VSFT,

CLY-LT-MGY,MBRN,AMORPH, TR VF-FGR SD INCL,OCC CGR SD,CALC,TR PYR, HYDRTD,VSFT,

SD-CLR,WH,BLK,VF-MGR,OCC CGR,PRED SLT SZ,ANG-RNDD,WSRT,UNCONS IN CLY MTRX,60% QTZ,20% LITH FRAGS,20% CHT, TR PYR,TR CALC,NSOFC,

SVY @ 2883' 0.37 Deg.

SLT-LT-MGY,AMORPH,VAREN, CARB SPECS IP,HYDRTD, GMMY IP,VSFT,

3000

3050

3100

3150

3200

3250

3300

CLY-MGY, MBRN, AMORPH, MIC MICA, CALC, TR PYR, HYDRTD, VSFT.

SLT-LT-MGY, AMORPH, AREN, CARB MAT, IP, HYDRTD, GMMY IP, TR PYR, VSFT.

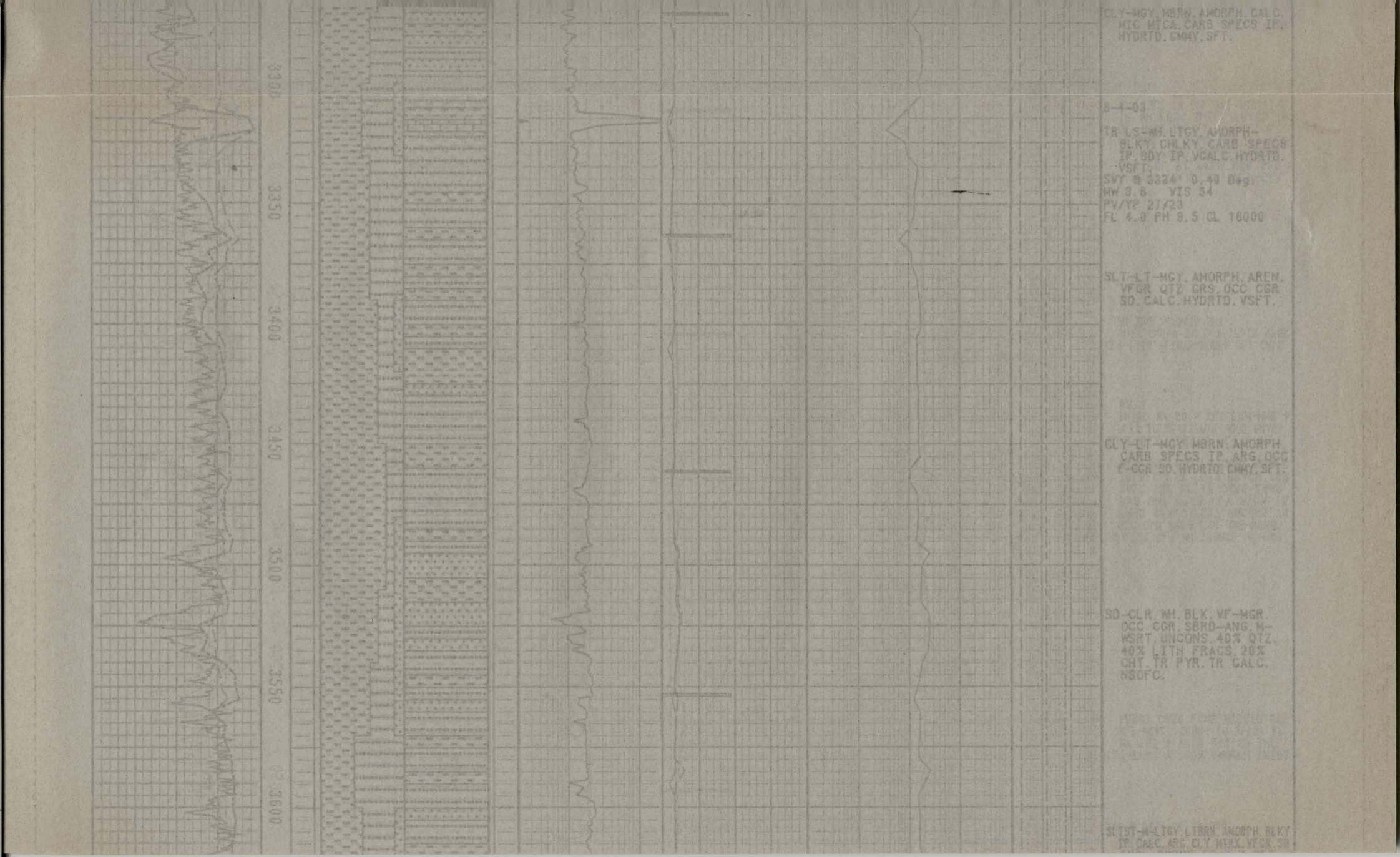
CLY-LT-MGY, MBRN, AMORPH, CALC, TR PYR, HYDRTD, VSFT.

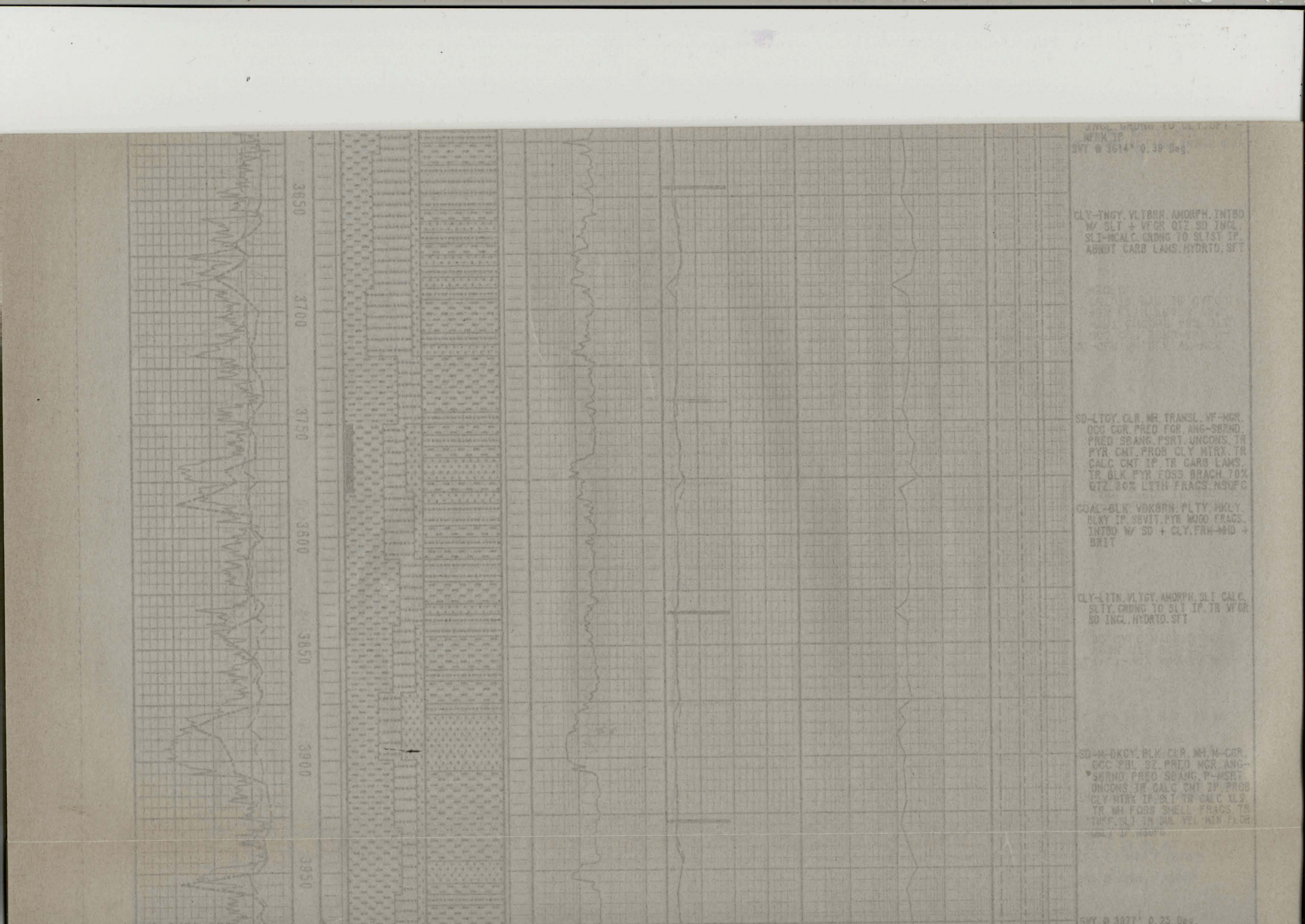
SLT-MGY, AMORPH, AREN, VFGR QTZ GRS, OCC CGR SD, CALC, HYDRTD, VSFT.

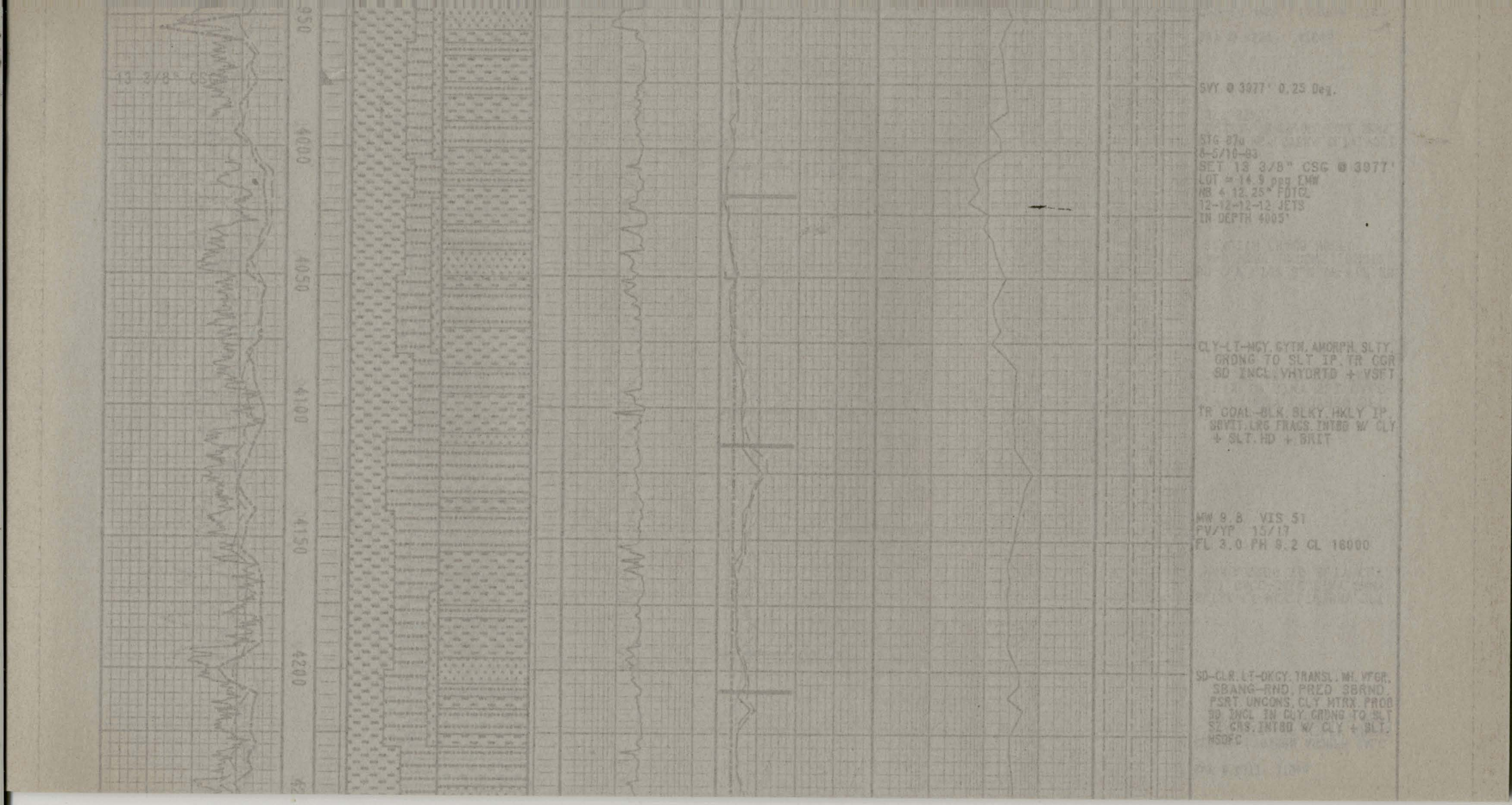
CLY-MGY, MBRN, AMORPH, CALC, MIC MICA, CARB SPECS IP, HYDRTD, GMMY, SFT.

8-4-03

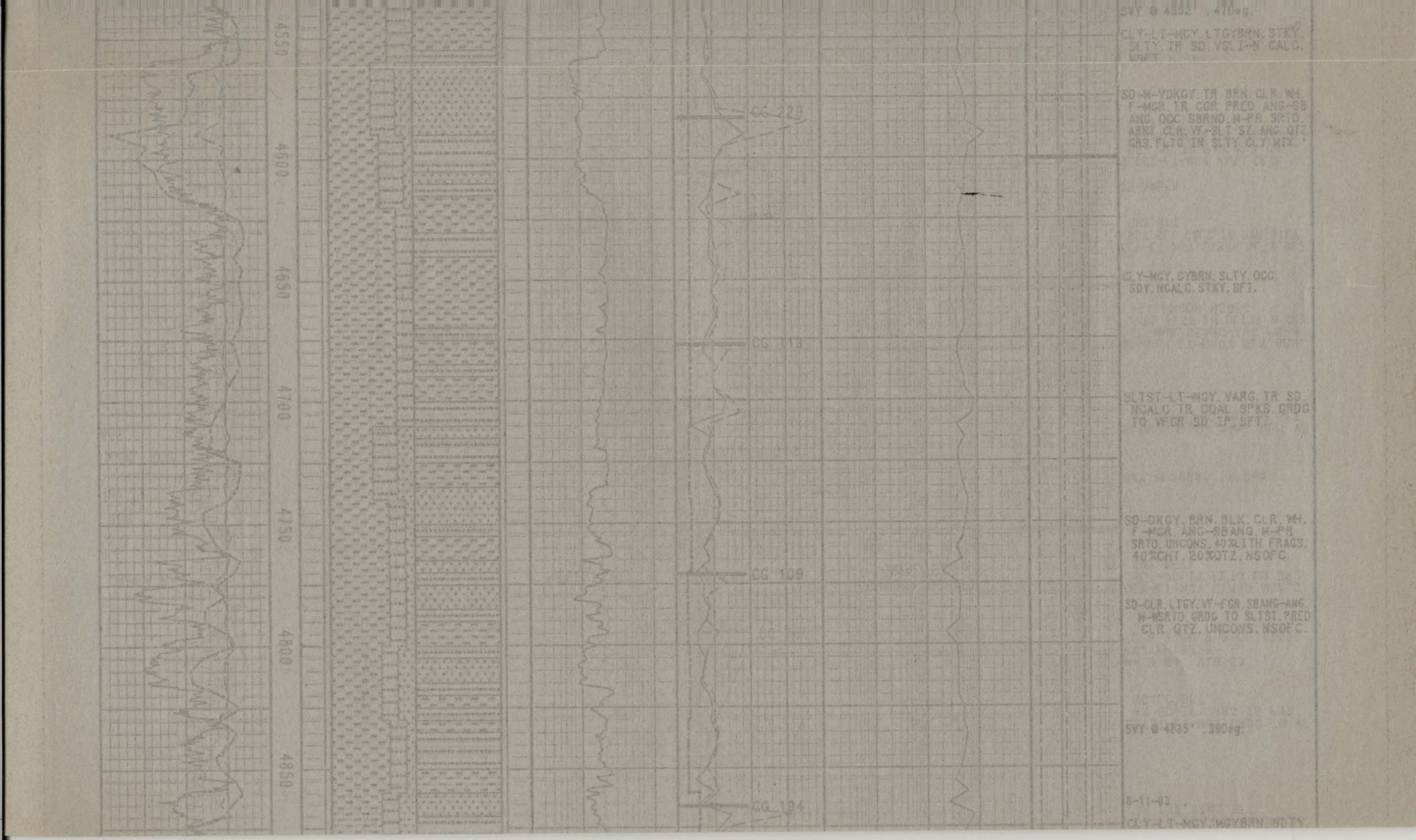
TR LS-MI, LTGY, AMORPH-

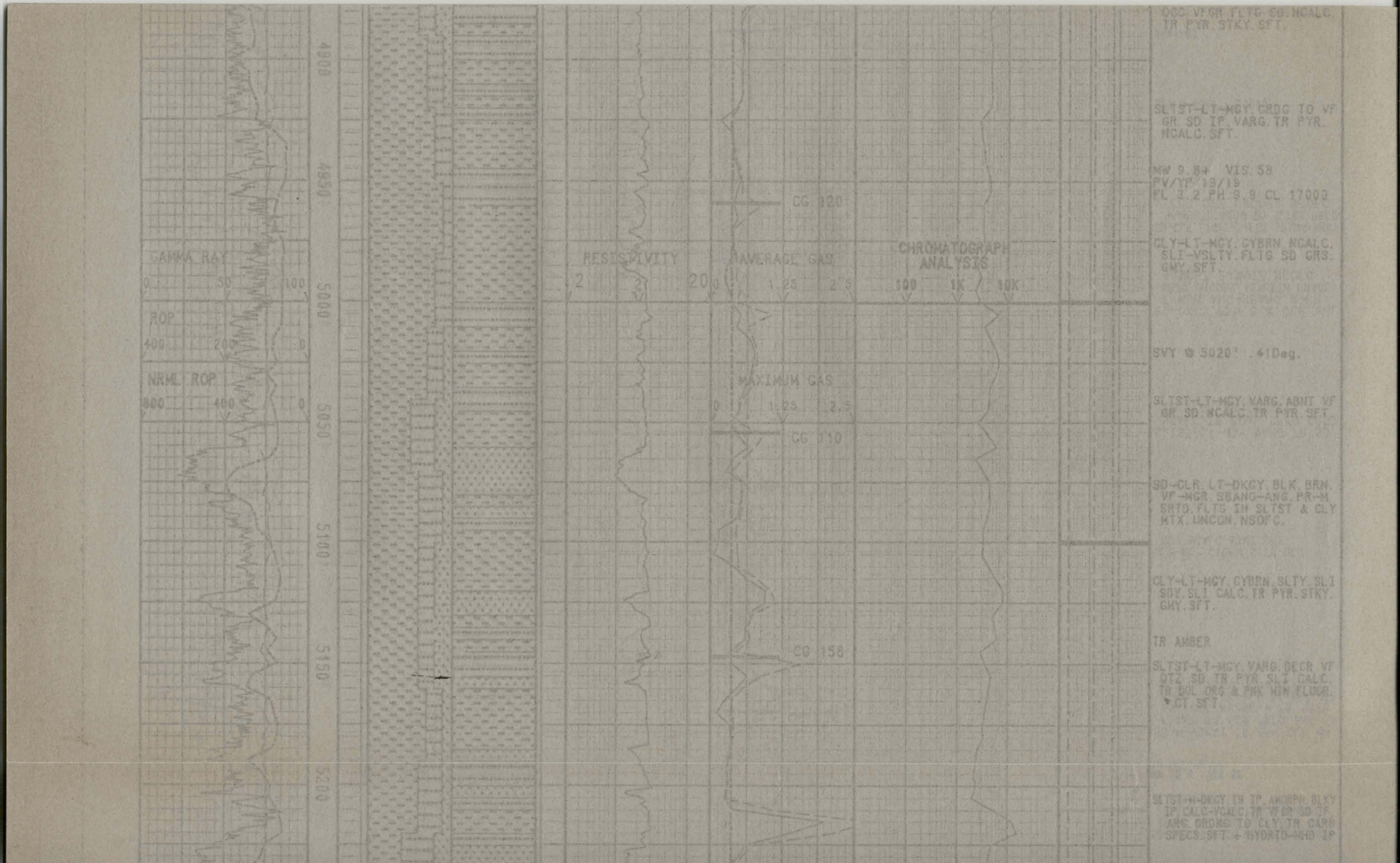

3300
3350
3400
3450
3500
3550
3600
CLY-MGY, MBRN, AMORPH, CALC, MIC MICA, CARB SPECS IP, HYDRTD, CMMY, SFT.
8-4-93
TR LS-WH, LTGY, AMORPH-BLKY, CHLKY, CARB SPECS IP, SDY IP, VCALC, HYDRTD, VSFT.
SVY @ 3324' 0.40 Deg.
MW 9.6 VIS 34
PV/YP 27/23
FL 4.0 PH 9.5 CL 16000
SLT-LT-MGY, AMORPH, AREN, VFGR QTZ, CRS, OCC CGR SD, CALC, HYDRTD, VSFT.
CLY-LT-MGY, MBRN, AMORPH, CARB SPECS IP, ARG, OCC F-CGR SD, HYDRTD, CMMY, SFT.
SD-CLR, WH, BLK, VF-MGR, OCC CGR, SBRD-ANG, M-WSRT, UNCONS, 40% QTZ, 40% LITH FRAGS, 20% CHT, TR PYR, TR CALC, NSOFC.
SLTST-M-LTGY-LTBRN, AMORPH, BLKY IP, CALC, ARG, CLY MTRX, VFGR, SD

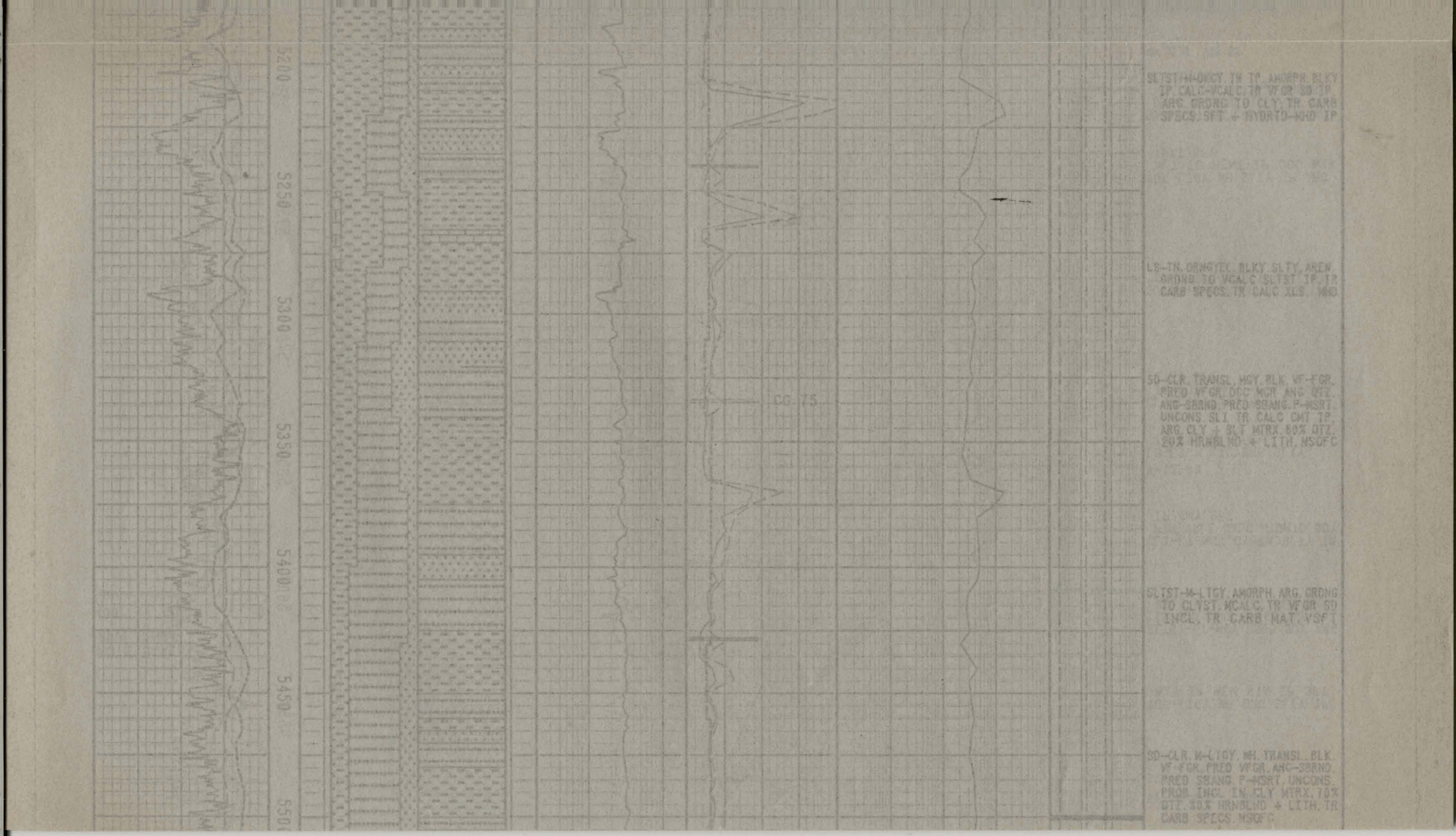

3650
3700
3750
3800
3850
3900
3950
SVY @ 3614' 0.39 Deg.
CLY-TNGY.VLTBRN.AMORPH.INTBD W/ SLT + VFGR QTZ SD INCL. SLI-MCALC.GRDNG TO SLTST IP. ABNDT CARB LAMS.HYDRTD.SFT
SD-LTGY.CLR.WH.TRANSL.VF-MGR. OCC CGR.PRED FGR.ANG-SBRND. PRED SBANG.PSRT.UNCONS.TR PYR CMT.PROB CLY MTRX.TR CALC CMT IP.TR CARB LAMS. TR BLK PYR FOSS BRACH.70% QTZ.30% LITH FRAGS.NSUFC
COAL-BLK.VDKBRN.PLTY.WKLY. BLKY IP.SBVIT.PYR WOOD FRAGS. INTBD W/ SD + CLY.FRM-MHD + BRIT
CLY-LTTN.VLTGY.AMORPH.SLI CALC. SLTY.GRDNG TO SLT IP.TR VFGR SD INCL.HYDRTD.SFT
SD-M-DKGY.BLK-CLR.WH.M-CGR. OCC PBL SZ.PRED MGR.ANG-SBRND PRED SBANG.P-MSRT. UNCONS.TR CALC CMT IP.PROB CLY MTRX IP.SLI TR CALC XLS. TR WH FOSS SHELL FRAGS.TR TOFF.SLI IR DUL YEL MIN FLOR.

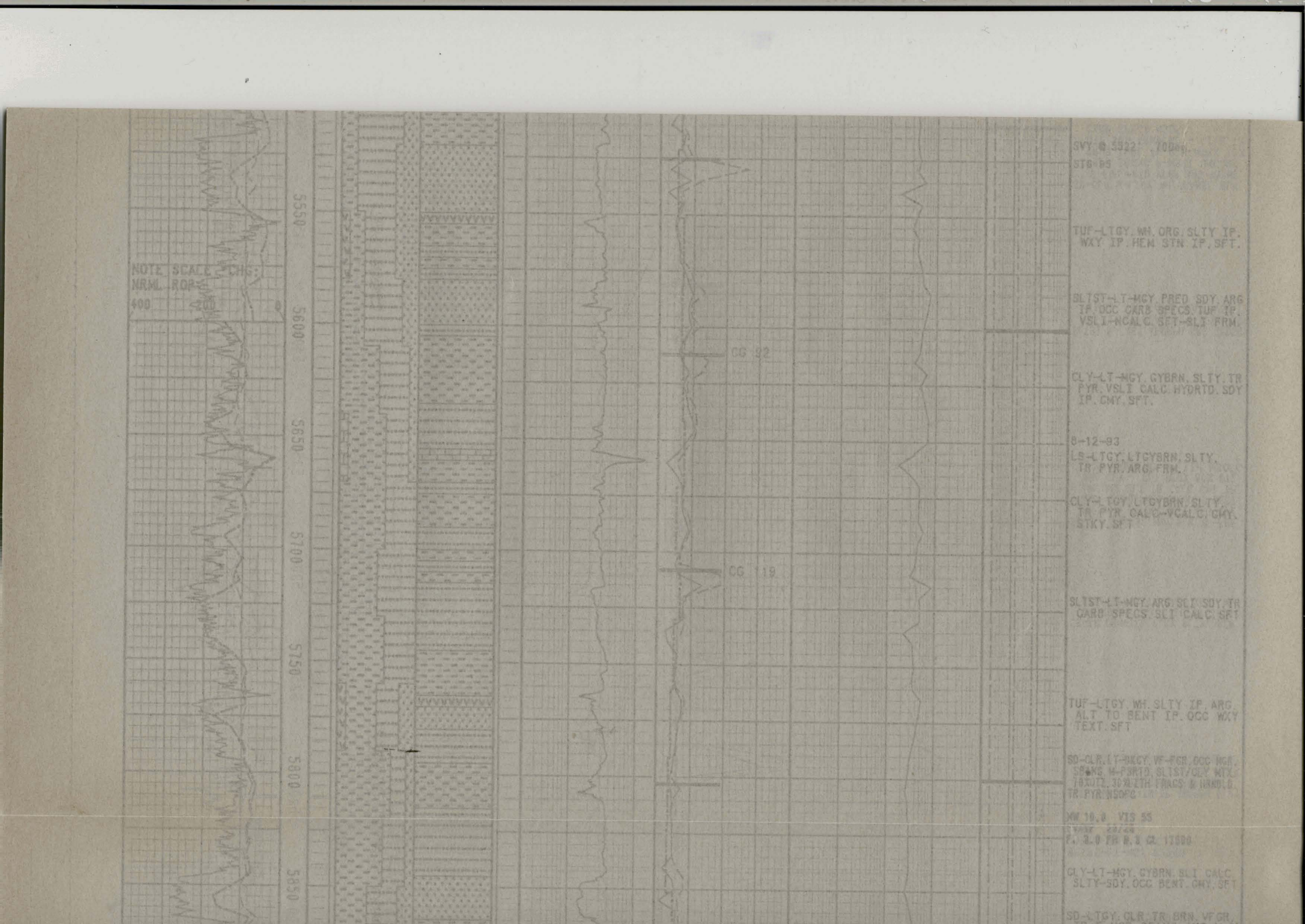

13 3/8" CSG
4000
4050
4100
4150
4200
SVY @ 3977' 0.25 Deg.
STG 87u
8-5/10-83
SET 13 3/8" CSG @ 3977'
LOT = 14.9 ppg EMW
NB 4 12.25" FDTC
12-12-12-12 JETS
IN DEPTH 4005'
CLY-LT-MGY,GYTM,AMORPH,SLTY,
GRDNG TO SLT IP,TR CGR
SD INCL,VHYDRTD + VSFT
TR COAL-BLK,BLKY,HKLY IP,
SBVIT,LRG FRACS,INTBD W/ CLY
+ SLT,HD + BRIT
MW 9.8 VIS 51
PV/YP 15/17
FL 3.0 PH 8.2 CL 16000
SD-CLR,LT-OKGY,TRANSL,WH,VFGR,
SBANG-RND,PRED SBRND,
PSRT,UNCONS,CLY MTRX PROB
ID INCL IN CLY,GRDNG TO SLT
SI CRS,INTBD W/ CLY + SLT,
HSOFC

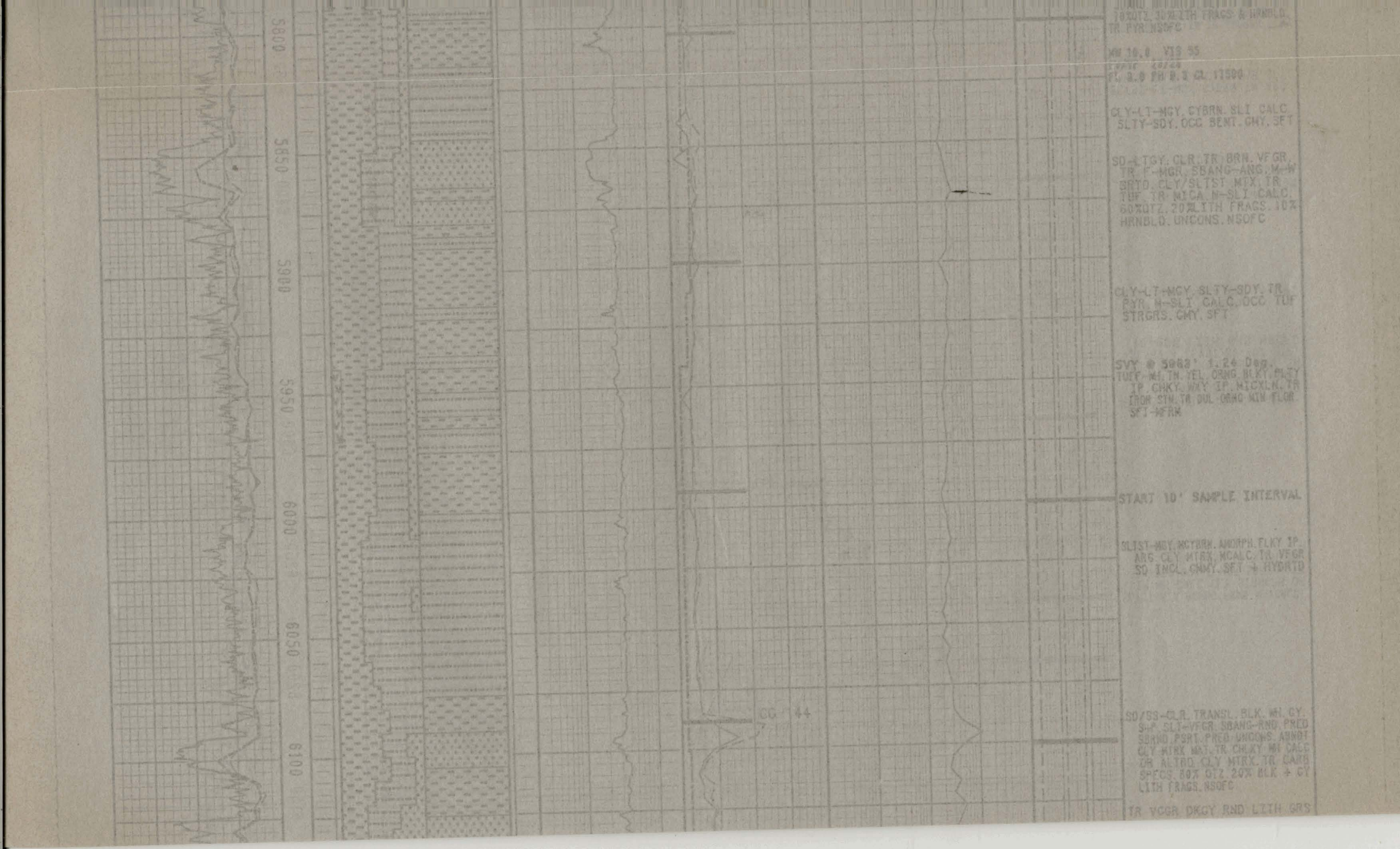

4300
4350
4400
4450
4500
4550
CG 78
CG 114
CG 96
CG 228
SVY @ 4217', 37Deg.
CLY-TN, LTGYBRN, AMORPH, CALC
MIC MICA IP, VSLTY, GRDNG
TO SLT IP, VHYDRTD + VSFT
SLTST-LT-MGY, LTGYBRN, SFT,
SLI CALC-CALC, STKY, OMMY,
VARG, GRDG TO SLTY CLY.
CLY-LT-MGY, LTGYBRN, SFT,
SLTY IP, STKY, SLI CALC-
CALC, TR SD, TR COAL FRAGS.
SD-CLR, LTGY, BLK, VF-FGR, SB
ANG, WSRT, UNCONS, 70%QTZ,
30%LITH FRAGS, NSOFC
CLY-LT-MGY, GYBRN, SLTY, VSLI
CALC IP, TR SD, OCC COAL SPKS,
SFT, STKY.
SVY @ 4552', 47Deg.
CLY-LT-MGY, LTGYBRN, STKY,
SLTY, TR SD, VSLI-N CALC,
VSFT.
SD-M-VDKGY, TR BRN, CLR, WH,
F-MGR, TR CGR, PRED ANG-SB
ANG, OCC SBRND, M-PR SRTD,

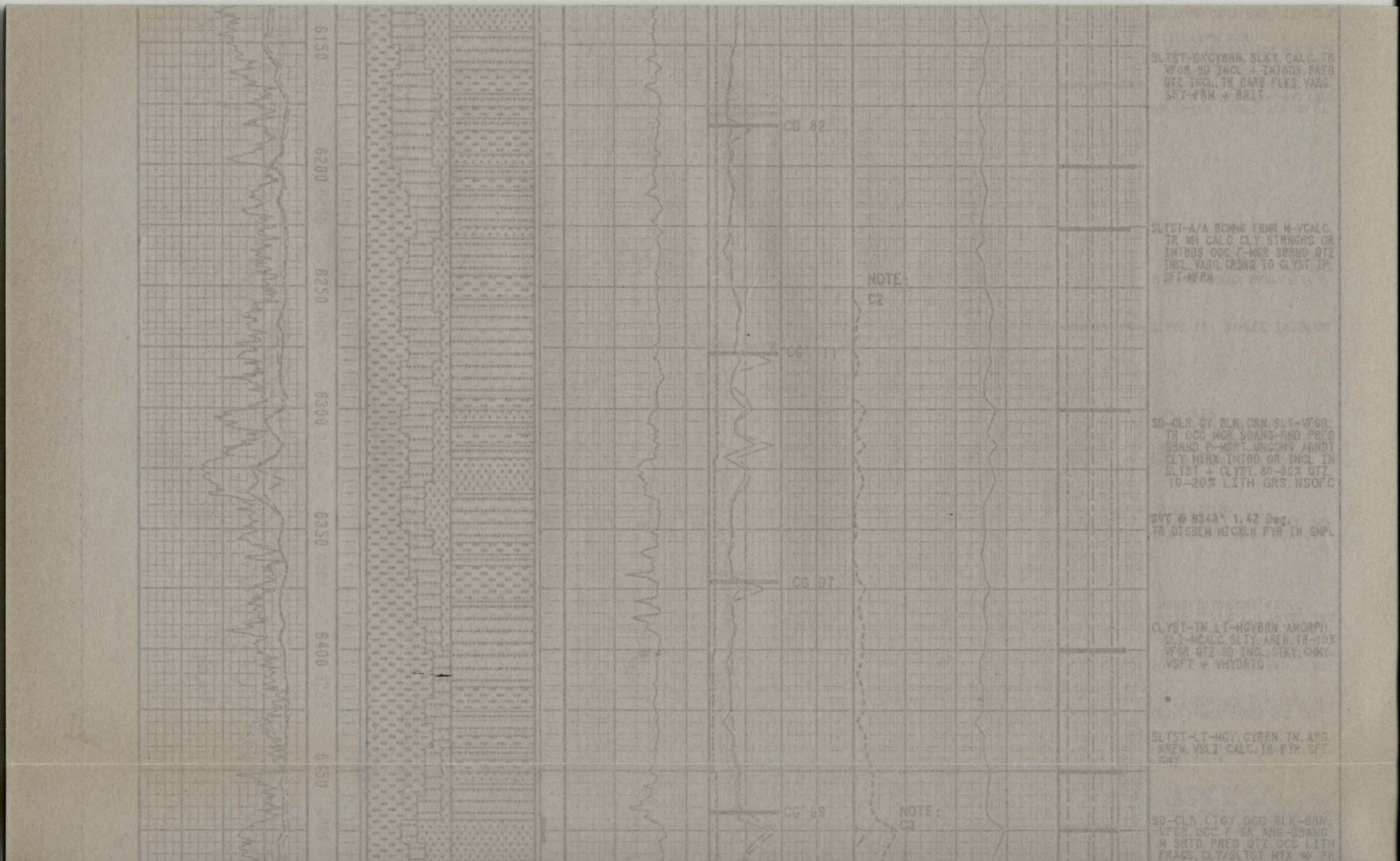

4550
4600
4650
4700
4750
4800
4850
CG 228
CG 113
CG 109
CG 194
SVY @ 4552' .47Deg.
CLY-LT-MGY.LTGYBRN.STKY.
SLTY.TR SD.VSLI-N CALC.
VARY.
SD-M-VDKGY.TR BRN.CLR.WH.
F-MGR.TR CGR.PRED.ANG-SB
ANG.OCC SBRND.M-PR SRTD.
ABNT CLR.VF-SLT SZ.ANG QTZ
GRS.FLTG IN SLTY CLY MTX.
CLY-MGY.GYBRN.SLTY.OCC.
SDY.NCALC.STKY.SFT.
SLTST-LT-MGY.VARG.TR SD.
NCALC.TR COAL SPKS.GRDG
TO VFGR SD IP.SFT.
SD-DKGY.BRN.BLK.CLR.WH.
F-MGR.ANG-SBANG.M-PR
SRTD.UNCONS.40%LITH FRAGS.
40%CHT.20%QTZ.NSOFC
SD-CLR.LTGY.VF-FGR.SBANG-ANG.
M-WSRTD.GRDG TO SLTST.PRED
CLR.QTZ.UNCONS.NSOFC.
SVY @ 4835' .39Deg.
8-11-03
CLY-LT-MGY.MGYBRN.SDTY.


GAMMA RAY
0 50 100
ROP
400 200 0
NRML ROP
800 400 0
4900
4950
5000
5050
5100
5150
5200
RESISTIVITY
2 3 20
CG 120
AVERAGE GAS
0 1.25 2.5
MAXIMUM GAS
0 1.25 2.5
CG 110
CG 158
CHROMATOGRAPH ANALYSIS
100 1K 10K
OCC VFGR FLTG SD.NCALC. TR PYR.STKY.SFT.
SLTST-LT-MGY.CRDG TO VF GR SD IP.VARG.TR PYR. NCALC.SFT.
MW 9.8+ VIS 58
PV/YP 19/19
FL 3.2 PH 9.9 CL 17000
CLY-LT-MGY.CYBRN.NCALC. SLI-VSLTY.FLTG SD GRS. GMY.SFT.
SVY @ 5020' .41Deg.
SLTST-LT-MGY.VARG.ABNT VF GR SD.NCALC.TR PYR.SFT.
SD-CLR.LT-DKGY.BLK.BRN. VF-MGR.SBANG-ANG.PR-M SRTD.FLTG IN SLTST & CLY MTX.UNCON.NSOFC.
CLY-LT-MGY.CYBRN.SLTY.SLI SDY.SLI CALC.TR PYR.STKY. GMY.SFT.
TR AMBER
SLTST-LT-MGY.VARG.DECR VF QTZ SD.TR PYR.SLI CALC. TR BOL.ORG & PNK MIN FLUOR. CT.SFT.
SLTST-M-DKGY.TR TF.AMORPH.BLKY IP.CALC-VCALC.TR VFGR SD.TR ARG.GRDNG TO CLY.TR CARB SPECS.SFT + HYDRTD-MOD IP


5200
5250
5300
5350
5400
5450
5500
CC 75
SLTST-M-DKGY TN TP AMORPH BLKY IP CALC-VCALC TR VFGR SD IP ARG GRDNG TO CLY TR CARB SPECS SFT & HYDRTD-MHD IP
LS-TN ORNGYEL BLKY SLTY ARGN GRDNG TO VCALC SLTST IP TR CARB SPECS TR CALC XLS MHD
SD-CLR TRANSL MGY BLK VF-FGR PRED VFGR OCC MCR ANG QTZ ANG-SBRND PRED SBANG P-MSRT UNCONS SLI TR CALC CMT IP ARG CLY & SLT MTRX 60% QTZ 20% HRNBLND & LITH MSOFC
SLTST-M-LTGY AMORPH ARG GRDNG TO CLYST MCALC TR VFGR SD INCL TR CARB MAT VSFT
SD-CLR W-LTGY WH TRANSL BLK VF-FGR PRED VFGR ANG-SBRND PRED SBANG P-MSRT UNCONS PROB INCL IN CLY MTRX 70% QTZ 10% HRNBLND & LITH TR CARB SPECS MSOFC


NOTE SCALE CHG:
NRML ROP
400 200 0
5550
5600
5650
5700
5750
5800
5850
CG 92
CG 19
SVY @ 5822' .70Deg
STB-95
TUF-LTGY, WH, ORG, SLTY IP, WXY IP, HEM STN IP, SFT.
SLTST-LT-MGY, PRED SDY, ARG IP, OCC CARB SPECS, TUF IP, VSLI-NCALC, SFT-SLI FRM.
CLY-LT-MGY, GYBRN, SLTY, TR PYR, VSLI CALC, HYDRTD, SDY IP, CMY, SFT.
8-12-93
LS-LTGY, LTGYBRN, SLTY, TR PYR, ARG, FRM.
CLY-LTGY, LTGYBRN, SLTY, TR PYR, CALC-VCALC, CMY, STKY, SFT
SLTST-LT-MGY, ARG, SLI SDY, TR CARB SPECS, SLI CALC, SFT
TUF-LTGY, WH, SLTY IP, ARG, ALT TO BENT IP, OCC WXY TEXT, SFT
SD-CLR, LT-MGY, VF-FGR, OCC MGR, SBANG, M-PRMD, SLIST/CLY MTX, TR PYR INCLS
MW 10.0 VIS 55
F, 3.0 FW 8.8 CL 17500
CLY-LT-MGY, GYBRN, SLI CALC, SLTY-SDY, OCC BENT, CMY, SFT
SD-LTGY, CLR, TR BRN, VFGR,


5800
5850
5900
5950
6000
6050
6100
70%QTZ.30%LITH FRAGS & HRNBLD.
TR PYR.NSOFC
WW 10.0 VIS 55
FL 8.8 PH 8.5 CL 11500
CLY-LT-MGY.CYBRN.SLI CALC.
SLTY-SDY.OCC BENT.CHKY.SFT
SD-LTGY.CLR.TR BRN.VFGR.
TR F-MGR.SBANG-ANG.M-W
SRTD.CLY/SLTST MTX.TR
TUF.TR MICA.N-SLI CALC.
60%QTZ.20%LITH FRAGS.10%
HRNBLD.UNCONS.NSOFC
CLY-LT-MGY.SLTY-SDY.TR
PYR.N-SLI CALC.OCC TUF
STRGRS.CHKY.SFT
SVY @ 5963' 1.24 Deg.
TUFF.WH.TN.YEL.ORNG.BLKY.PLTY
IP.CHKY.WXY IP.MICXL.N.TR
IRON STN.TR DUL ORNG MIN FLOR
SFT-WFRM
START 10' SAMPLE INTERVAL
SLTST-MGY.MCYBRN.AMORPH.FLKY IP.
ARG CLY MTRX.MCALC.TR VFGR
SD INCL.CHKY.SFT + HYDRTD
CG 44
SD/SS-CLR TRANSL.BLK.WH.GY.
S+P SLT-VFGR.SBANG-RND.PRED
SBRND.PSRT.PRED UNCONS.ABNDT
CLY MTRX MAT.TR CHLKY MI CALC
OR ALTRD CLY MTRX.TR CARB
SPECS.80% QTZ.20% BLK + GY
LITH FRAGS.NSOFC
TR VCGR DKGY RND LITH GRS

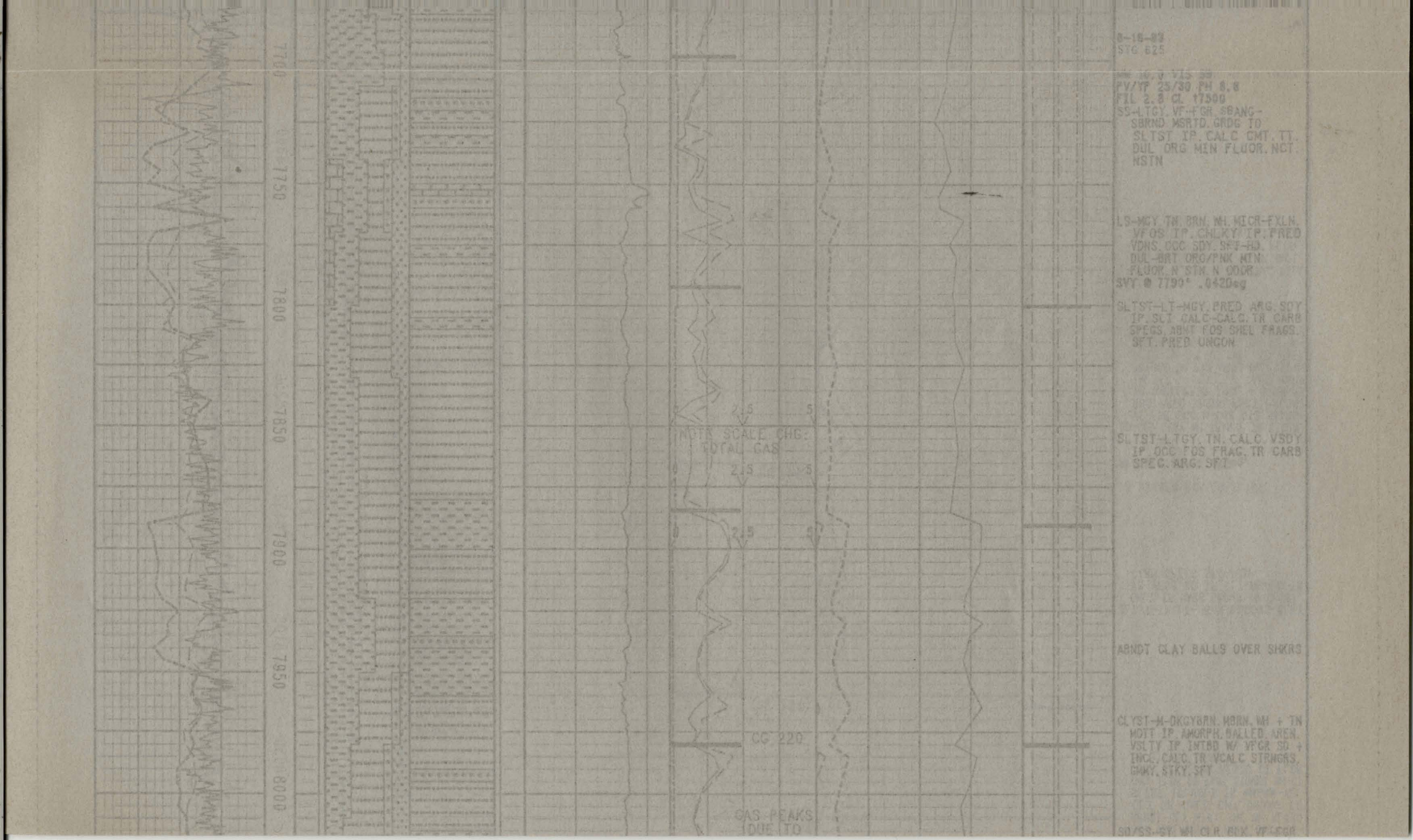

6150
6200
6250
6300
6350
6400
6450
CG 82
CG 77
CG 87
CG 68
NOTE:
C2
NOTE:
SLTST-DKGYBRN, SLKY, CALC, TR VFGR SD INCL + INTBDS, PRED QTZ INCL, TR CARB FLKS, VARG SFT-FRM + BRIT
SLTST-A/A, BCMNG FRMR, M-VCALC, TR WH CALC CLY STRNGRS OR INTBDS, OCC F-MGR SBRND QTZ INCL, VARG GRDNG TO CLYST IP, SFT-MFRM
SD-CLR, GY, BLK, CRN, SLT-VFGR, TR OCC MGR, SBANG-RND, PRED SBRND, P-MSRT, UNCONS ABNDT CLY MTRX INTBD OR INCL IN SLTST + CLYST, 80-90% QTZ, 10-20% LITH GRS, NSOFC
SVY @ 6343', 1.42 Deg, FR DISSEN MICXLN PYR IN SMPL
CLYST-TN, LT-MGYBRN, AMORPH, SLI-MCALC, SLTY, AREN, TR-10% VFGR QTZ SD INCL, STKY, CHKY, VSFT + VHYDRTD
SLTST-LT-MGY, GYBRN, TN, ARG, AREN, VSLI CALC, TR PYR, SFT, CHKY
SD-CLR, LTGY, OCC BLK-BRN, VFGR, OCC F GR, ANG-SBANG, M SRTD, PRED QTZ, OCC LITH FRAGS, CLY/SLTST MTX, W, PR


6450
6500
6550
6600
6650
6700
6750
NOTE SCALE CHG
NRML ROP
1200
600
0
CG 69
NOTE:
CG
CG 85
GAS X10
X10
SLTST-LT-MGY,GYBRN,TN,ARG
AREN,VSLI CALC,TR PYR,SFT,
FMY
SD-CLR,LTGY,OCC BLK-BRN,
VFGR,OCC F GR,ANG-SBANG,
M SRTD PRED QTZ,OCC LITH
FRAGS,CLY/SLTST MTX W/ PR
POR,<5%DUL ORG-ORG FLUOR,
TR YEL/GN FLUOR,FR YEL CUT
FLUOR IP,N STN,N ODOR
CLY-LT-MGY,LTGYBRN,SLTY-
VSLTY SLI-VSDY,OCC CARB
SPECS,SLI-M CALC,GHY,SFT
SVY @ 8547' 1.42 Deg.
MW 10.0+ VIS 39
PV/YP 22/28
FL 2.7 FH 3.1 CL 17000
8-13-93
NB 5 12.25" DS-40H
2-14 3-13 JETS
TG 142
SD-CLR TR LTGY BLK TR SLT-VFGR
SBANG-SRND,PRED SBRND P-MSRT,
VARG-UNCONS,ASNDT CLY MTRX
MAT,80-90% QTZ,10-20% LITH
M-BRI GRNGLR FLOR IN 50% OF
SMPL SURFACE FAIR-SLO MLKY
YEL CT FLOR,GD YELWH RESID
CT FLOR RING,OIL ODOR,
NO VIS STN
SD-DKGY,BLK,CLR,TRANSL,MGY,
VF-MGR,PRED MGR,OCC C-VCGR,
SBANG-RNDD,PRED SBANG P-MSRT,
ARG-UNCONS,SLTY,CLY MTRX
MAT,50-70% CHT & LITH GRS
30-40%CLR-FRSTD QTZ,TR PYR,
50-70% M-BRI GRNGLR SURFACE
SMPL FLOR,GD FAST STRMNG
MLKY WHYEL CT FLOR,GD WHYEL
RESID CT FLOR RINGS,OIL ODOR,
SLI TR TR-LTBRN STN DRY IP,
8-14-93 NCB1 RC412 TFA .7
CORE #1 8729-8732 NO REC.
TG 98
RRB 5 DS-40H
2-14 3-13 JETS
SD-DKGY,BLK-GRN,LTGY,CLR
F-MGR,SBANG-ANG,M-PR

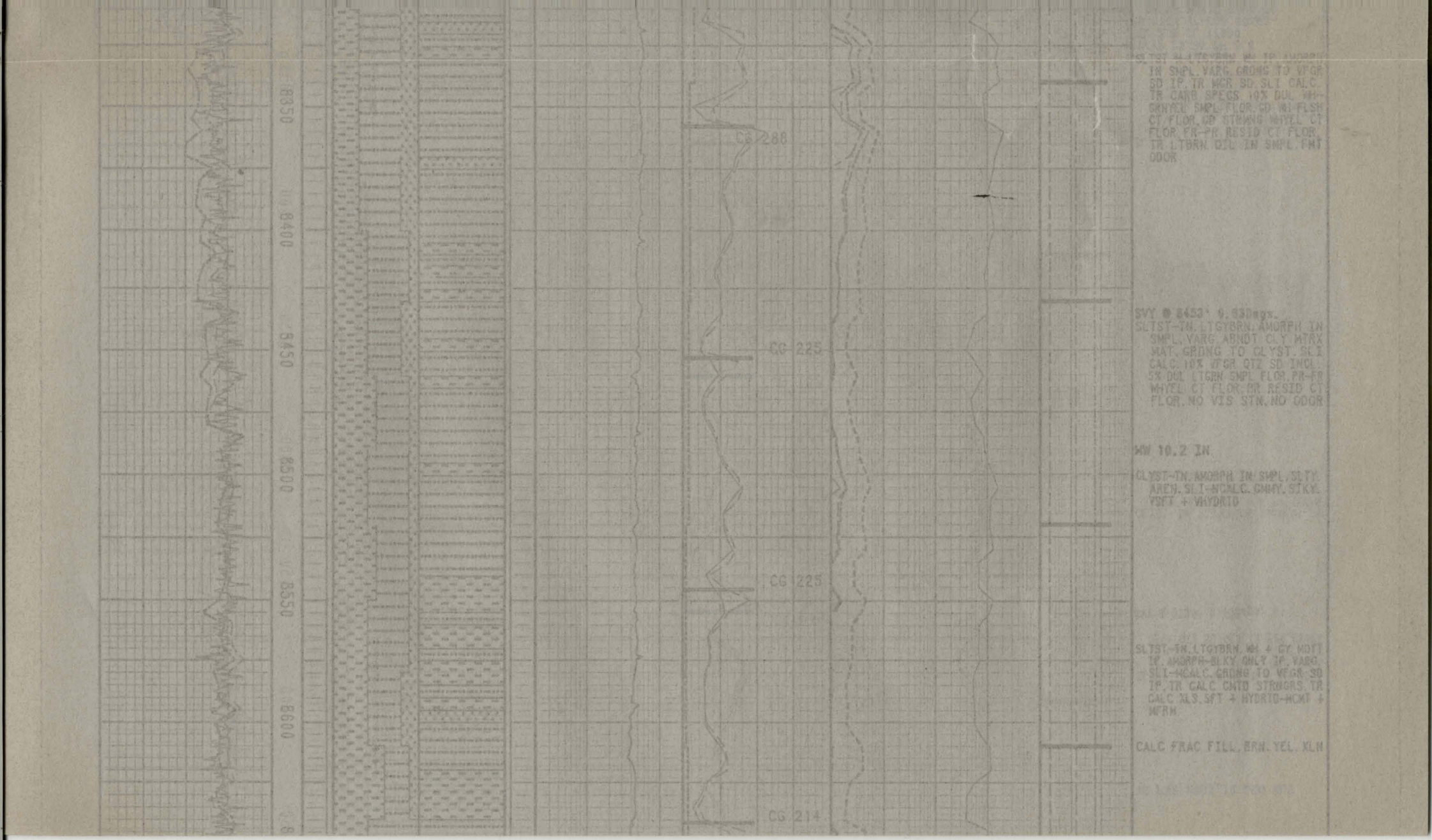

6800
6850
6900
6950
7000
7050
CG 92
CG 20
CG 110
SRTD. TR PYR. FRED. CHT & LITH FRAGS. 30-40% QTZ. SLTY. CLY. MTX. UNCONS. 40% MOD YEL/GN FLUOR. CO MLKY CUT FLUOR. YEL/GLD RESID CT
SLTST-LT-MGY. ARG. SLI-VSDY. TR THN COAL STRGRS. TR PYR. SLI CALC. SFT
SLTST-LT-MGY. ARG. SLI-VSDY. TR THN COAL STRGRS. TR PYR. SLI CALC. SFT.
CLY-LTGY. VSLTY. SDY STRGRS. SLI CALC. TR TN-BRN FOS FRAGS W/ ORG MIN FLUOR. TR BITMN. SFT.
MW 10.1+ VIS 69 FIL 3.0 PV/YP 24/34 PH 8.5 CL 17000
SLTST-LTGY-LTGYBRN. SDY. ARG. SLI CALC. TR TN-BRN FOS FRAGS W/ DUL ORG MIN FLUOR. TR BITMN. SFT
SLTST-LTGY-TN. MOTT IP. TR TN-BRN FOS MAT W/ DUL-MOD ORG FLUOR. SDY. ARG. SLI CALC. SFT
8-15-83
SVY @ 6940' 0.89Deg.
CLY-LT-MGY. GYBRN. SLTY. F-M GR FLTG SD GRS. OCC TN-BRN FOS FRAGS W/ DUL ORG MIN FLUOR. SLI CALC. SFT
SD-LT-DKGY. BLK. CLR. F-M GR. SB. ANG-ANG. M-PR SRTD. PRED UNCON. TR W/ TT CALC CMT. 25% OF SAMP SURF W/ YELGN FLUOR. FR STRMG YEL CT IP
SH-MGY. SLTY. OCC SDY. CALC-VCALC. HD
SLTST-LTGY. LTGYBRN. ARG. SLT-MOD CALC. OCC TN-BRN FOS FRAGS W/ DUL ORG MIN FLUOR. TR CARB SPECS. SFT


7100
7150
7200
7250
7300
7350
CG 82
CG 124
SD-M-DKGY, CLR, TRNSL, WH, F-CGR, PRED CGR, ANG-SBANG, PR SRTD, UNCONS, TR CALC CMT IP, 80% LITH FRAGS, 20%OT2, 10%DUL ORG MIN FLUOR, 10%BRT YEL/WH SAMP FLUOR, N RESID CT, N STN, SLTY CLY MTX
CLY-LT-MGY, TN, SLTY-SDY, MOTT IP, SLI CALC-CALC, TR FOS, SFT
ABNDT CALC FRAGS.
SLTST-LT-MBRN, TN, BLKY, AMORPH IP, CALC, OCC VCALC CMTD STRNGRS, ABNDT F-MGR SD INCL, GRDNG TO CLYST IP, SFT-MD + BRIT
SS-BLK, GY, S+P, WH, F-VCGR, PRED MGR, ANG-SBRND, PRED SBANG, PSRT, MCMT, UNCONS IP, CALC, 20% DUL ORNG MIN FLOR, NSOC
SLTST-LT-MBRN, TN, DKBRN + WH MOTT IP, BLKY-UNCONS, VWCMT IP, VCALC, ARG, TR-10% VF-FGR SD INCL, GRDNG TO SH IP, TR CARB SPECS, TR-MOVEL CALC STRNGRS, TR DUL ORNG MIN FLOR ONLY IP, HYDRTD-MD + BRIT
CLYST-TN, LTGYBRN, AMORPH IN SMPL AREA, NCALC SLTY, TR VF-OCC CGR SD INCL, PROG INSD W/ SD STRNGRS, PROG GRDNG TO HYDRTD SH IP, CMMT, STKY, VSFT + HYDRTD

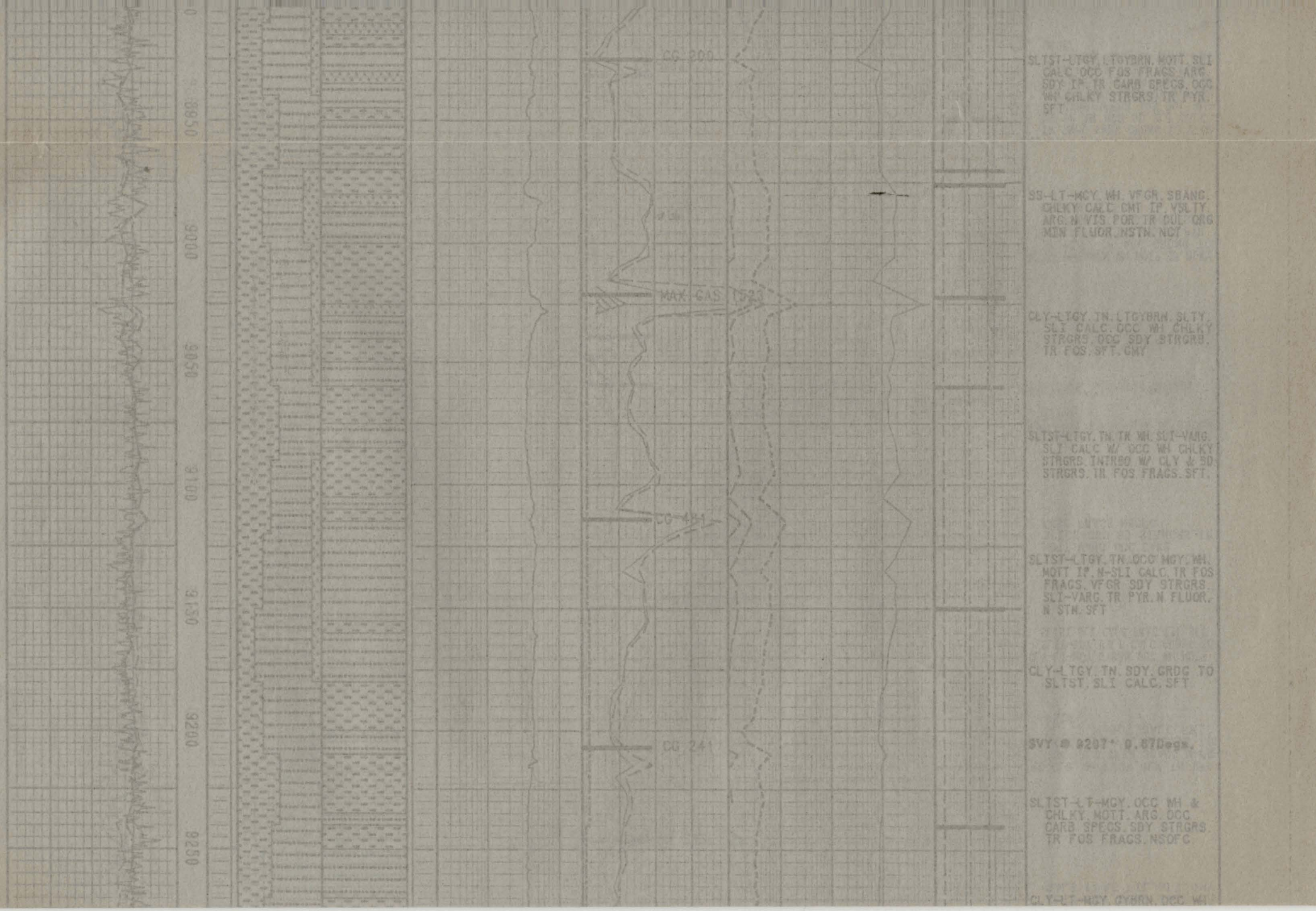

GAMMA
0
50
100
ROP
400
200
0
N. ROP
1200
800
0
7400
7450
7500
7550
7600
7650
7700
E.WR
2
20
CG 153
AVG GAS
1.25
2.5
CHROMAT
100
1K
10K
CG 70
MAX GAS
1.25
2.5
CG 220
TR PYR NODS IN CLYST + SLTST
SVY @ 7412' 0.5Deg.
SLTST-TN, LTGYBRN, AMORPH-UNCONS, ARG PROB CLY MTRX MAT, CALC, OCC VCALC STRNGRS, TR-10% VFGR SD INCL, GRDNG TO CLYST, VSFT + VHYDRTD
RESUME 20' SAMPLE INTERVAL
SLTST-LT-MBRN, TN, AMORPH-PLTY IP, ARG, MCALC, BCMNG FRMR, TR VFGR SD INCL, PRED SBRND QTZ, SLI TR PYR NODS, VSFT + HYDRTD-FSH + BRIT
CLYST-TN, LTGYBRN, AMORPH IN SMPL, SLI-MCALC, ABDN, 10% VFGR QTZ SD INCL, GRDNG TO SLTST IP, GNNY, STKY, VSFT + VHYDRTD
SD-CLR WH, LTGY, OCC MLK, VF-MGR, PRED VFGR, SBANG-VWRND, PRED SBRND, PSRT, UNCONS, INCL IN CLYST + SLTSY, PRED QTZ, TR LITH + CARB FRAGS, NSOFC
8-16-83
STC 625
PV/YP 25/30 FW 8.8
FIL 2.8 CC, @7500
SS-LTGY, VF-FGR, SBANG-SBRND, MSRTD, GRDG TO SLTST IP, CALC CMT, TT DUL ORG MIN FLUOR, WCT


8-16-82
STC 625
FV/YP 25/30 PH 8.8
FIL 2.8 CL 17500
SS-LTGY,VF-FGR,SBANG-SBRND,MSRTD,GRDG TO SLTST,IP,CALC CMT,TT, DUL ORG MIN FLUOR,NGT, NSTN
LS-MGY,TN,BRN,WH,MICR-FXLN, VFOS,IP,CHLKY,IP,PRED VDNS,OCC,SDY,SFT-HD, DUL-BRT ORG/PNK MIN FLUOR,N STN,N ODOR
SVY @ 7790' .042Deg
SLTST-LT-MGY,PRED ARG,SDY IP,SLY CALC-CALC,TR CARB SPECS,ABNT FOS SHEL FRAGS, SFT,PRED UNCON
SLTST-LTGY,TN,CALC,VSDY IP,OCC FOS FRAG,TR CARB SPEC,ARG,SFT
ABNDT CLAY BALLS OVER SHKRS
CLYST-M-DKGYBRN,MBRN,WH + TN MOTT IP,AMORPH,BALLED,AREN, VSLTY IP INTBD W/ VFGR SD + INCL,CALC,TR VCALC STRNGRS, GMMY,STKY,SFT
SD/SS-SY,WH,CLR,BLK,VF-FGR
7750
7800
7850
7900
7950
8000
NOTE SCALE CHG:
TOTAL GAS
CG 220
GAS PEAKS DUE TO


DOWN TIME
CG 254
CG 143
CG 429
8050
8100
8150
8200
8250
8300
OCC MGR.SBRND PSRT.UNCONS-ABNDT CLY MTRX.SHC WH ALTRD CLY OR CALC CMT.GRDNG TO SLTST IP.VSLI TR WHGRN-YEL SMPL FLOR.CD FAST STRMNG WH CT FLOR.IP.CD WH RESID CT FLOR NO STN.NO ODOR
SLTST-TN,LT-MBRN.UNCONS-BLKY ONLY IP.VARG.GRDNG TO CLYST. TR VFGR SD IP.SLI-MCALC.TR CARB SPECS.SFT-FRM
TR DISSEM PYR IN SLIST
SVY @ 8188' 0.46Deg.
SD-CLR,LTGY,WH TRANSL TR LTGRN. VF-FGR.OCC M-CGR QTZ.SBANG-RND.PRED SBRND PSRT.UNCONS IN SMPL.PROB INCL + STRNGRS IN SLT + CLY.SLI CALC CARB PRTNGS.TR PYR.MDFI-DUL YEL WH FLOR IN 5% OF SMPL.CD FAST STRMNG WH CT FLOR.FR WH RESID CT FLOR.NO STN.NO ODOR
SD/SLTST-A/A.TR CALC FRAC FILL DUL WHYEL FLOR IN 5% OF SMPL. VPR VSLO-FNT WH CT FLOR. NO RESID CT FLOR.NO VIS STN. VFNT ODOR

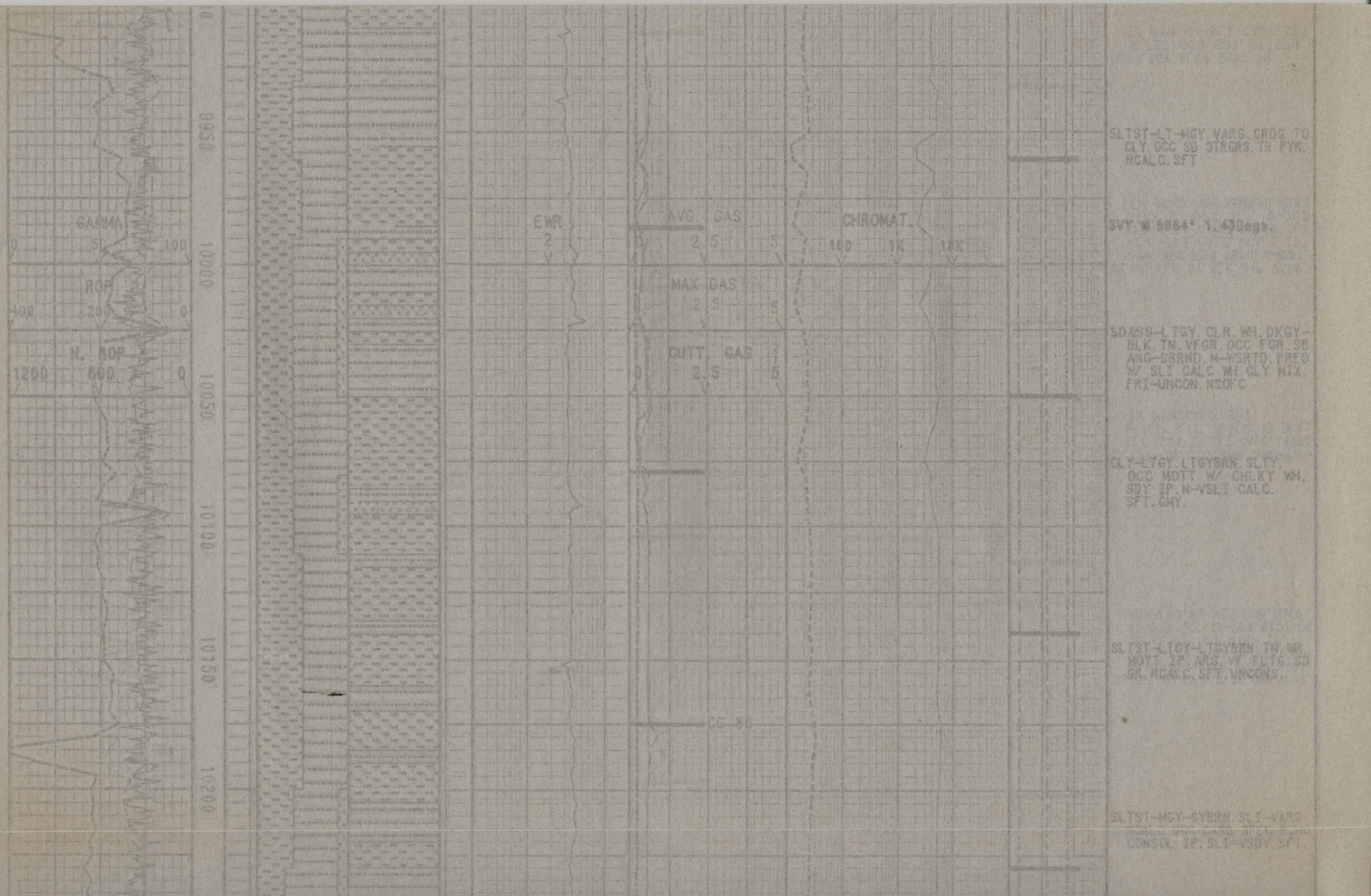

8350
8400
8450
8500
8550
8600
CG 288
CG 225
CG 225
CG 214
IN SMPL VARG GRDNG TO VFGR SD IP TR MGR SD SLI CALC TR CARB SPECS 10% DUL WH-GRNYEL SMPL FLOR SD WI FLSH CT/FLOR GD STRNNG WHYEL CT FLOR FR-PR RESID CT FLOR TR LTBRN OIL IN SMPL FNT ODOR
SVY @ 8453' 9.93Degs.
SLTST-TN LTGYBRN AMORPH IN SMPL VARG ABNDT CLY MTRX MAT GRDNG TO CLYST SLI CALC 10% VFGR QTZ SD INCL 5% DUL LTGRN SMPL FLOR PR-FR WHYEL CT FLOR PR RESID CT FLOR NO VIS STN NO ODOR
WW 10.2 IN
CLYST-DN AMORPH IN SMPL SLTY AREN SLI-NCALC CMNY STKY VSFT + VHYDRO
SLTST-TN LTGYBRN WH & GY MDTY IP AMORPH-BLKY ONLY IP VARG SLI-NCALC GRDNG TO VFGR SD IP TR CALC CMTD STRNGRS TR CALC XLS SFT + HYDRO-NCMT + MFRM
CALC FRAC FILL BRN YEL XLN

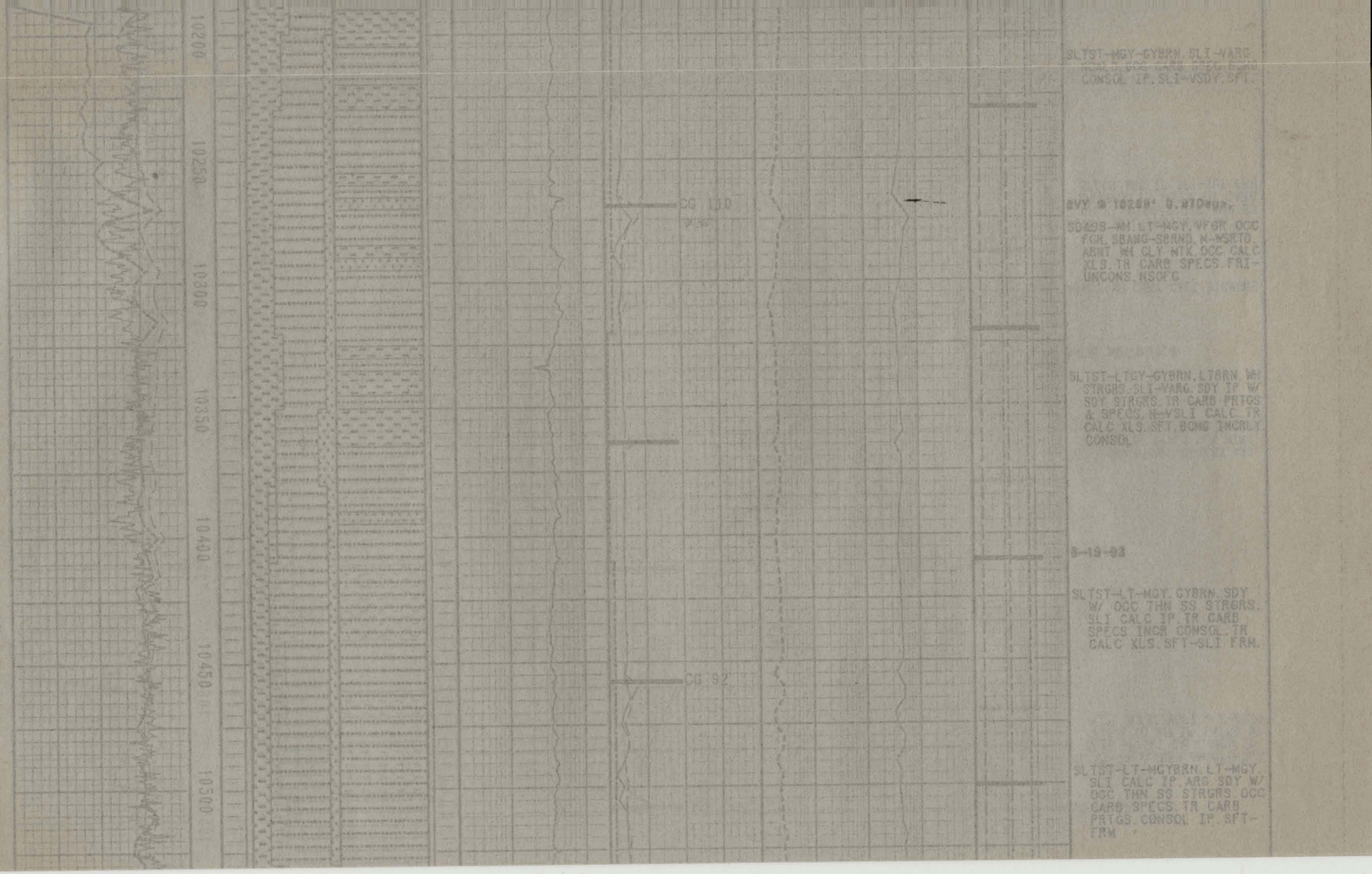

8700
8750
8800
8850
8900
8950
CG 249
CG 182
CG 200
TR PYR MOOS, TR LRG XLS
SLTST-IN LT-MBRN, TN & MI MOTT IP, VARG, SLI-MCALC, OCC CALC STRNGRS, GRDNG TO CLYST, TR VFGR QTZ SD GRS, TR PYR, MSOFC
SVY @ 8733' 0.70Degs.
CLYST-IN, VLTGYBRN, AMORPH IN SMPL, AREN IP, VSLTY, PROB LYRD W/ SLTST, TR VFGR SD INCL, STKY, GMY, VSFT & HYDRTD
SD-CLR, LT-DKGY, BLK, VF-FGR, PRED VFGR, SBANG-MSRTD, FLTG IN SLTY CLY MTX, CALC IP, ABNT FOSS FRAGS, DUL ORG MIN FLUOR IP, NSTN, NCT
SLTST-LTGY, LTGYBRN, MOTT, SLI CALC, OCC FOS FRAGS, ARG, SDY IP, TR CARB SPECS, OCC WI CHLKY STRGRS, TR PYR, SFT
SS-LT-MGY, WH, VFGR, SBANG,

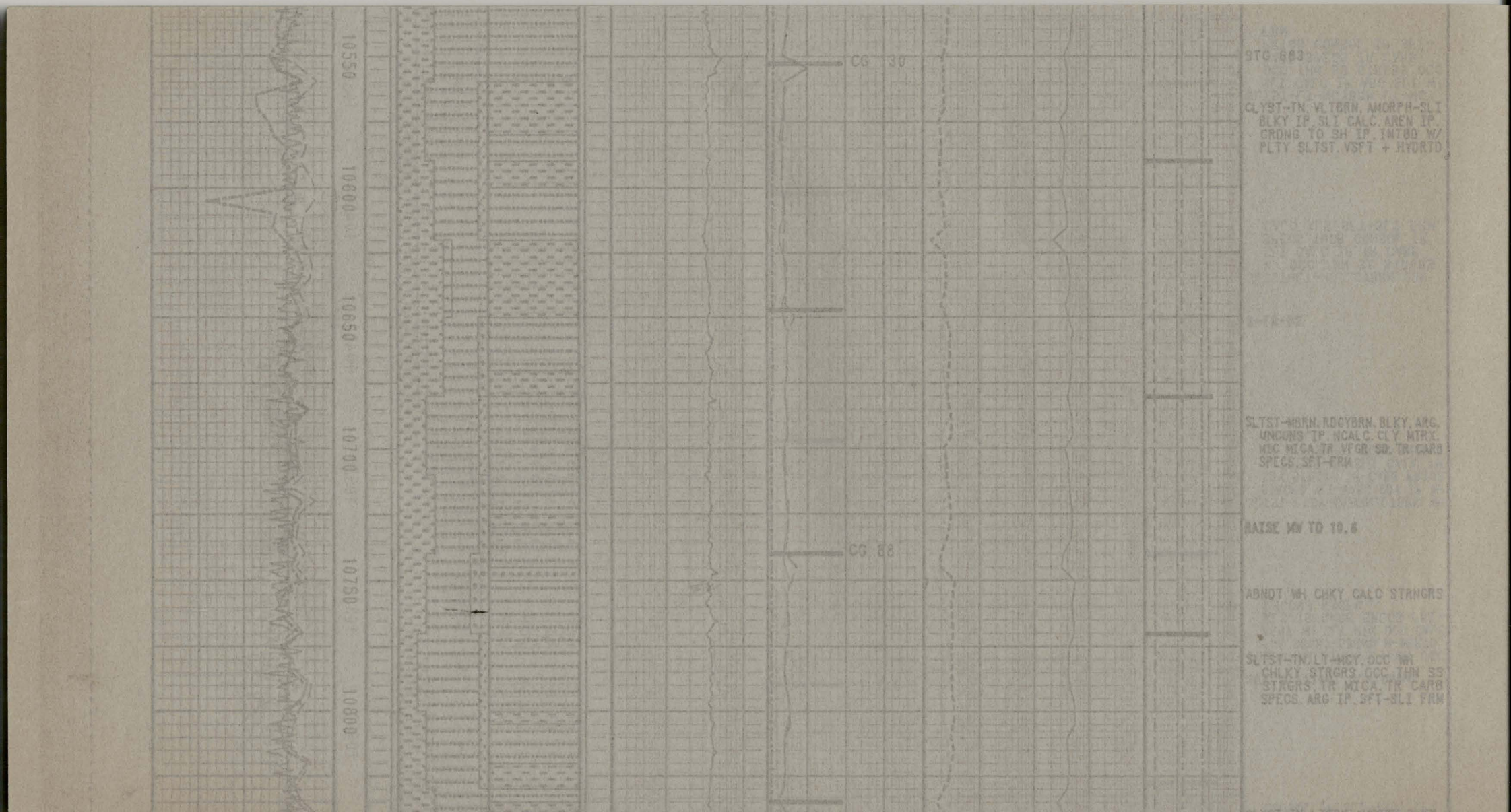

8950
9000
9050
9100
9150
9200
9250
CG 200
MAX GAS 1523
CG 141
CG 241
SLTST-LTGY,LTGYBRN,MOTT,SLI CALC OCC FOS FRAGS ARG SDY IP TR CARB SPECS,OCC WH CHLKY STRGRS,TR PYR, SFT
SS-LT-MGY,WH,VFGR,SBANG, CHLKY CALC CMT IP,VSLTY, ARG,N VIS POR,TR DUL ORG MIN FLUOR,NSTN,NOT
CLY-LTGY,TN,LTGYBRN,SLTY SLI CALC,OCC WH CHLKY STRGRS,OCC SDY STRGRS, TR FOS,SFT,GMY
SLTST-LTGY,TN,TR WH,SLI-VARG, SLI CALC W/ OCC WH CHLKY STRGRS,INTRBD W/ CLY & SD STRGRS,TR FOS FRAGS,SFT,
SLTST-LTGY,TN,OCC MGY,WH, MOTT IP,N-SLI CALC,TR FOS FRAGS,VFGR SDY STRGRS, SLI-VARG,TR PYR,N FLUOR, N STN,SFT
CLY-LTGY,TN,SDY,GRDG TO SLTST,SLI CALC,SFT
SVY @ 9207' 0.67Deg.
SLTST-LT-MGY,OCC WH & CHLKY,MOTT,ARG,OCC CARB SPECS,SDY STRGRS, TR FOS FRAGS,NSOFC
CLY-LT-MGY,GYBRN,OCC WH

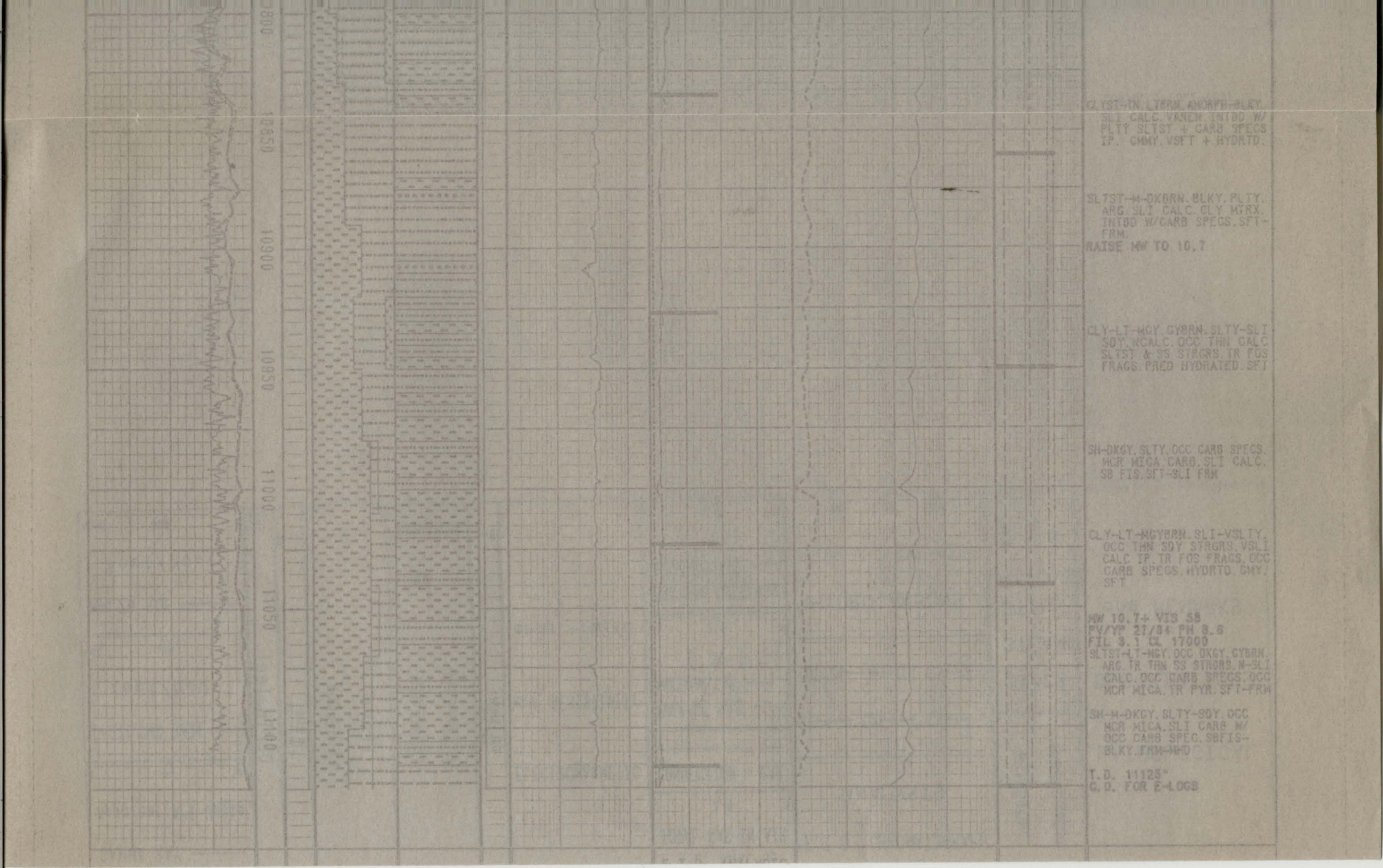

9300
9350
9400
9450
9500
9550
9600
CG 242
CG 185
CG 101
CG 111
SLTY-SDY,VSLI CALC,TR CALC FRAC FIL,SFT,GRY
SS-CLR WH LTGY BLK TN,VF-FGR,FRED VFGR,SBANG,M-PR SRTD,SLI-VSLTY,GRDG TO SLTST,M-SLI CALC,FRI, NSOFC
CLY-LT-MGY,GYBRN,OCC WH MOTT, SLTY-SDY,VSLI CALC,GRDNG TO SLTST,SLI CALC FRAC FIL,SFT,
SLTST-LT-MGY,OCC WH + CHKY MOTT,VARG,OCC CARB SPECS,OCC SD STRNGRS,TR FOSS FRAGS,NSOFC
MW 10.4+ VIS 70 FTL 2.0 PV/YP 30/40 PH 8.5 CL 17000 5-17-83
SVY @ 9488' 1.25Degs.
5-18-83
MB 6 12.25" DS40H
5-15 JETS
TG 1541
SLTST-M-DKBRN,WH MOTT IP,BLKY IP,PLTY IP,ARG GRDNG TO CLYST IP,SLI CALC,TR PYR, TR VFGR QTZ SD INCL,SFT-MFRM + BRIT

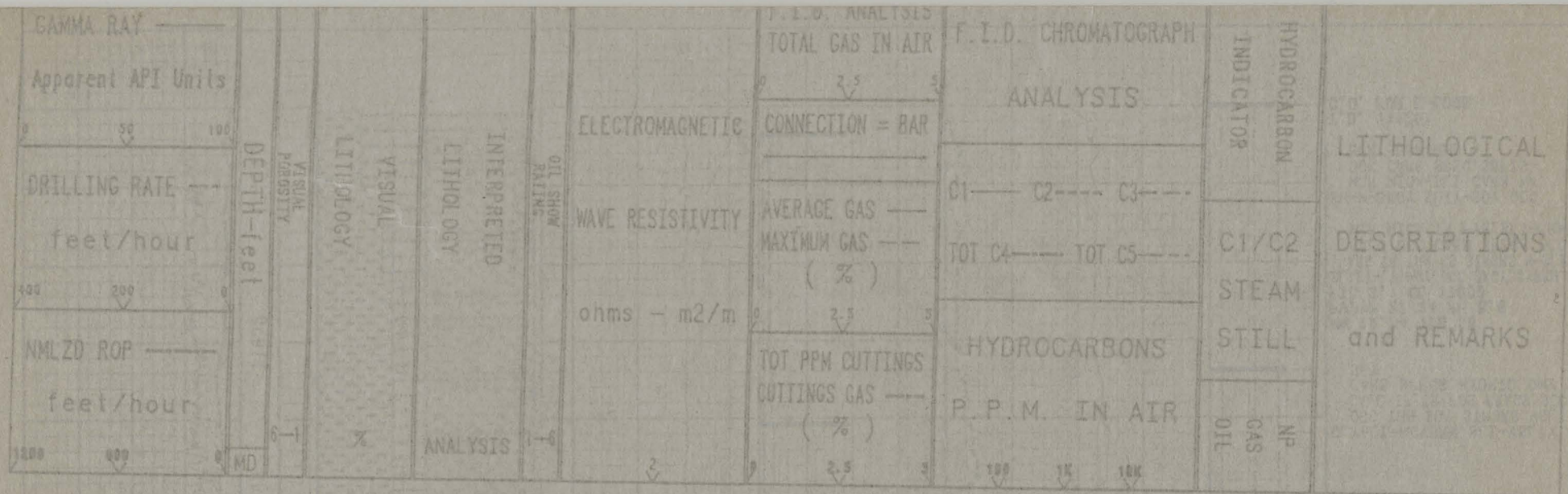

9600
9650
9700
9750
9800
9850
9900
CG 111
CG 98
CG 186
SS-CLR, MLCY, BLK, TR GRN, VFGR, SBANG-RND, PRED SBRND, MSRT, VCALC, CLY MTRX, MAT IP, CHKY OR ALTRD CLY MTRX IP, TT, 80-90% QTZ, 10-20% BIOT OR HRNBLND, NO VIS POR, NSOFC
CLYST-TR, LTGYBRN, AMORPH-SLT BLKY IP, SLT CALC, INTBD W/ PLTY SLTST, TR VFGR SD INCL, TR PYR, CMMY, SFT
SS-WH CLR CY BLK S+P VFGR SBRND-RND PRED SBRND, M-WSRT MCMT-FRI, CALC, VCALC IP, GRDNG TO SLTST, SP, TR CLY MTRX, 80-90% QTZ, 10-20% LITH FRAGS, POSS HRNBLND, NSOFC
CLY-LTGY, SLTY GRDG TO SLTST, OCC SOY STRGRS, TR PYR, N-VSLI CALC, SFT


GAMMA
0 50 100
ROP
400 200 0
N. ROP
1200 600 0
0
9950
10000
10050
10100
10150
10200
EWR
2
AVG. GAS
2.5
MAX GAS
2.5
CUTT. GAS
2.5
CHROMAT.
100 1K 10K
CC-36
SLTST-LT-MGY, VARG. GRDG TO CLY, OCC SD STRGRS, TR PYR. NCALC, SFT
SVY @ 9884' 1.430deg.
SD/SS-LTGY, CLR, WH, DKGY-BLK, TN, VFGR, OCC FGR, SB ANG-SBRND, M-WSRTD, PRED W/ SLT CALC MI CLY MIX, FRI-UNCGN, NSOFC
CLY-LTGY, LTGYBRN, SLTY, OCC MOTT W/ CHLKY WH, SDY IP, N-WSLI CALC, SFT, CMY.
SLTST-LTGY-LTGYBRN, TN, WH, MOTT IP, ARG, VF, FLTG SD GR, NCALC, SFT, UNCONS,
SLTST-MGY-GYBRN, SLI-VARG CONSOL IP, SLI-VSDY, SFT


10200
10250
10300
10350
10400
10450
10500
SLTST-MGY-GYBRN.SLI-VARG. CONSOL IP.SLI-VSDY.SFT.
CG 100
SVY @ 10259' 0.27Deg.
SDSTN-WH.LT-MGY.VFGR.OCC FGR.SBANG-SBRND.M-MSRTD. ABNT WH CLY MTX.OCC CALC XLS.TR CARB SPECS.FRI-UNCONS.NSOFC
SLTST-LTGY-GYBRN.LTBRN.WH STRGRS.SLI-VARG.SDY IP W/ SDY STRGRS.TR CARB PRTGS & SPECS.N-VSLI CALC.TR CALC XLS.SFT.BOMG INCRLY CONSOL
8-19-03
SLTST-LT-MGY.GYBRN.SDY W/ OCC THN SS STRGRS. SLI CALC IP.TR CARB SPECS INCR CONSOL.TR CALC XLS.SFT-SLI FRM.
CG 92
SLTST-LT-MGYBRN.LT-MGY. SLI CALC IP.ARG.SDY W/ OCC THN SS STRGRS.OCC CARB SPECS.TR CARB PRTGS.CONSOL IP.SFT-FRM


10550
10600
10650
10700
10750
10800
CG 30
CG 88
STG 883
CLYST-TN, VLTBRN, AMORPH-SLI BLKY IP, SLI CALC, AREN IP, GRDNG TO SH IP, INTBD W/ PLTY SLTST, VSFT + HYDRTD
SLTST-MBRN, RDCYBRN, BLKY, ARG, UNCONS IP, NCALC, CLY MTRX, MSC MICA, TR VFGR SD, TR CARB SPECS, SFT-FRM
RAISE MW TO 10.6
ABNDT WH CHKY CALC STRNGRS
SLTST-TN/LT-MGY, OCC WH CHLKY STRGRS, OCC THN SS STRGRS, TR MICA, TR CARB SPECS, ARG IP, SFT-SLI FRM


10800
10850
10900
10950
11000
11050
11100
CLYST-DK,LTBRN,AMORPH-BLKY, SLI CALC.VARGN INTBD W/ PLTY SLTST + CARB SPECS IP. CMMY.VSFT + HYDRTD.
SLTST-M-DKBRN.BLKY.PLTY. ARG.SLI CALC.CLY MTRX. INTBD W/CARB SPECS.SFT-FRM.
RAISE MW TO 10.7
CLY-LT-MGY.GYBRN.SLTY-SLI SDY.NCALC.OCC THN CALC SLTST & SS STRGRS.TR FOS FRAGS.PRCD HYDRATED.SFT
SH-DKGY.SLTY.OCC CARB SPECS. MCR MICA.CARB.SLI CALC. SS FIS.SFT-SLI FRM
CLY-LT-MGYBRN.SLI-VSLTY. OCC THN SDY STRGRS.VSLI CALC IP.TR FOS FRAGS.OCC CARB SPECS.HYDRTD.CMY. SFT
MW 10.7+ VIS 55
PV/YP 27/34 PH 8.6
FIL 3.1 CL 17000
SLTST-LT-MGY.OCC DKGY.GYBRN. ARG.TR THN SS STRGRS.M-SLI CALC.OCC CARB SPECS.OCC MCR MICA.TR PYR.SFT-FRM
SH-M-DKGY.SLTY-SDY.OCC MCR MICA.SLI CARB W/ OCC CARB SPEC.SBFIS-BLKY.FRM-HRD
T.D. 11125'
C.D. FOR E-LOGS


GAMMA RAY
Apparent API Units
0 50 100
DRILLING RATE
feet/hour
100 200 0
NMLZD ROP
feet/hour
1200 600 0
DEPTH-feet
MD
6—1
VISUAL POROSITY
VISUAL LITHOLOGY
%
INTERPRETED LITHOLOGY
ANALYSIS
OIL SHOW RATING
1—6
ELECTROMAGNETIC
WAVE RESISTIVITY
ohms — m2/m
2
F.I.D. ANALYSIS
TOTAL GAS IN AIR
0 2.5 5
CONNECTION = BAR
AVERAGE GAS
MAXIMUM GAS
(%)
0 2.5 5
TOT PPM CUTTINGS
CUTTINGS GAS
(%)
0 2.5 5
F.I.D. CHROMATOGRAPH
ANALYSIS
C1 C2 C3
TOT C4 TOT C5
HYDROCARBONS
P.P.M. IN AIR
100 1K 10K
HYDROCARBON INDICATOR
C1/C2
STEAM
STILL
NP
GAS
OIL
LITHOLOGICAL
DESCRIPTIONS
and REMARKS

sperry-sun DRILLING SERVICES **LOGGING SYSTEMS**

A Baroid Company

BIT RECORD

CASING PROGRAM

30	inch at	301	ft
20	inch at	1017	ft
13 3/8	inch at	3978	ft
	inch at		ft
	inch at		ft

COMPANY	ARCO ALASKA INC.	FIELD/BLOCK	OCS BLK 672 NR6-4
WELL	KUVLUM #2	LOCATION	BEAUFORT SEA
CONTRACTOR	CANMAR	STATE	ALASKA
MUD COMPANY	M & I	SPUD DATE	28 JUL 93

DATE	BIT NO	TYPE	SIZE inches	JETS 1/32	DEPTH OUT	FEET drlg	ROP ft/hr	HRS	TOT HRS	CST $/ft	WOB klbs	RPM	FLOW gpm	SSP psi	MW ppg	GRADE B	GRADE T	GRADE G	REMARKS
07-28-93	1	ATXG1	26	3-21,1-22	1030	819	23	36.3	36.3	1028	23	111	1015	1875	8.5	2	2	I	
08-02-93	2	SS33SGJ4	17.5	3-18,1-11	1040	10	3.6	2.8	39.1	4019	8	64	1020	2000	9.8	1	1	I	DRILL CMT+ 10'
08-02-93	3	FDTC	12.25	3X14,1-10	4005	2966	88	33.7	72.8	311	14	122	720	2400	9.8	3	E	I	
08-06-93	3RR	FDTC/H.O.	12.25/17.5	TFA: 1.44	4005	2966	294	10.1	82.9	151	16	143	1090	1971	9.8	3	E	I	OPENED HOLE TO 17.5'
08-12-93	4	FTDC-L	12.25	4-12	6593	2588	76	34.1	117	370	40	130	615	3250	10	6	E	3	POOH ON ROP
08-14-93	5	DH-40H	12.25	2-14,3-13	6729	136	75	1.8	118.8	1500	8	138	700	2650	10	I	N	C	POOH F CORE #1
08-14-93	CB-1	RC-412	8.5	TFA: .7	6723	3	3.3	.9	119.7	NA	10	60	300	1280	10	I	N	C	FAILED TO CORE
08-17-93	5RR	DS-40H	12.25	2-14,3-13	9500	2766	101	27.4	147.1	331	14	160	700	3200	10.4	40	%	.1	POOH FOR BOP TEST
08-20-93	6	DS-40H	12.25	5-15	11125	2625	65	25.1	172.2	517	10.8	152	677	3118	10.7	4	X	.1	REACHED T.D.

sperry-sun
DRILLING SERVICES
A Barold Company

LOGGING SYSTEMS

BIT RECORD

CASING PROGRAM

30	inch at	309	ft
20	inch at	1022	ft
13 3/8	inch at	3681	ft
	inch at		ft
	inch at		ft

COMPANY	ARCO ALASKA, INC.	FIELD/BLOCK	NR6-4 BLOCK 673
WELL	OCS-Y-0866 NO. 2 KUVLUM #3	LOCATION	OFFSHORE - BEAUFORT SEA
CONTRACTOR	CANMAR	STATE	ALASKA
MUD COMPANY	M & I	SPUD DATE	9-9-93

DATE	BIT NO	TYPE	SIZE inches	JETS 1/32	DEPTH OUT	FEET drlg	ROP ft/hr	HRS	TOT HRS	CST $/ft	WOB klbs	RPM	FLOW gpm	SSP psi	MW ppg	GRADE B	GRADE T	GRADE G	REMARKS
09-11-93	1	ATXG1	26	21-21-21-22	1040	824	30.7	26.7	26.7	890	10	165	927	1450	8.5	E	3	I	RR BIT FROM KUVLUM 2
09-13-93	2	SS33SGJ4	17.5	18-18-18-11	1050	10	60	.15	26.75	NA	10	95	865	2200	9.8	E	2	I	DRLG CEMENT - RR BIT F/ KUV 2
09-16-93	3	FDSS	12.25	13-13-13-12	3705	2655	95	28.0	54.8	297	15	140	650	2600	9.8	E	2	I	
09-19-93	4	FDTC/H.O.	17.5	TFA:1.44	3705	2655	200	13.3	68.1	NA	15	145	1085	2500	9.8	E	3	I	OPEN HOLE TO 17.5'
09-21-93	5	DS40H	12.25	5-13	3705	0	0	0											PDC-WOULD NOT DRILL FLOAT
09-23-93	6	FDT	12.25	13-13-13-12	4585	880	96	9.1	77.2	379	22	130	688	2300	9.8	E	2	1	PULLED ON ROP
08-25-93	7	DS40H	12.25	TFA .751	8000	2934	90	36.5	113.7	317	6	172	713	3100	10.6	E	2	1	TD

sperry-sun LOGGING SYSTEMS
DRILLING SERVICES
A Baroid Company

CASING PROGRAM

30	inch at	301	ft
20	inch at	1017	ft
13 3/8	inch at	3978	ft
	inch at		ft
	inch at		ft

DRILLLING MUD RECORD

COMPANY	ARCO ALASKA INC.	FIELD/BLOCK	OCS BLK 672 NR6-4
WELL	KUVLUM #2	LOCATION	BEAUFORT SEA
CONTRACTOR	CANADIAN MARINE DRILLING	STATE	ALASKA
MUD COMPANY	M & I	SPUD DATE	28 JUL 93

DATE	DEPTH ft	WEIGHT lb/gal	VIS sec	PV cp	YP lb/hf2	GELS 10 sec/ 10 min	FLTR ml/30m	HTHP /deg F	CAKE 1/32	SOL %	OIL %	WATER %	SD %	CEC meq/hg	pH	PM	Pf/Mf	Cl- ppm	CA ppm
07-29-93	1030	8.6	300	48	56	38/75													
07-29-93	1030	8.6	100																
07-30-93	1030	8.6																	
07-31-93	1030	9.8	90	28	19	4/8	5	-	1	6.3	0	93.6	0	NA	9.5	1.8	.5/1.8	17500	1560
08-01-93	1040	9.8	50	19	26	5/8	8	-	1	5.6	0	94.4	0	5	9.9	2.2	.1/2.9	17000	400
08-02-93	1956	9.8	50	24	21	4/5	4.6	-	1	6.3	0	93.7	0	0	9.6	1.3	.8/1.7	16000	840
08-03-93	3300	9.8	54	27	23	3/5	4.0	-	1	8	0	92	0	3.25	9.5	1.1	.6/1,5	16000	1200
08-04-93	4005	9.8	52	24	22	3/5	4.2	-	1	7.8	0	92.2	1.25	3.75	9.5	1.8	.8/1.9	16000	800
08-05-93	4005	9.8	52	24	22	3/5	3.8	-	1	7.8	0	92.2	1.25	3.75	9.5	1.8	.8/1.9	16000	200
08-06-93	2240	9.8	65	26	30	3/6	4.2	-	1	8.3	0	91.7	3.0	5.0	9.2	1.3	.5/1.6	16000	600
08-07-93	4005	9.8	52	24	26	3/4	5.2	-	1	8.3	0	91.7	1.5	3.75	9.3	1.2	.4/1.6	16000	680
08-08-93	4005	9.8	50	23	21	3/4	3.8	-	1	8.3	0	91.7	1.75	3.5	9.4	1.2	.4/1.4	16000	640
08-09-93	4005	9.8	51	15	17	3/4	3.0	-	1	8	0	92	.8	3.5	9.2	1.0	.3/1.5	16000	600
08-10-93	4900	9.8+	58	19	19	3/4	3.2	-	1	8	0	92	1.5	3.0	9.9	1.0	.3/1.6	17000	860
08-11-93	5645	10.0	55	20	23	3/6	3.0	-	1	8.5	0	91.5	1.0	4..5	9.3	.7	.15/1.4	17500	680
08-12-93	6593	10.0+	59	22	28	5/9	2.7	-	1	8.5	0	91.5	1.0	4.5	9.1	.5	.1/1.3	17000	920
08-13-93	6729	10.0	79	26	32	5/10	2.6	6.4 @150	1	9	.5	90.5	1.25	4.5	9.0	.5	.1/1.3	17500	1040
08-14-93	6768	10.1	69	24	34	5/12	3.0	6.8	1	11	T	89	.75	5.5	8.9	.3	.1/1.3	17000	920
08-15-93	7698	10.0	59	25	30	3/8	2.8	6.0	1	9	T	91	1.0	6.0	8.6	.3	.1/1.3	17500	880
08-16-93	9500	10.4+	70	30	40	5/15	2.9	6.8	1	10.5	T	89.5	1.25	6.5	8.8	.3	.1/1.4	17000	920
08-17-93	9500	10.4	68	23	35	4/7	.3	6.8	1	10	T	90	.75	5.5	8.8	.3	.1/1.5	17500	920
08-18-93	10270	10.5	64	26	34	4/12	3.4	6.8	1	10	TR	90	1.0	6.5	8.6	.45	.25/1/5	17000	920
08-19-93	11125	10.7	58	27	34	3/9	3.1	6.0	1	11.5	T	88.5	1.0	6.5	8.6	.3	.2/1.5	17000	960
08-20-93	11125	10.8	56	28	36	3/13	3.0	6.2	1	11.5	TR	88.5	.75	7.0	8.5	.3	.15/1.4	17000	920
08-21-93	11125	10.9	68	28	37	3/12	2.6	7.0	1	12	T	88	1.0	7.0	8.5	.3	.15/1.4	17000	840

sperry-sun LOGGING SYSTEMS
DRILLING SERVICES
A Baroid Company

CASING PROGRAM

30	inch at	309	ft
20	inch at	1022	ft
13 3/8	inch at	3681	ft
	inch at		ft
	inch at		ft

DRILLLING MUD RECORD

COMPANY	ARCO ALASKA, INC.	FIELD/BLOCK	NR6-4 BLOCK 673
WELL	OCS-Y-0866 NO. 2 KUVLUM # 3	LOCATION	OFFSHORE - BEAUFORT SEA
CONTRACTOR	CANMAR	STATE	ALASKA
MUD COMPANY	M & I	SPUD DATE	9-9-93

DATE 1993	DEPTH ft	WEIGHT lb/gal	VIS sec	PV cp	YP lb/hf2	GELS 10 sec/ 10 min	FLTR ml/30m	HTHP /deg F	CAKE 1/32	SOL %	OIL %	WATER %	SD %	CEC meq/hg	pH	PM	Pf/Mf	Cl- ppm	CA ppm
09-09-93	309	8.8	70	16	16	12/28	-	-	-	-	-	-	-	-	9.0	-	.15/.3	650	400
09-10-93	10040	9.6	58	16	18	6/14	13	-	1	-	-	-	TR	-	9.5	.4	.2/.5	14000	560
09-11-93	1040	9.6	58	16	18	6/14	13.0	-	1	-	-	-	TR	-	9.5	.4	.2/.5	14000	560
09-12-93	1040	9.8	53	18	19	4/4	4.1	-	1	6	0	94	0	1.5	9.0	.4	.2/.8	18000	1800
09-13-93	1284	9.7+	43	16	18	3/3	5.1	-	1	6.5	0	93.5	.75	1.5	10.0	1.5	.4/1.3	17400	1560
09-14-93	2702	9.7+	72	29	35	4/5	3.2	-	1	7	0	93	2	3.5	10.1	1.3	1.1/2.7	17300	880
09-15-93	3705	9.9	82	37	44	6/9	2.2	-	1	7	0	93	1.75	4.5	9.8	1.2	.9/2.3	17100	680
09-16-93	3705	10.1	74	31	39	6/9	2.4	-	1	8.5	0	91.5	2	4.5	9.8	1.2	.9/2.4	17000	720
09-17-93	3705	10.0	54	21	26	3/4	2.8	-	1	8	0	92	.5	4.0	9.5	.5	.5/1.3	17000	480
09-18-93	2900	9.9	60	29	34	4/6	2.0	-	1	7.5	0	92.5	1.75	3.75	9.7	.5	.5/1.5	17000	240
09-19-93	3705	9.8+	80	30	42	5/9	3.6	-	1	7.5	0	92.5	1.75	4.0	9.5	.6	.5/2.5	16800	100
09-20-93	3705	9.9	62	22	21	3/6	2.4	6.4	1	7.5	0	92.5	1.5	4.0	9.9	.6	.6/1.9	17000	320
09-21-93	3705	9.8	58	19	20	3/4	3.4	7.8	1	7.2	-	92.8	.75	3.75	9.0	.6	.25/1.5	17000	360
09-22-93	3705	9.7+	56	18	20	3/4	3.4	8.0	1	7.2	-	92.8	.75	3.75	9.0	.6	.25/1.5	17000	360
09-23-93	3875	9.7+	74	20	20	2/3	3.4	6.8	1	7.0	0	93	.7	4.0	9.0	.2	.15/2.5	17000	400
09-24-93	5147	9.8	60	25	31	3/5	3.8	7.8	1	7.5	tr	92.5	.8	4.25	9.0	.5	.2/2.8	17000	240
09-25-93	6658	10.4	64	30	41	4/8	3.0	6.6	1	10.0	0	90	.5	4.5	9.1	.5	.25/2.9	17000	200
09-26-93	7036	10.5	57	25	29	4/8	2.8	6.8	1	10.0	0	90	.5	6.0	9.2	.6	.3/2.0	17000	320
09-27-93	7170	10.5	60	25	30	3/8	2.8	8.0	1	10.5	0	89.5	.5	6.0	9.2	.6	.3/2.0	17000	280
09-28-93	8000	10.6	60	31	43	4/9	3.0	7.6	1	11	0	89	.75	6.0	9.1	.6	.2/2.0	17500	320
09-29-93	8000	10.7	62	30	42	7/16	3.0	7.8	1	11.5	0	88.5	.75	5.0	9.0	.4	.15/1.9	17500	360
09-30-93	8000	10.7	65	28	40	5/14	3.0	8.0	1	11.5	0	88.5	.75	5.0	9.0	.3	.15/2.0	17500	360
10-01-93	8000	10.7	81	25	33	4/9	2.6	8.2	1	11.5	0	88.5	.75	5.0	9.0	.3	.15/1.7	17800	320
10-02-93	8000	10.5	59	20	24	3/6	3.2	8.2	1	10.5	0	89.5	.75	4.5	9.1	.3	.15/1.6	18000	320
10-03-93	8000	10.5	61	19	24	3/6	3.2	8.2	1	10.5	0	89.5	.75	4.5	9.1	.3	.15/1.5	18000	360

SPERRY-SUN DRILLING SERVICES, INC. PAGE 1

ARCO ALASKA, INC.
WILDCAT
AKMM930511:55-171-00009
JULY 1993

KUVLUM #2 OCS-Y-0865-1
KULLUK
NORTH REFERENCE : TRUE NORTH
SHORT COLLAR METHOD
MAG. FIELD STRENGTH (NT) : 57558
DIP ANGLE : 81.01
TOTAL CORRECTION : 31.55

MEASURED DEPTH	ANGLE DEGREE	DIRECTION DEGREE	VERTICAL DEPTH	LATITUDE FEET	DEPARTURE FEET	VERTICAL SECTION	DOG LEG SEVERITY
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1074.00	0.74	253.92	1073.97	-1.92	-6.65	-6.45	0.07
1170.82	0.48	251.58	1170.78	-2.22	-7.64	-7.41	0.27
1266.93	0.36	265.10	1266.89	-2.37	-8.32	-8.05	0.16
1358.72	0.33	259.03	1358.68	-2.45	-8.86	-8.52	0.05
1452.16	0.30	276.86	1452.12	-2.47	-9.37	-8.93	0.10
1547.36	0.19	262.30	1547.32	-2.46	-9.77	-9.25	0.13
1641.35	0.22	294.50	1641.31	-2.40	-10.08	-9.47	0.12
1738.12	0.43	249.86	1738.08	-2.45	-10.60	-9.90	0.33
1831.76	0.25	269.73	1831.71	-2.58	-11.13	-10.40	0.23
1927.19	0.36	260.92	1927.14	-2.62	-11.64	-10.83	0.13
2021.51	0.17	252.23	2021.46	-2.71	-12.06	-11.23	0.21
2115.73	0.25	255.09	2115.68	-2.81	-12.39	-11.54	0.08
2210.30	0.24	259.98	2210.25	-2.89	-12.78	-11.91	0.00
2306.32	0.12	18.84	2306.27	-2.83	-12.95	-12.00	0.33
2401.20	0.28	51.44	2401.15	-2.59	-12.73	-11.68	0.20
2495.88	0.23	60.47	2495.83	-2.35	-12.39	-11.26	0.07
2592.00	0.17	86.01	2591.95	-2.25	-12.08	-10.96	0.11
2687.19	0.06	223.74	2687.14	-2.27	-11.98	-10.89	0.22
2781.63	0.33	81.34	2781.58	-2.23	-11.66	-10.61	0.28
2869.95	0.24	95.79	2869.90	-2.21	-11.22	-10.25	0.13
2963.60	0.37	56.65	2963.54	-2.06	-10.77	-9.80	0.26
3060.21	0.32	47.83	3060.15	-1.70	-10.31	-9.22	0.08
3149.29	0.43	32.30	3149.23	-1.26	-9.95	-8.66	0.16
3242.22	0.51	31.18	3242.16	-0.61	-9.55	-7.95	0.09
3333.90	0.47	1.97	3333.83	0.11	-9.33	-7.34	0.27
3440.99	0.40	6.58	3440.92	0.91	-9.27	-6.80	0.06
3521.14	0.15	332.77	3521.07	1.28	-9.29	-6.59	0.35
3614.39	0.25	5.33	3614.32	1.59	-9.32	-6.43	0.15
3710.52	0.23	23.76	3710.45	1.97	-9.23	-6.12	0.08
3805.60	0.37	8.93	3805.53	2.46	-9.10	-5.73	0.17
3899.58	0.38	5.71	3899.51	3.07	-9.02	-5.29	0.03
3977.56	0.39	26.62	3977.48	3.57	-8.88	-4.87	0.18
4085.83	0.31	53.21	4085.75	4.07	-8.48	-4.25	0.16
4180.66	0.33	48.27	4180.58	4.41	-8.07	-3.72	0.02
4277.02	0.37	27.97	4276.93	4.87	-7.71	-3.16	0.13
4365.48	0.44	41.01	4365.39	5.37	-7.36	-2.57	0.13
4456.40	0.40	35.58	4456.31	5.89	-6.95	-1.93	0.06
4552.26	0.47	47.58	4552.17	6.43	-6.46	-1.22	0.12

ARCO ALASKA, INC.
WILDCAT
AKMM930511:55-171-00009
JULY 1993

KUVLUM #2 OCS-Y-0865-1
KULLUK
NORTH REFERENCE : TRUE NORTH
SHORT COLLAR METHOD
MAG. FIELD STRENGTH (NT) : 57558
DIP ANGLE : 81.01
TOTAL CORRECTION : 31.55

MEASURED DEPTH	ANGLE DEGREE	DIRECTION DEGREE	VERTICAL DEPTH	LATITUDE FEET	DEPARTURE FEET	VERTICAL SECTION	DOG LEG SEVERITY
4645.97	0.38	54.53	4645.87	6.87	-5.93	-0.53	0.12
4739.78	0.37	51.88	4739.68	7.23	-5.44	0.08	0.04
4835.25	0.39	55.89	4835.15	7.60	-4.94	0.70	0.04
4926.63	0.40	58.01	4926.53	7.94	-4.42	1.32	0.00
5020.40	0.41	67.09	5020.30	8.24	-3.84	1.97	0.07
5116.55	0.61	67.27	5116.44	8.57	-3.05	2.79	0.21
5209.97	0.53	67.04	5209.86	8.93	-2.20	3.69	0.07
5305.49	0.64	77.51	5305.37	9.22	-1.27	4.60	0.16
5398.53	0.70	76.33	5398.41	9.46	-0.20	5.59	0.06
5493.57	0.70	79.49	5493.44	9.71	0.93	6.64	0.04
5582.97	0.93	77.13	5582.83	9.97	2.17	7.78	0.26
5678.24	1.09	93.97	5678.09	10.08	3.82	9.16	0.35
5773.01	1.19	95.63	5772.84	9.92	5.71	10.56	0.11
5867.25	1.24	86.34	5867.06	9.88	7.70	12.12	0.21
5963.31	1.34	85.98	5963.09	10.03	9.86	13.93	0.10
6057.33	1.30	89.19	6057.09	10.12	12.02	15.70	0.09
6155.89	1.38	88.44	6155.62	10.17	14.33	17.56	0.08
6246.52	1.40	90.58	6246.22	10.19	16.52	19.31	0.06
6343.21	1.42	88.65	6342.88	10.20	18.90	21.21	0.05
6437.02	1.44	96.52	6436.66	10.10	21.24	23.00	0.21
6530.52	1.40	95.36	6530.13	9.86	23.54	24.68	0.05
6625.49	1.25	90.26	6625.08	9.75	25.72	26.34	0.20
6717.99	1.13	90.62	6717.56	9.73	27.64	27.86	0.12
6811.52	1.11	86.25	6811.07	9.78	29.47	29.34	0.09
6908.43	0.89	88.57	6907.97	9.86	31.15	30.72	0.23
7001.41	0.70	87.03	7000.94	9.91	32.43	31.77	0.20
7094.07	0.65	71.73	7093.59	10.10	33.49	32.73	0.20
7191.10	0.67	75.26	7190.62	10.42	34.56	33.77	0.04
7289.93	0.66	79.87	7289.44	10.66	35.68	34.81	0.05
7384.33	0.57	83.08	7383.83	10.82	36.68	35.69	0.09
7479.16	0.35	68.42	7478.66	10.98	37.41	36.37	0.26
7576.54	0.46	53.07	7576.04	11.32	38.00	37.05	0.16
7667.12	0.62	62.88	7666.61	11.76	38.73	37.89	0.20
7764.12	0.42	53.59	7763.61	12.22	39.48	38.77	0.23
7855.86	0.51	50.80	7855.35	12.67	40.06	39.51	0.09
7948.98	0.40	63.86	7948.46	13.07	40.68	40.24	0.15
8044.80	0.49	55.09	8044.28	13.46	41.32	40.98	0.12
8135.91	0.46	52.84	8135.39	13.90	41.93	41.74	0.04
8235.49	0.50	38.54	8234.96	14.48	42.51	42.55	0.12
8327.87	0.58	21.77	8327.34	15.23	42.94	43.35	0.19

ARCO ALASKA, INC.
WILDCAT
AKMM930511:55-171-00009
JULY 1993

KUVLUM #2 OCS-Y-0865-1
KULLUK
NORTH REFERENCE : TRUE NORTH
SHORT COLLAR METHOD
MAG. FIELD STRENGTH (NT) : 57558
DIP ANGLE : 81.01
TOTAL CORRECTION : 31.55

MEASURED DEPTH	ANGLE DEGREE	DIRECTION DEGREE	VERTICAL DEPTH	LATITUDE FEET	DEPARTURE FEET	VERTICAL SECTION	DOG LEG SEVERITY
8422.68	0.63	30.47	8422.14	16.13	43.38	44.25	0.11
8516.08	0.63	38.17	8515.53	16.98	43.96	45.22	0.08
8611.27	0.63	51.31	8610.72	17.72	44.69	46.25	0.15
8705.56	0.70	47.75	8705.00	18.43	45.52	47.34	0.08
8801.41	0.77	43.45	8800.84	19.29	46.40	48.56	0.08
8988.40	0.68	26.79	8987.82	21.18	47.76	50.79	0.12
9176.72	0.67	26.31	9176.13	23.16	48.74	52.78	0.00
9365.32	1.02	36.50	9364.71	25.49	50.23	55.38	0.20
9478.52	1.00	41.74	9477.89	27.04	51.49	57.32	0.09
9574.08	1.00	34.65	9573.43	28.35	52.52	58.93	0.13
9671.24	1.30	58.34	9670.57	29.62	53.94	60.83	0.57
9862.12	1.41	62.09	9861.40	31.86	57.85	65.30	0.08
9954.39	1.43	58.84	9953.64	32.99	59.84	67.56	0.09
10049.37	1.06	61.01	10048.60	34.02	61.63	69.61	0.40
10239.79	0.97	70.43	10238.99	35.42	64.68	72.88	0.10
10332.67	1.45	65.20	10331.85	36.17	66.49	74.77	0.53
10519.48	1.54	31.86	10518.60	39.30	69.96	79.43	0.46
10617.34	1.78	31.43	10616.42	41.71	71.45	82.08	0.25
10713.17	2.10	34.71	10712.19	44.43	73.22	85.15	0.35
10803.90	2.43	27.34	10802.85	47.51	75.06	88.47	0.48
10895.52	3.02	27.19	10894.36	51.38	77.05	92.41	0.64
10993.30	3.48	25.72	10991.99	56.34	79.52	97.39	0.48
11087.35	4.03	29.16	11085.84	61.80	82.36	102.96	0.63
11125.00	4.03	29.16	11123.40	64.10	83.65	105.39	0.05

CALCULATIONS BASED ON THE MINIMUM CURVATURE METHOD
HORIZONTAL DISPLACEMENT AT A DEPTH OF 11125.0 FEET
IS 105.4 FEET ALONG N 52 DEG 32 MIN E
RELATIVE TO WELL HEAD
VERTICAL SECTION RELATIVE TO WELL HEAD
VERTICAL SECTION COMPUTED ALONG 52.54 DEG
A DECLINATION OF 31.55 HAS BEEN APPLIED

Arco Alaska
COOK INLET
930818 :50-733-20450
OCTOBER 1993

SOUTH COOK INLET #3
ROWAN Gilbert Rowe
NORTH REFERENCE : GRID NORTH
SHORT COLLAR METHOD
MAG. FIELD STRENGTH (NT) : 50600
DIP ANGLE : 60.00
TOTAL CORRECTION : 0.00

MEASURED DEPTH (feet)	INCLIN (degree)	AZIMUTH (degree)	VERTICAL DEPTH (feet)	LATITUDE (N/S,+/-) (feet)	DEPARTURE (E/W,+/-) (feet)	VERTICAL SECTION (feet)	DOG LEG SEVERITY (dg/100f)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1168.26	0.57	322.73	1168.24	4.64	-3.53	2.01	0.05
1261.74	0.41	333.21	1261.72	5.31	-3.96	2.34	0.20
1356.74	0.34	76.06	1356.72	5.68	-3.84	2.72	0.62
1452.70	0.08	101.51	1452.67	5.73	-3.50	2.95	0.29
1548.29	0.31	267.17	1548.26	5.71	-3.69	2.82	0.40
1641.68	0.13	327.24	1641.65	5.78	-3.99	2.72	0.28
1733.95	0.22	329.85	1733.92	6.02	-4.14	2.85	0.10
1830.39	0.20	31.05	1830.36	6.33	-4.14	3.10	0.22
1924.83	0.18	17.28	1924.80	6.61	-4.01	3.41	0.05
2022.13	0.09	22.18	2022.10	6.82	-3.94	3.63	0.09
2115.36	0.27	50.38	2115.33	7.03	-3.74	3.91	0.21
2212.57	0.19	67.27	2212.54	7.24	-3.42	4.25	0.11
2307.50	0.32	64.32	2307.47	7.41	-3.04	4.61	0.14
2401.75	0.25	160.42	2401.72	7.33	-2.73	4.71	0.46
2495.45	0.32	26.24	2495.42	7.37	-2.54	4.84	0.56
2590.19	0.36	52.74	2590.16	7.79	-2.19	5.39	0.17
2689.37	0.33	131.61	2689.34	7.79	-1.72	5.64	0.45
2781.30	0.55	43.63	2781.26	7.93	-1.22	6.03	0.68
2874.98	0.41	21.61	2874.94	8.57	-0.79	6.79	0.24
2968.18	0.33	38.28	2968.14	9.08	-0.50	7.38	0.14
3061.97	0.27	51.92	3061.93	9.43	-0.16	7.86	0.09
3152.98	0.21	69.15	3152.94	9.62	0.17	8.20	0.09
3242.33	0.14	40.00	3242.29	9.77	0.39	8.44	0.12
3336.89	0.25	62.39	3336.85	9.95	0.65	8.73	0.13
3430.55	0.12	62.79	3430.51	10.09	0.92	9.00	0.13
3473.83	0.25	54.91	3473.78	10.17	1.04	9.12	0.30
3563.50	0.23	70.29	3563.45	10.34	1.36	9.45	0.07
3676.01	0.22	101.19	3675.96	10.37	1.78	9.70	0.10
3707.84	0.22	12.97	3707.79	10.42	1.86	9.78	0.96
3802.62	0.19	63.10	3802.57	10.67	2.04	10.09	0.19
3897.24	0.32	63.42	3897.19	10.86	2.42	10.45	0.14
3988.52	0.48	3.65	3988.47	11.36	2.68	11.01	0.46
4083.75	0.45	106.74	4083.70	11.65	3.06	11.47	0.77
4179.16	0.51	217.53	4179.11	11.21	3.16	11.15	0.83
4274.97	0.60	25.09	4274.91	11.32	3.11	11.22	1.15
4367.75	0.51	335.18	4367.69	12.13	3.14	11.92	0.51
4461.12	0.41	29.76	4461.06	12.80	3.14	12.47	0.46

4553.01	0.44	6.42	4552.95	13.44	3.34	13.12	0.19
4646.62	0.30	83.77	4646.55	13.82	3.62	13.59	0.50
4739.28	0.31	347.11	4739.21	14.09	3.80	13.92	0.49
4835.65	0.34	336.31	4835.58	14.60	3.63	14.26	0.07
4929.53	0.33	347.63	4929.46	15.12	3.46	14.60	0.07
5023.80	0.24	358.70	5023.73	15.59	3.40	14.96	0.11
5113.83	0.25	256.66	5113.76	15.73	3.20	14.98	0.43
5210.65	0.35	347.19	5210.58	15.97	2.93	15.03	0.45
5304.72	0.31	327.06	5304.65	16.47	2.73	15.34	0.12
5399.64	0.19	15.68	5399.57	16.84	2.63	15.60	0.25
5493.87	0.15	328.32	5493.79	17.09	2.60	15.80	0.15
5585.79	0.23	286.16	5585.71	17.24	2.37	15.80	0.16
5683.08	0.19	350.41	5683.00	17.45	2.16	15.87	0.23
5777.47	0.21	53.01	5777.39	17.71	2.27	16.14	0.22
5870.88	0.27	74.87	5870.80	17.87	2.62	16.47	0.11
5964.10	0.28	60.60	5964.02	18.04	3.03	16.83	0.07
6060.56	0.40	18.10	6060.48	18.48	3.35	17.37	0.28
6153.23	0.49	21.54	6153.15	19.16	3.59	18.08	0.09
6250.88	0.55	59.34	6250.79	19.79	4.15	18.91	0.35
6344.96	0.43	55.87	6344.87	20.22	4.83	19.64	0.12
6438.75	0.48	35.79	6438.66	20.74	5.35	20.36	0.18
6533.91	0.66	44.77	6533.81	21.45	5.98	21.30	0.21
6628.07	0.78	52.54	6627.96	22.23	6.87	22.43	0.16
6721.85	0.76	57.76	6721.74	22.95	7.90	23.59	0.07
6816.40	0.67	65.09	6816.28	23.52	8.93	24.62	0.14
6910.53	0.57	55.66	6910.40	24.01	9.81	25.52	0.15
7005.88	0.71	57.18	7005.75	24.60	10.70	26.49	0.14
7101.23	0.89	43.49	7101.09	25.45	11.71	27.75	0.27
7289.67	0.96	56.75	7289.50	27.38	14.03	30.62	0.12
7384.20	1.09	33.23	7384.02	28.56	15.18	32.24	0.46
7479.40	1.28	33.65	7479.20	30.21	16.27	34.21	0.20
7572.76	1.67	35.42	7572.53	32.19	17.64	36.62	0.42
7664.78	1.86	35.42	7664.50	34.50	19.29	39.46	0.21
7763.66	1.94	40.49	7763.33	37.09	21.30	42.72	0.18
7856.37	2.16	48.02	7855.98	39.45	23.62	45.96	0.37
7951.11	2.18	46.41	7950.65	41.88	26.25	49.42	0.07
8000.00	2.18	46.41	7999.51	43.16	27.60	51.23	0.00

CALCULATIONS BASED ON THE MINIMUM CURVATURE METHOD

HORIZONTAL DISPLACEMENT AT A DEPTH OF 8000.0 FEET
IS 51.2 FEET ALONG N 32 DEG 36 MIN E
RELATIVE TO WELL HEAD

VERTICAL SECTION RELATIVE TO WELL HEAD
VERTICAL SECTION COMPUTED ALONG 32.59 DEG

SHOW EVALUATION REPORTS

This section of the report contains copies of show evaluation reports for Kuvlum No. 2 and Kuvlum No. 3. These reports are based on chromatography evaluations of gases retrieved from mud samples injected into Sperry-Sun's Steam Still apparatus; consequently, interpretations made on each report reflect this procedure. Show reports are not always included in the well report analysis because of restricted information requirements placed on some wildcat wells. They do offer some insight of fluid content on potential producing zones of good permeability; however, they are often inadequate on tight zones or when gas samples are taken while coring.

See attachment regarding SPE-AIME, B.O. Pixler referencing hydrocarbon ratio evaluations.

sperry-sun LOGGING SYSTEMS
DRILLING SERVICES
A Baroid Company

Show Report 1 Part B
Depth Interval 6470 to 6500
True Vert.Depth _____ to _____
Prepared by TOM MANSFIELD
Delivered to _____
Date 8/13/93 Time 06:00 A.M.

Operator ARCO ALASKA INC.
Well Name KUVLUM #2
Location BEAUFORT SEA, ALASKA

ZONE PRODUCTION	☐ GAS	☐ OIL	☐ WATER	☒ NON-PRODUCIBLE HYDROCARBONS
CONTACT DEPTH	Gas/Oil _____ ft.	Gas/Water _____ ft.	Oil/Water _____ ft.	

5 DEPTH 6475 ft. GAS ☐ % ☒ units 122 MUD CHLORIDES (ppm) 17000

	FLOWLINE ppm	- SUCTION ppm	= SHOW ppm
	(Steam Still ppm's in 1000's)		
C_1	5,850	1,140	4,710
C_2	57	4	53
C_3	22		22
C_4	21		21
C_5	7		7

HYDROCARBON RATIOS

C_1/C_2 =	89
C_1/C_3 =	214
C_1/C_4 =	224
C_1/C_5 =	673

PRODUCTION ANALYSIS ☐ GAS ☐ OIL ☐ WATER ☒ NON-PRODUCIBLE HYDROCARBONS

6 DEPTH _____ ft. GAS ☐ % ☐ units _____ MUD CHLORIDES (ppm) _____

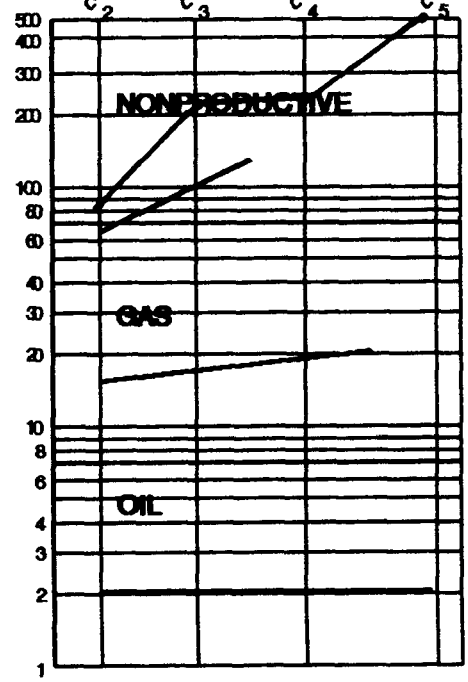
	FLOWLINE ppm	- SUCTION ppm	= SHOW ppm
	(Steam Still ppm's in 1000's)		
C_1			
C_2			
C_3			
C_4			
C_5			

HYDROCARBON RATIOS

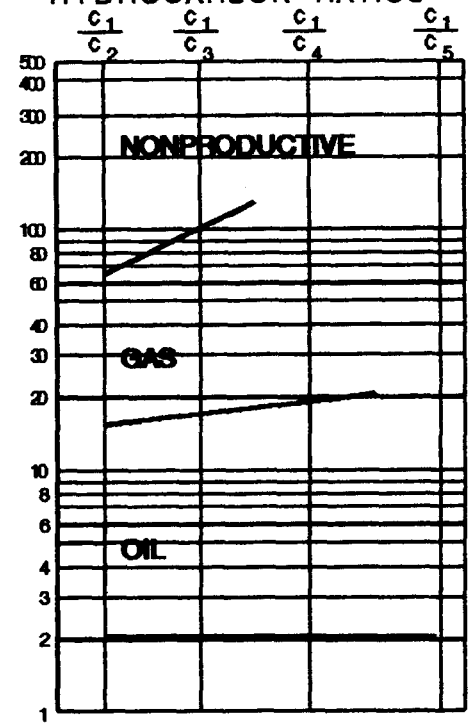
C_1/C_2 =	
C_1/C_3 =	
C_1/C_4 =	
C_1/C_5 =	

PRODUCTION ANALYSIS ☐ GAS ☐ OIL ☐ WATER ☐ NON-PRODUCIBLE HYDROCARBONS

HYDROCARBON RATIOS



HYDROCARBON RATIOS



LITHOLOGY

SAND-CLEAR, LIGHT GRAY, OCCASIONAL BLACK TO BROWN, VERY FINE GRAIN, OCCASIONAL FINE GRAIN, ANGULAR TO SUB ANGULAR, MODERATELY SORTED, PREDOMINATELY QUARTZ GRAINS, OCCASIONAL LITHIC FRAGMENT, SILTY CLAY MATRIX MATERIAL.

SHOW EVALUATION

LESS THAN 5% DULL ORANGE TO ORANGE FLUORESCENCE, TRACE YELLOW/GREEN FLUORESCENCE, FAIR YELLOW CUT FLUORESCENCE IN PART, NO ODOR, NO STAIN, SILTY CLAY MATRIX MATERIAL WITH POOR VISIBLE POROSITY.

REMARKS

POOR SHOW

sperry-sun LOGGING SYSTEMS
DRILLING SERVICES
A Baroid Company

Show Report 2 Part B
Depth Interval 6663 to 6672
True Vert. Depth _____ to _____
Prepared by TOM MANSFIELD
Delivered to _____
Date 8/13/93 Time 22:30

Operator ARCO ALASKA INC.
Well Name KUVLUM #2
Location BEAUFORT SEA, AK

ZONE PRODUCTION	[X] GAS	[ ] OIL	[ ] WATER	[ ] NON-PRODUCIBLE HYDROCARBONS
CONTACT DEPTH	Gas/Oil _____ ft.	Gas/Water _____ ft.	Oil/Water _____ ft.	

5 DEPTH 6665 ft. GAS [ ] % [X] units 506 MUD CHLORIDES (ppm) 17000

	FLOWLINE ppm	- SUCTION ppm	= SHOW ppm
	(Steam Still ppm's in 1000's)		
C_1	23,800	- 1,380	= 22,420
C_2	362	- 17	= 345
C_3	324	- 11	= 313
C_4	211	- 10	= 201
C_5	207	- 7	= 200

HYDROCARBON RATIOS
C_1/C_2 = 65
C_1/C_3 = 72
C_1/C_4 = 112
C_1/C_5 = 112

PRODUCTION ANALYSIS [ ] GAS [ ] OIL [ ] WATER [ ] NON-PRODUCIBLE HYDROCARBONS

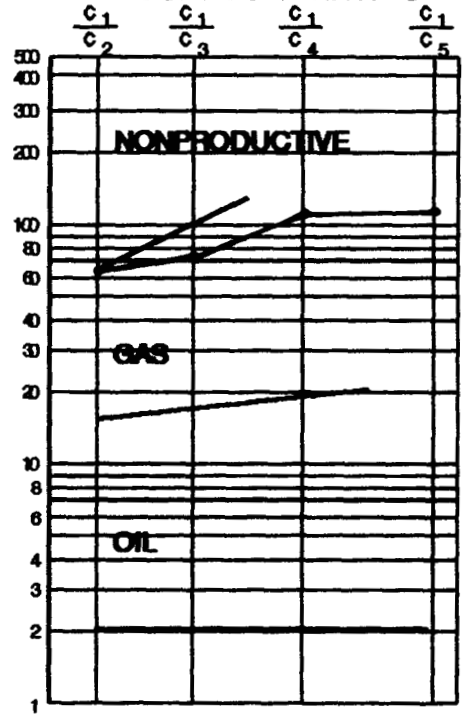
6 DEPTH 6675 ft. GAS [ ] % [X] units 472 MUD CHLORIDES (ppm) 17000

	FLOWLINE ppm	- SUCTION ppm	= SHOW ppm
	(Steam Still ppm's in 1000's)		
C_1	10,900	- 1,380	= 9,520
C_2	134	- 17	= 117
C_3	100	- 11	= 89
C_4	64	- 10	= 54
C_5	59	- 7	= 52

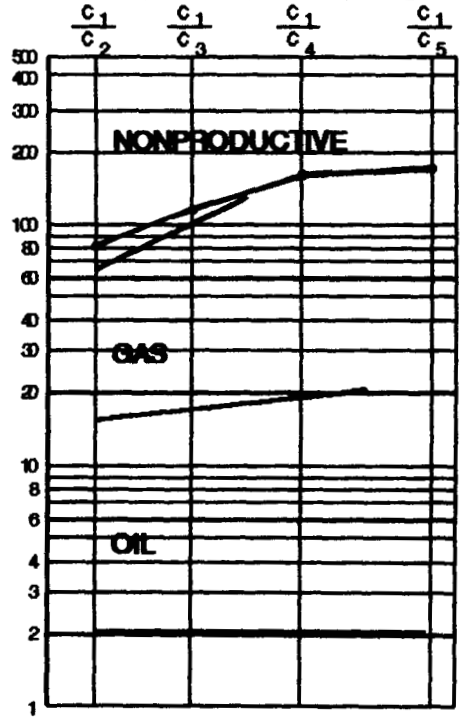
HYDROCARBON RATIOS
C_1/C_2 = 81
C_1/C_3 = 107
C_1/C_4 = 176
C_1/C_5 = 183

PRODUCTION ANALYSIS [ ] GAS [ ] OIL [ ] WATER [X] NON-PRODUCIBLE HYDROCARBONS

HYDROCARBON RATIOS



HYDROCARBON RATIOS



LITHOLOGY

SAND-CLEAR, TAN, LIGHT GRAY, BLACK IN PART, SILT-VERY FINE GRAIN, SUB ANGULAR TO SUB ROUND, PREDOMINATELY SUB ROUNDED POOR TO MODERATELY SORTED, UNCONSOLIDATED, CLAY MATRIX, 80-90% QUARTZ, 10-20% LITHIC GRAINS.

SHOW EVALUATION

MEDIUM TO BRIGHT GREEN/GOLD FLUORESCENCE ON 50% OF SURFACE, FAIR SLOW YELLOW CUT FLUORESCENCE, GOOD YELLOW/ WHITE RESIDUAL RING CUT FLUORESCENCE. FAINT TO FAIR OIL ODOR, NO VISIBLE OIL STAINING, CLAY MATRIX, APPEARS LOW IN POROSITY. FLUORESCENCE INTENSITY FADING SOMEWHAT WITH TIME.

REMARKS

GOOD RESISTIVITY READINGS (10 AVG.) FROM 6665-6670. RATIO ANALYSIS INDICATES THAT THIS ZONE CONTAINS GAS. FAIR TO GOOD SHOW RATING FOR GAS/GAS CONDENSATE.

sperry-sun LOGGING SYSTEMS
DRILLING SERVICES
A Baroid Company

Show Report 3 Part B
Depth Interval 6698 to 6720
True Vert.Depth _____ to _____
Prepared by MANSFIELD/PATTON
Delivered to _____
Date 8/13/93 Time 22:30

Operator ARCO ALASKA INC.
Well Name KUVLUM #2
Location BEAUFORT SEA, AK

ZONE PRODUCTION	[X] GAS	[ ] OIL	[ ] WATER	[ ] NON-PRODUCIBLE HYDROCARBONS
CONTACT DEPTH	Gas/Oil _____ ft.	Gas/Water _____ ft.	Oil/Water _____ ft.	

5 DEPTH 6700 ft. GAS [ ] % [X] units 523 MUD CHLORIDES (ppm) 17000

	FLOWLINE ppm	- SUCTION ppm	= SHOW ppm
	(Steam Still ppm's in 1000's)		
C_1	45,500	- 1,380	= 44,120
C_2	620	- 17	= 603
C_3	398	- 11	= 387
C_4	271	- 10	= 261
C_5	260	- 7	= 253

HYDROCARBON RATIOS

C_1/C_2 =	73
C_1/C_3 =	114
C_1/C_4 =	169
C_1/C_5 =	174

PRODUCTION ANALYSIS [X] GAS [ ] OIL [ ] WATER [ ] NON-PRODUCIBLE HYDROCARBONS

6 DEPTH 6710 ft. GAS [ ] % [X] units 504 MUD CHLORIDES (ppm) 17000

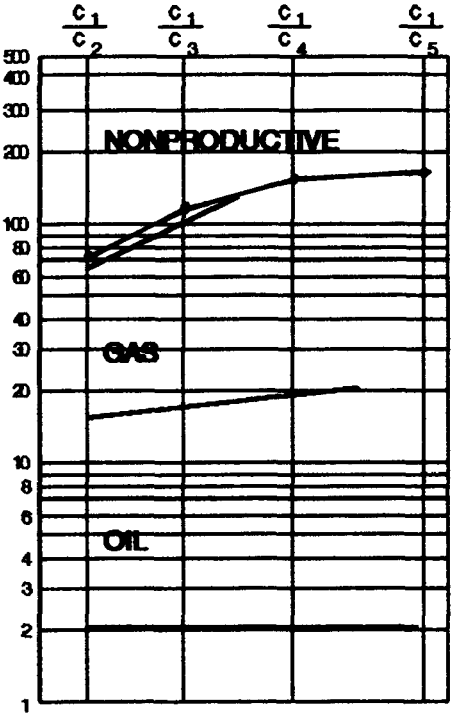
	FLOWLINE ppm	- SUCTION ppm	= SHOW ppm
	(Steam Still ppm's in 1000's)		
C_1	33,800	- 1,380	= 32,420
C_2	495	- 17	= 478
C_3	350	- 11	= 339
C_4	265	- 10	= 255
C_5	258	- 7	= 251

HYDROCARBON RATIOS

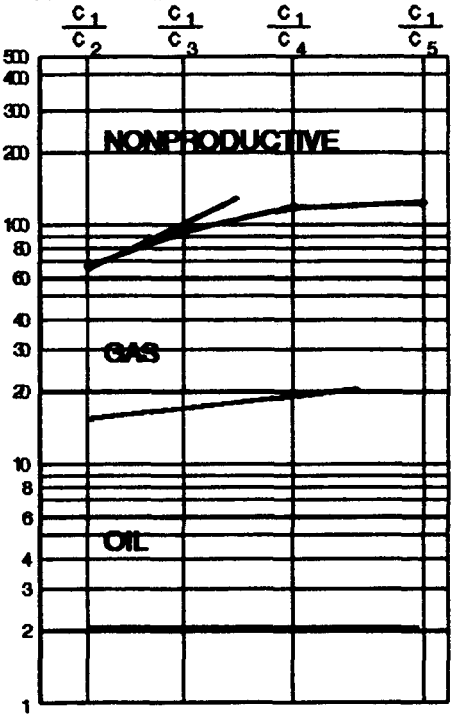
C_1/C_2 =	68
C_1/C_3 =	96
C_1/C_4 =	127
C_1/C_5 =	129

PRODUCTION ANALYSIS [X] GAS [ ] OIL [ ] WATER [ ] NON-PRODUCIBLE HYDROCARBONS

HYDROCARBON RATIOS



HYDROCARBON RATIOS



LITHOLOGY

SAND-DARK GRAY, BLACK, CLEAR, TRANSLUCENT, MEDIUM GRAY, VERY FINE TO MEDIUM GRAIN, PREDOMINATELY MEDIUM GRAIN, OCCASIONALLY COARSE TO VERY COARSE GRAIN, SUB ANGULAR TO WELL ROUNDED, PREDOMINATELY SUB ANGULAR, POOR TO MODERATELY SORTED, UNCONSOLIDATED,SILTY CLAY MATRIX, 60-70% CHERT & LITHIC FRAGMENTS, 30-40% QUARTZ.

SHOW EVALUATION

50-70% MEDIUM TO BRIGHT GREEN/GOLD FLUORESCENCE ON SAMPLE SURFACE, GOOD FAST STREAMING MILKY WHITE/YELLOW CUT FLUORESCENCE, GOOD WHITE/YELLOW RESIDUAL RING CUT FLUORESCENCE, FAIR OIL ODOR, SLIGHT TRACE OF TAN TO LIGHT BROWN OIL STAIN. FLOURESCENSE INTENSITY FADING WITH TIME IN THE 6700 AND 6710 SAMPLES.

REMARKS

RESISTIVITY READINGS AVERAGING 7-8 IN THIS INTERVAL WHICH IS SOMEWHAT LOW FOR A VERY GOOD SHOW RATING. RATIO ANALYSIS INDICATES THAT THE ZONE IS PREDOMINATELY GAS BEARING OR POSSIBLY TIGHT. GOOD OVERALL SHOW RATING FOR GAS/GAS CONDENSATE.

sperry-sun LOGGING SYSTEMS

DRILLING SERVICES
A Baroid Company

Show Report 4 Part B
Depth Interval 6721 to 6729
True Vert. Depth _____ to _____
Prepared by MANSFIELD/PATTON
Delivered to _____
Date 8/13/93 Time 24:00

Operator ARCO ALASKA INC.
Well Name KUVLUM #2
Location BEAUFORT SEA, AK

ZONE PRODUCTION	[X] GAS	[ ] OIL	[ ] WATER	[ ] NON-PRODUCIBLE HYDROCARBONS
CONTACT DEPTH	Gas/Oil _____ ft.	Gas/Water _____ ft.	Oil/Water _____ ft.	

5 DEPTH 6525 ft. GAS [ ] % [X] units _____ MUD CHLORIDES (ppm) 17000

	FLOWLINE ppm	- SUCTION ppm	= SHOW ppm	HYDROCARBON RATIOS
	(Steam Still ppm's in 1000's)			
C_1	15,500	- 1,380	= 14,120	C_1/C_2 = 61
C_2	250	- 17	= 233	C_1/C_3 = 77
C_3	194	- 11	= 183	C_1/C_4 = 98
C_4	154	- 10	= 144	C_1/C_5 = 99
C_5	150	- 7	= 143	

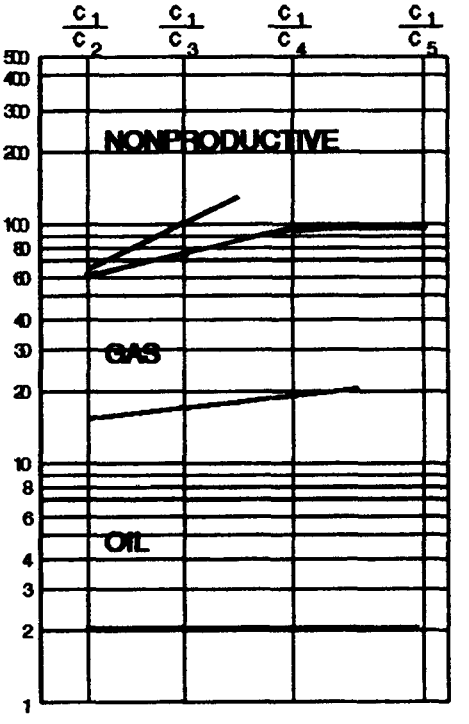
PRODUCTION ANALYSIS [X] GAS [ ] OIL [ ] WATER [ ] NON-PRODUCIBLE HYDROCARBONS

6 DEPTH 6729 ft. GAS [ ] % [X] units _____ MUD CHLORIDES (ppm) 17000

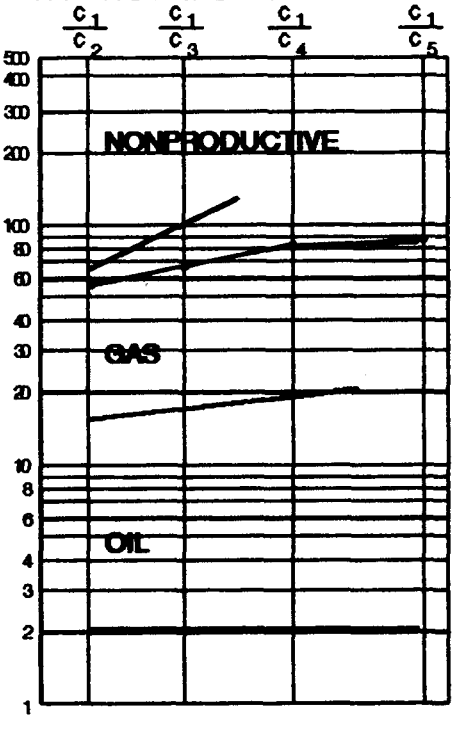
	FLOWLINE ppm	- SUCTION ppm	= SHOW ppm	HYDROCARBON RATIOS
	(Steam Still ppm's in 1000's)			
C_1	8,400	- 1,380	= 7,020	C_1/C_2 = 57
C_2	141	- 17	= 124	C_1/C_3 = 68
C_3	114	- 11	= 103	C_1/C_4 = 83
C_4	95	- 10	= 85	C_1/C_5 = 78
C_5	97	- 7	= 90	

PRODUCTION ANALYSIS [X] GAS [ ] OIL [ ] WATER [ ] NON-PRODUCIBLE HYDROCARBONS

HYDROCARBON RATIOS



HYDROCARBON RATIOS



LITHOLOGY

SAND-DARK GRAY, BLACK, CLEAR, TRANSLUCENT, MEDIUM GRAY, FINE TO MEDIUM GRAIN, OCCASIONAL COARSE GRAIN TO SMALL PEBBLE SIZE, SUB ANGULAR TO WELL ROUNDED, POOR TO MODERATELY SORTED, UNCONSOLIDATED SILTY CLAY MATRIX, 60-70% CHERT AND LITHIC FRAGMENTS, 30-40% QUARTZ, OCCASIONAL CALCITE, TRACE PYRITE.

SHOW EVALUATION

60-70%MEDIUM TO BRIGHT GREEN/GOLD FLUORESCENCE ON SAMPLE SURFACE, GOOD FAST STREAMING MILKY WHITE/YELLOW CUT FLUORESCENCE, GOOD YELLOW/GOLD RESIDUAL RING CUT FLUORESCENCE, FAIR OIL ODOR, TRACE OF TAN TO LIGHT BROWN OIL STAIN.

REMARKS

RESISTIVITY READINGS INCREASED IN THIS INTERVAL TO 15+. C1/C2 RATIOS ARE STILL IN THE GAS RANGE BUT ARE DECREASING WITH DEPTH. GOOD OVERALL SHOW RATING FOR GAS/GAS CONDENSATE.

sperry-sun DRILLING SERVICES **LOGGING SYSTEMS**
A Baroid Company

Show Report 5 Part B
Depth Interval 7095 to 7115
True Vert. Depth 7095 to 7115
Prepared by TOM MANSFIELD
Delivered to
Date AUG 15,93 Time 23:00

Operator ARCO ALASKA INC.
Well Name KUVLUM #2
Location BEAUFORT SEA, AK

ZONE PRODUCTION	[X] GAS	[ ] OIL	[ ] WATER	[ ] NON-PRODUCIBLE HYDROCARBONS
CONTACT DEPTH	Gas/Oil ____ ft.	Gas/Water ____ ft.	Oil/Water ____ ft.	

5 DEPTH 7100 ft. GAS [ ] % [X] units 258 MUD CHLORIDES (ppm) 17000

	FLOWLINE ppm	- SUCTION ppm	= SHOW ppm	HYDROCARBON RATIOS
	(Steam Still ppm's in 1000's)			
C_1	15,800	- 1,570	= 14,230	C_1/C_2 = 51
C_2	326	- 46	= 280	C_1/C_3 = 97
C_3	216	- 70	= 146	C_1/C_4 = 106
C_4	212	- 78	= 134	C_1/C_5 = 117
C_5	205	- 83	= 122	

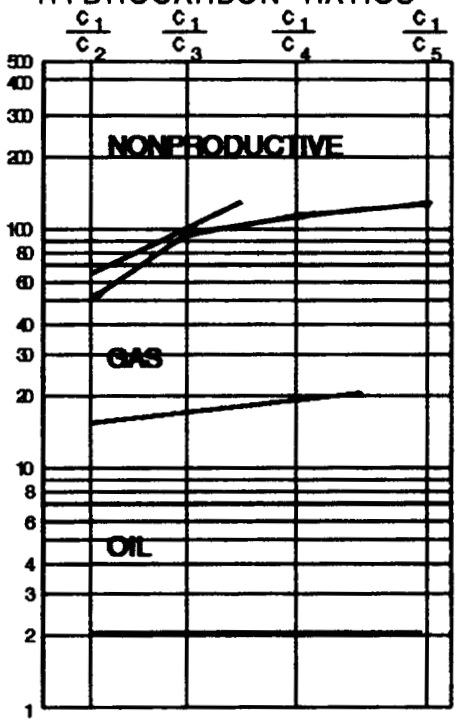
PRODUCTION ANALYSIS [X] GAS [ ] OIL [ ] WATER [ ] NON-PRODUCIBLE HYDROCARBONS

6 DEPTH 7110 ft. GAS [ ] % [X] units 268 MUD CHLORIDES (ppm) 17000

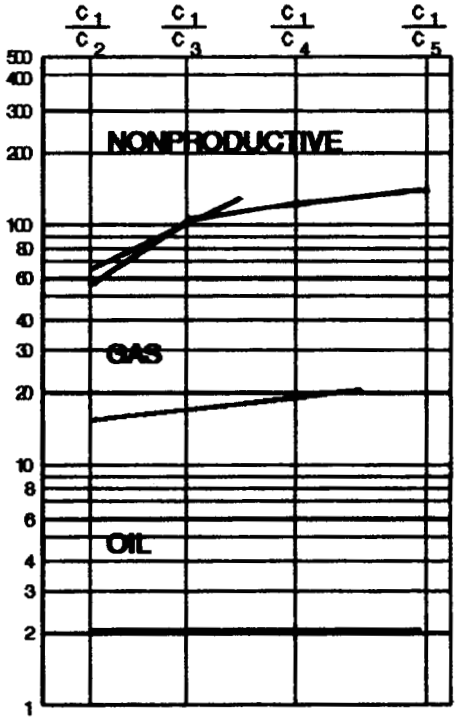
	FLOWLINE ppm	- SUCTION ppm	= SHOW ppm	HYDROCARBON RATIOS
	(Steam Still ppm's in 1000's)			
C_1	10,800	- 1,570	= 9,230	C_1/C_2 = 56
C_2	210	- 46	= 164	C_1/C_3 = 103
C_3	160	- 70	= 90	C_1/C_4 = 123
C_4	153	- 78	= 75	C_1/C_5 = 134
C_5	152	- 83	= 69	

PRODUCTION ANALYSIS [X] GAS [ ] OIL [ ] WATER [ ] NON-PRODUCIBLE HYDROCARBONS

HYDROCARBON RATIOS



HYDROCARBON RATIOS



LITHOLOGY

SAND-BLACK,M TO DARK GRAY, CLEAR,TRANSLUCENT,WHITE,FINE TO COARSE GRAIN,PREDOMINATELY COARSE GRAIN, ANGULAR TO SUB ANGULAR, POORLY SORTED, UNSCONSOLIDATED, TRACE CALCITE CEMENT (ONLY IN PART), 80% LITHIC FRAGMENTS,20% QUARTZ, 10% DULL ORANGE MINERAL FLUORESCENCE.

SHOW EVALUATION

10% BRIGHT YELLOW/WHITE SAMPLE FLUORESCENSE, VERY SLOW POOR WHITE CUT FLUORESCENCE, NO RESIDUAL CUT FLUORESCENCE. NO STAIN.

REMARKS

RESISTIVITY READINGS AVERAGED 7-8 FOR THIS INTERVAL. RATIO ANALYSIS INDICATES THAT THIS ZONE CONTAINS GAS. FAIR OVERALL SHOW RATING FOR GAS.

Formation Evaluation by Analysis of Hydrocarbon Ratios

B. O. Pixler, SPE-AIME, Baroid Div. National Lead Co.

Introduction

Mud logging was first offered commercially in Aug., 1939. This logging method quickly gained favor among many operators because the type of fluid in the formation could be determined within minutes after the formation was drilled. The presence and magnitude of the methane show was and is the most important factor in mud log interpretation. However this magnitude in some instances was improperly understood, and as a consequence some operators still do not use mud logging, even though the early technique frequently made the difference between a successful well and an abandoned hole. Both the "hot wire" log of gas combustibles in the sample and the percent-of-gas log obtained with the conventional gas trap and the gas chromatograph indicate only that the reservoir in question contains hydrocarbons. These methods do not necessarily indicate the quantitative amounts of the various hydrocarbons in the mud.

The addition of a new Steam Still-Reflux gas sampling system to gas chromatography enables accurate determination of the composition of the mud gas sample. A knowledge of gas composition makes it possible to establish the relationship of methane to the heavier hydrocarbon shows. An awareness of this relationship led to a new, additional mud log interpretative technique that permits relating the quantitative amounts of methane (C_1), ethane (C_2), propane (C_3), butane (C_4), and pentane (C_5) to in-place reservoir fluid content.

A long-accepted premise is that as formations are drilled, the drilling mud filtrate partially flushes the formation fluid ahead of the bit. It was generally thought that the formations were flushed to an irreducible minimum — generally considered to be about 30 percent of in-place fluid. Experience in mud logging, however, has shown that this rarely happens. This partial flushing does not prevent mud logging from successfully determining productive or nonproductive formations. Experienced logging engineers, in possession of quantitative gas analyses, make interpretations that take into account the flushing that results in rocks of various permeabilities, the effect of overbalanced mud weight and the effect of initial filtrate loss.

Method

Ordinarily, when formation cuttings are drilled they retain much of the formation pore fluid. This fluid is released to the mud column as the cuttings travel up the annulus. Most of the formation fluid in the cuttings will be "produced" into the drilling mud during the top 500 ft of hole travel. Conventionally, a mud sample is diverted to a mechanically operated gas trap to obtain a sample of the gas in the mud. The efficiency of this trap is from 15 to 70 percent, depending upon the gel strength of the mud, the amount of mud flowing through the trap and the rotation speed of the trap impeller. The magnitude of the conventional

The ratio of methane to the heavier hydrocarbon components — ethane, propane, butane, and pentane — is indicative of gas, oil and water productive potential. The Steam Still-Reflux Unit, used in conjunction with mud logs and gas chromatographs yields a quantitative analysis from which this ratio can be plotted.

gas show is, therefore, quantitative only to the air-gas sample obtained. The sample is accurately analyzed by the gas chromatograph; but, because the sample furnished by the conventional gas trap represents only a fraction of the gas present in the mud, and because that fraction is not representative of the total gases in the mud, the results are still only qualitative.

When the Steam Still-Reflux Unit is used to obtain the gas sample, the gas sample will represent almost 100 percent of the hydrocarbon fractions C_1 through C_5 that were in the mud sample. This enables the chromatograph analysis to be related quantitatively to the mud, and the readings to be reported as parts per million of each hydrocarbon vapor (C_1 through C_5) to mud volume.

Because the cuttings from a particular formation "produce" the gas they contain into the drilling mud, it was reasonable to assume that this same formation, if completed, would produce gases of a similar composition. This assumption led to a comparison of ppm Logs of hydrocarbon vapors with similar data from producing wells. Plots were made of the ratio of methane to each of the heavier hydrocarbons from many analyses of wellhead samples. These plots were compared with plots, made from ppm Logs, of gas in mud. Both groups of plots showed definite patterns between (1) the magnitude of the ratios of methane to each of the heavier hydrocarbons, and (2) the slope of the lines of the plotted ratios. These, in turn, indicate productive potential and reservoir permeability.

The Steam Still-Reflux Unit consists of a small steam boiler, mud-injection port, mud-steam mixing chamber, Reflux-Condensing Unit and a gas-extraction port. Five ml of mud are injected into the purged mud-steam mixing chamber. The mud is rolled with 2,000 to 4,000 volumes of steam. The hydrocarbons (C_1 through C_5) extracted from the mud are collected at the Reflux-Condensing Unit, withdrawn with a syringe, diluted to the standard chromatograph sample size and injected into the chromatograph for analysis. The Reflux-Condensing Unit removes only the lighter paraffin series hydrocarbons from the mud sample tested. For example, if the mud contains diesel oil, the more complex hydrocarbons — C_6 and above — condense and drop back into the mud-steam mixing chamber. Therefore, regardless of whether the fluid phase of the mud is oil or water, the gas sample analyzed contains only the light fractions through C_5, and the analysis is representative of the formation gas.

The full importance of determining formation gas composition has not always been apparent. At first it was observed that if the magnitude of butane in the mud was greater than the magnitude of either propane or ethane, the zone in question would produce water and hydrocarbons. Later, the ratios of methane to each of the heavier hydrocarbon components were plotted on semilog paper. Hydrocarbon ratio plots obtained from ppm Logs and available data from wellhead gas sample analyses were compared. The comparison of the plots from ppm Logs and wellhead gas analysis data showed a striking correlation. The correlation demonstrated that ppm Logs made with Steam Still-Reflux samples could be interpreted in terms of in-place formation content.

The magnitude of the methane-to-ethane ratio determines if the reservoir contains gas or oil or if it is nonproductive. The slope of the line of the ratio plot of C_1/C_2, C_1/C_3, C_1/C_4, and C_1/C_5 indicates whether the reservoir will produce hydrocarbons or hydrocarbons and water. Positive line slopes indicate production; negative slopes indicate water-bearing formations. An undersaturated reservoir may show a negative slope, but such occurrences are rare. The ratio plots may not be definitive for low permeability zones, but unusually steep plots indicate tight zones.

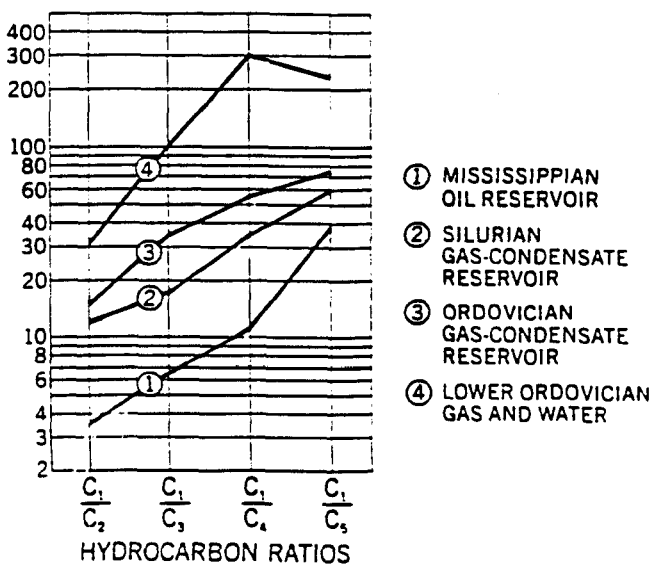


Fig. 1—Hydrocarbon ratio plots obtained from wellhead sample analyses data, limestone reservoirs, Rocky Mountain area.

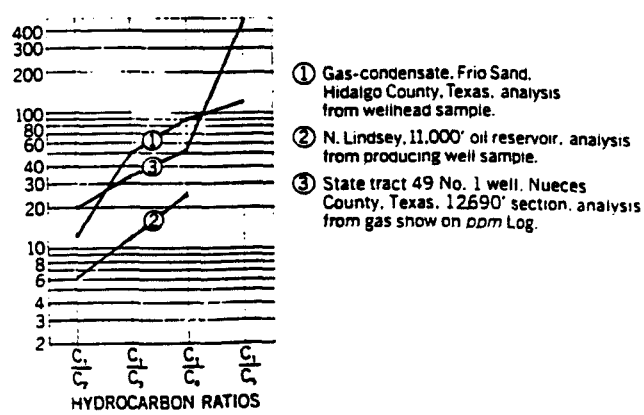


Fig. 2—Hydrocarbon ratio plots, productive reservoirs, South Texas.

A ratio of C_1/C_2 between 2 and 15 indicates oil. A ratio of C_1/C_2 between 15 and 65 indicates gas. The lower the C_1/C_2 ratio, the richer the gas or the lower the oil gravity. If the ratio of C_1/C_2 is below about 2 or above about 65 the zone is nonproductive.

Field Examples

Fig. 1 shows average hydrocarbon ratio plots from limestone reservoirs in the Rocky Mountain area. Plot 1 is derived from analyses of gases from Mississippian oil-producing reservoirs. The C_1/C_2 ratio is 3.5. The slope of the line is positive and not steep. Plot 2 was obtained from analyses of gases from wells producing gas-condensate from the Silurian. The C_1/C_2 ratio is 12; the line slope is again positive and not steep. Plot 3 is from gas-condensate wells producing from the Ordovician. The C_1/C_2 ratio is 15 and, again, the slope of the line is not steep; all three plots show slopes favorable for production. Plot 4 shows ratios obtained from an analysis of gas from the Lower Ordovician, which produced gas and water. The plot shows a negative slope of the section from the C_1/C_4 ratio to the C_1/C_5 ratio. Many tests have verified the fact that if a ratio plot shows a negative slope, the zone in question is water-bearing.

Fig. 2 shows plotted hydrocarbon ratios for productive reservoirs in South Texas. Plot 1 was made from an analysis of a wellhead sample of gas-condensate produced from a Frio sand, Hidalgo County. The production is rich in liquid hydrocarbons as indicated by the low C_1/C_2 ratio. Plot 2 is from an analysis of a wellhead gas sample from an 11,000-ft oil reservoir, North Lindsey field. The pentane was not reported, but the low C_1/C_2 ratio indicates oil production. Plot 3 was obtained from a gas show at 12,690 ft on the ppm Log of the State Tract 49 No. 1 Well, Nueces County, Tex. Formation tests resulted in gas production.

Experience shows that if the C_1/C_2 ratio is above 65 the zone is too tight for commercial production. Fig. 3 shows the ratio plots obtained from ppm Logs on Texas Gulf Coast wells that were nonproductive in the zones of interest. Plot 1 is from the ppm Log of the R. A. Tally No. 1 Well, Victoria County, Tex. The C_1/C_2 ratio was 470. The zone was tested extensively but it was a low permeability reservoir that could not be commercially completed. Plots 2 and 3 are from the State Tract 49 No. 1 Well, Nueces County, Tex. Plot 2 was from a sand encountered at about 8,060 ft. The relatively high ratios of C_1/C_2, C_1/C_3, C_1/C_4, and C_1/C_5 indicated that the zone was nonproductive because of the low permeability. This was subsequently verified by testing. Plot 3 was obtained from a sand at 9,130 ft. The negative slope of the ratio plot, C_1/C_2 to C_1/C_3, indicated that the zone was water-bearing. Subsequent formation tests showed water and non-commercial amounts of gas.

Plot 4 was obtained from the ppm Log of the Kovar No. 1 Well, Victoria County, Tex. The sand encountered from which the plot was made is at 10,120 ft. The gas show appeared to be good, but a negative slope of the C_1/C_3 ratio to the C_1/C_4 ratio was positive identification of a water-bearing formation.

Evaluation Technique

It is apparent that with this evaluation system, potential production can be accurately predicted. The only significant time lapse between penetration of the formation and evaluation of its productive possibilities is the time required to pump the mud from the bottom of the hole to the surface and analyze it by the Steam Still-Reflux and Chromatograph method. Fig. 4 shows the evaluation technique, which may be described as follows.

First, record the net increase of each gas component over the background gas; next, plot the ratios

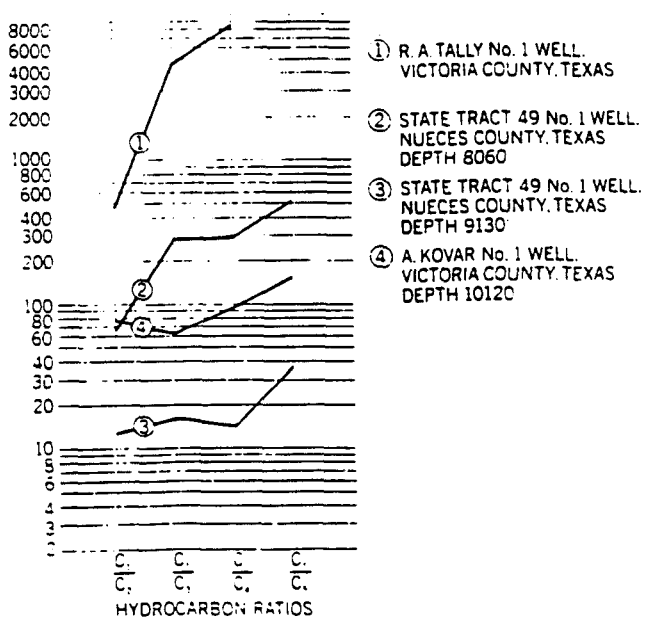


Fig. 3—Hydrocarbon ratio plots, nonproductive reservoirs, South Texas—analyses from gas shows on ppm Logs.

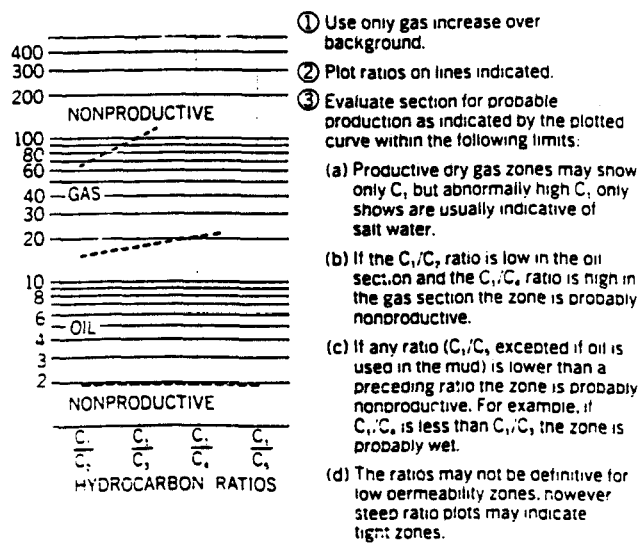


Fig. 4—ppm Log and report form for evaluation of show.

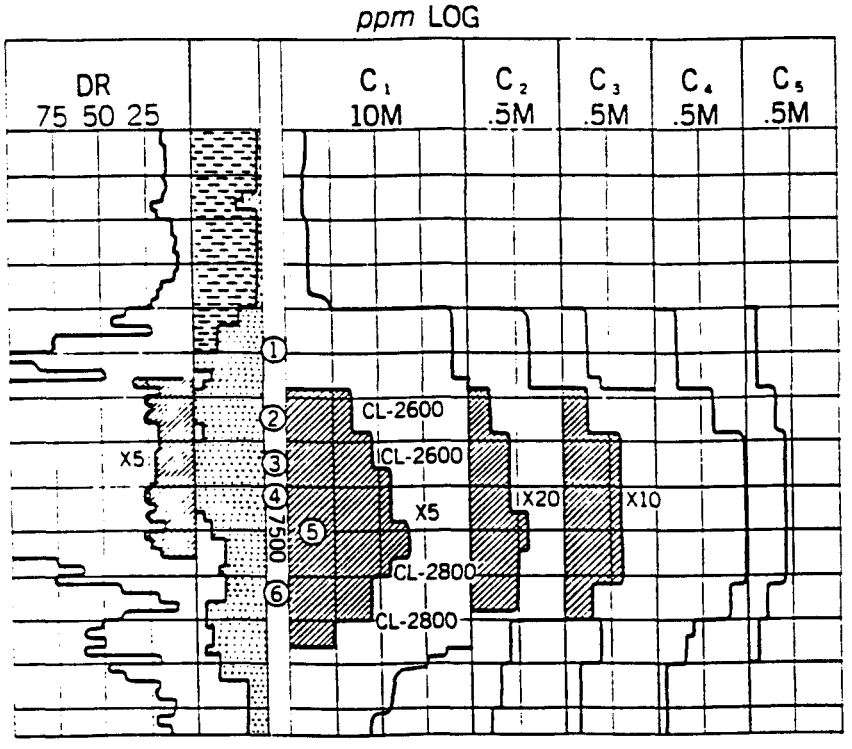
C_1/C_2, C_1/C_3, C_1/C_4, C_1/C_5 on the ratio lines as indicated. Then evaluate, within the following limits, the section in question for probable production as indicated by the plotted curve:

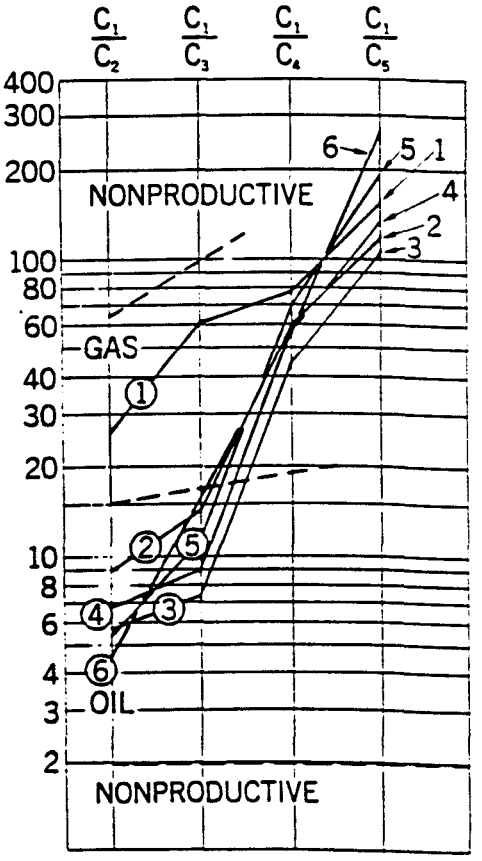
1. Productive dry gas zones may show only C_1, but abnormally high shows of C_1 only are usually indicative of salt water.
2. If the C_1/C_2 ratio is low in the oil section and the C_1/C_4 ratio is high in the gas section the zone is probably nonproductive.
3. If any ratio (C_1/C_5 excepted if oil is used in the mud) is lower than a preceding ratio, the zone is probably nonproductive. For example, if C_1/C_4 is less than C_1/C_3, the zone is probably water-bearing.
4. The ratios may not be definitive for low permeability zones; however, steep ratio plots may indicate tight zones.

Application

The ppm Log is only one of many tools that are ordinarily used for formation evaluation. But in many instances, the ppm Log has furnished the vital information necessary to make the final decision on a well. One well drilled in inland waters of Louisiana had what appeared on the ppm Log to be a good sand body, but the ppm Log showed only a nominal increase in gas. After the sand was penetrated and the well deepened, hole trouble was encountered. No other information of interest was available on the sand. The cost of the side-tracking to investigate the sand was sizable. Tight hole conditions and the low magnitude of the gas show indicated that the sand had good permeability and that possibly formation hydrocarbons had been flushed ahead of the bit. A plot of the hydrocarbon ratios indicated oil production. Therefore, at considerable expense, the sand was investigated and a new oil field was found.

An interesting well recently drilled in St. Martin Parish, La., was the No. 1 St. Martin Bank and Trust located on the southeast flank of the Anse La Butte Dome. A good sand encountered at about 8,000 ft showed oil, but the negative slope of the ratio plot indicated that the sand was water-bearing. The well was deepened to approximately 9,600 ft. One of the partners, a successful independent with a talent for finding oil by "feel" and by prudent use of the latest technology, decided that the formations in which the well was being drilled were tilted to almost vertical.





HYDROCARBON RATIOS

PLOT	$\frac{C_1}{C_2}$	$\frac{C_1}{C_3}$	$\frac{C_1}{C_4}$	$\frac{C_1}{C_5}$
1	26	62	78	155
2	8.6	14	59	118
3	5.6	7.4	46	106
4	6.8	9.1	56	130
5	5.4	11	70	193
6	4.5	15	54	254

Fig. 5—ppm Log and hydrocarbon ratio plots. No. 1 St. Martin Bank and Trust Well, St. Martin Parish, La.

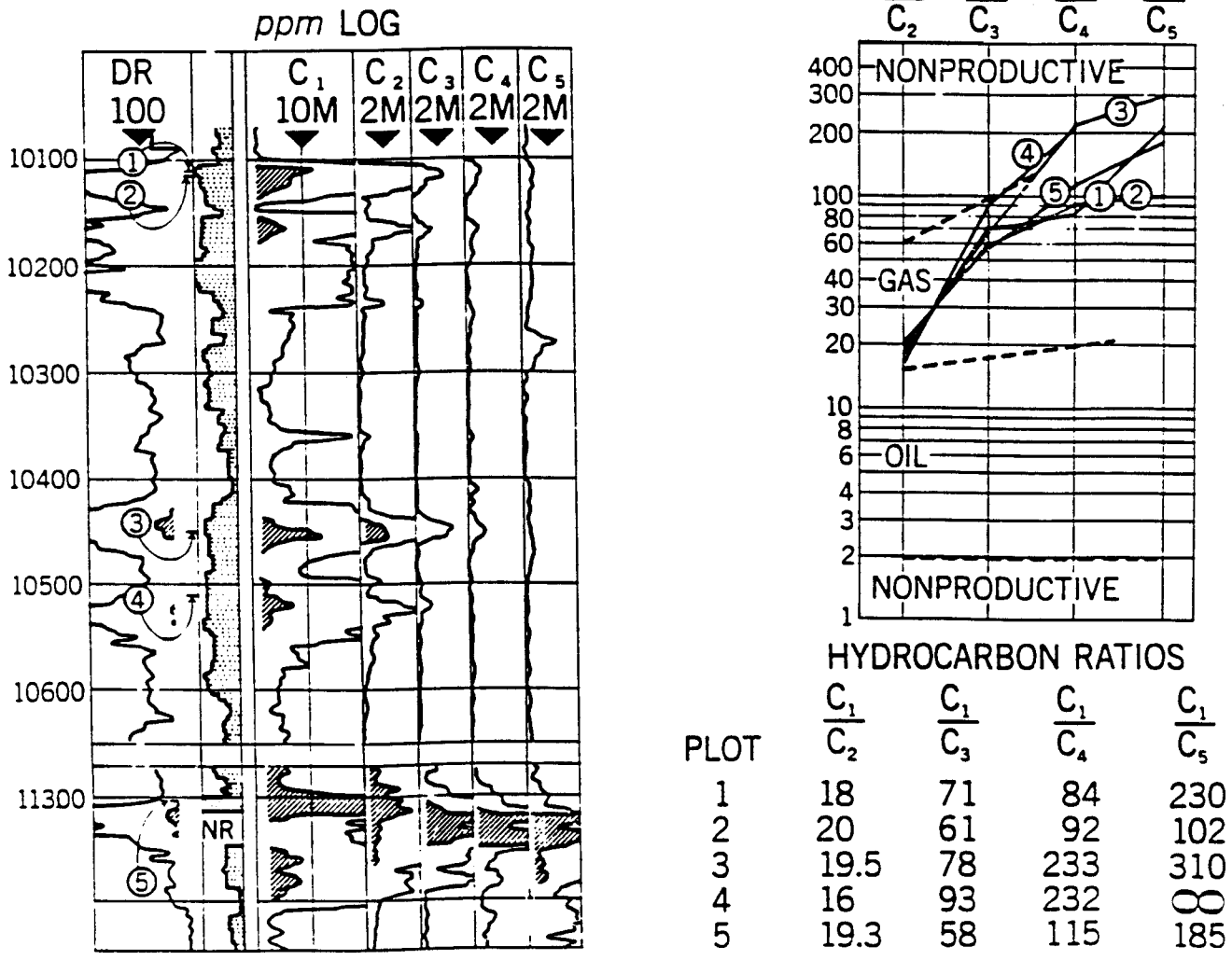
On his recommendaion the well was plugged back to about 7,000 ft and sidetracked. The sand that was drilled at 8,000 ft in the first hole was encountered in the directional hole at approximately 7,400 ft and the entire sand was hydrocarbon saturated.

The ppm Log and the ratio plots from the sand in the sidetrack hole are shown in Fig. 5. Table 1 shows the mud gas components related to percent of total gas. In actual practice the ppm gas shows obtained from the ppm Log are not converted to percent of total gas; but note the general decrease in percent methane in the lower section of the sand compared with that in the upper section. The magnitude of the gas show in the straight hole and in the sidetrack hole was significant. An accurate determination, however. of the composition of the gas in both cases led to correct conclusions on the potential productivity of the sand at the different depths in each hole. Note that the ratio Plot 1 at the top of the sand indicates a gas cap. As shown in Table 1, the gas was 93.1 percent methane. Subsequent plots indicated that production would be oil. In each of these cases the C_1/C_2 ratio was less than 9. The lowest ratio, 4.5, is shown in Plot 6. which was made from the show at the bottom of the sand.

TABLE 1—MUD GAS COMPONENTS, PERCENT OF TOTAL GAS

Depth (ft)	C_1	C_2	C_3	C_4	C_5
7,460	93.1	3.6	1.5	1.2	0.6
7,475	82.4	9.6	5.9	1.4	0.7
7,485	74.4	13.3	10.0	1.6	0.7
7,490	78.0	11.4	8.6	1.4	0.6
7,500	77.0	14.3	7.2	1.1	0.4
7,515	76.1	17.1	5.1	1.4	0.3

Another example of the application of the ppm Log is No. 1 State Tract 198 Well, Aransas County, Tex. Many sands were encountered showing the presence of hydrocarbons. The logging crew submitted more than 60 ratio plots to the operator during the drilling of the well. In almost all instances subsequent information verified the logging engineers' predictions of probable productivity based on the ratio plots. Fig. 6 shows a section of the ppm Log and the ratio plots for this well. The gas composition relating the percent of each gas component to the total gas is shown in Table 2. Gas condensate production is indi-



PLOT	C_1/C_2	C_1/C_3	C_1/C_4	C_1/C_5
1	18	71	84	230
2	20	61	92	102
3	19.5	78	233	310
4	16	93	232	∞
5	19.3	58	115	185

Fig. 6—ppm Log and hydrocarbon ratio plots. No. 1 State Tract 198 Well. Aransas County. Tex.

TABLE 2—MUD GAS COMPOSITION, PERCENT OF TOTAL GAS

Depth (ft)	C_1	C_2	C_3	C_4	C_5
10,110	92.0	5.2	1.3	1.1	0.4
10,115	92.0	4.6	1.5	1.0	0.9
10,450	93.3	4.8	1.2	0.4	0.3
10,520	92.8	5.8	1.0	0.4	0.0
11,305	92.3	4.8	1.6	0.8	0.5

cated by the ppm Log and ratio plots as shown. The zones are tight marine deposits — especially the 10,520-ft zone. Plot 4 has the steepest line slope; pentane was not present. The slope of Plot 3 is steep. Plots 2 and 5 show more favorable (less steep) line slopes. The electric log and subsequent formation tests made of each zone indicated probable production. The well was completed as a gas condensate producer in the 11,300-ft section, which is the section plotted as No. 5.

Conclusions

Only qualitative shows of hydrocarbons in the mud can be derived from conventional mud logs. If chromatography is used, only a general indication of in-place gas composition is obtainable. Such hydrocarbon shows may be reported as units of gas or percent hydrocarbons or parts per million of gas in the air-gas mixture tested. Only the presence in relative amounts, not the actual quantity, of hydrocarbons in mud is indicated, and other supplemental information may be necessary to evaluate the formation in terms of potential productivity. However, if the composition of the gas sample obtained from the mud is representative of the in-place formation gas, then the gas analysis is accurate. The use of the Steam Still-Reflux Unit makes possible a report of formation gas composition on the ppm Log. Meaningful ratio plots of gas composition can then be made. Even though many factors affect the amount of reservoir fluid released to the drilling mud, reservoir potential productive capabilities can be determined by a study of the ratio of methane to each of the heavier hydrocarbon components. The hydrocarbon ratio plot is a unique technique and provides the operator with new information for evaluating productive possibilities of exploratory wells.

Computer programs involving percent gas in mud (ppm Log) and gas composition are being used in special cases to determine reservoir potential production. The use of computers in mud log interpretation, although new, will contribute significantly towards a better application of the data shown on the ppm Log.

JPT

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sperry-sun DRILLING SERVICES
A Baroid Company

LOGGING SYSTEMS

DEPTH 296
OPERATION DRLG
FOOTAGE 71

NO. 1
DATE Jul 29 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	0-1		
CONNECTION			
TRIP			
FLOWLINE TEMP	NA	degrees F	

SURVEY DATA NA
LITHOLOGY NA
SAMPLE DEPTH
TRIP CHLORIDES
LAG DOWN DP
LAG OFF BOTTOM NA

DRILL RATE ft/hr 5.2
CORRECTED 'D' EXP.
SHALE DENSITY g/cc
EWR Res.

FORMATION PRESSURE DATA

	CASING		BOTTOM HOLE		OPEN HOLE		
PORE PRESSURE	psi	ppg	131 psi	8.5 ppg	psi	ppg	ft
FRACTURE PRESSURE	NA psi	ppg	psi	ppg	psi	ppg	ft
ECD	psi	ppg	132 psi	8.6 ppg	psi	ppg	ft

MUD DATA

TIME	
TYPE	SEA WATER
WEIGHT IN	8.5
FUNNEL VIS.	
PV/YP	
GELS	
pH	
FILT/CAKE API	
HP-HT	
Pm	
Pf/Mf	
CHLORIDES ppm	
CALCIUM ppm	
OIL/WATER/SOLIDS	
DAILY/CUM. COST	

BIT DATA

BIT NO.	1	
TYPE	ATXG1	
IADC CODE		
SIZE	26	
JETS	3-21.1-22	
DEPTH OUT		
ROT HRS.	14.7	
FOOTAGE	67	
AVG ft/hr	5.2	
GRADE		
HOLE DEV.		
COST/FT		
RPM	140	
WOB	35	

HYDRAULIC DATA

PUMPS	1. ID 1600	2. 1D
SIZE inches	7.5x12	7.5x12
CAPACITY gal/stk	6.54	6.54
PUMP RATE stks/min	81	80
FLOW RATE gal/min	530	523
PRESSURE psi	1490	
PD SURF / DS psi	193	
ANN / BIT psi	0	
JET VELOCITY ft/sec	246	
JET IMPACT lbs	1149	
BIT HP	988	
HP RATIO / HP/IN2	.4 hp/in2	
REDUCED RATE 1	psi at stk/min	
2	psi at stk/min	

ANNULAR DATA

	LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
9.5X26	71	.636	40	378	14
5X26					

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH			
OD-inches	5.0	5.0		9..5					
ID-inches	4.276	3.0		2.875					
CAP-bbls/ft		.0087		.0080					
DISP-bbls/ft		.0181		.0707					
LENGTH-ft		193		103					
WEIGHT-lbs/ft	19.5	49		195					

REMARKS AND RECOMMENDATIONS

MW GPM JETS ft/mi = sec/std

RIG UP TO RUN 30" CSG. RUN 30" CSG AND LOCK INTO PGB. PU 26" BIT. BHA AND MUD MOTOR. DRILL AND WASH CSG TO 296'. NO RISER.
GAS LIFT SYSTEM INSTALLED. BACKGROUND GAS 0-1 UNIT.

ADT DON WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 915
OPERATION DRLG
FOOTAGE 619

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 2
DATE Jul 30 93
TIME 04 00

OPERATOR	ARCO ALASKA. INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	5	8	
CONNECTION			
TRIP			
FLOWLINE TEMP	NA	degrees F	

SURVEY DATA NA
LITHOLOGY NA
SAMPLE DEPTH
TRIP CHLORIDES
LAG DOWN DP
LAG OFF BOTTOM NA

DRILL RATE ft/hr 65
CORRECTED 'D' EXP.
SHALE DENSITY g/cc
EWR Res.

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	133 psi	8.5 ppg		404 psi	8.5 ppg		psi	ppg	ft
FRACTURE PRESSURE	NA psi	ppg		psi	ppg		psi	ppg	ft
ECD	135 psi	8.64 ppg		419 psi	8.8 ppg		psi	ppg	ft

MUD DATA

TIME	
TYPE	SEA WATER
WEIGHT IN	8.5
FUNNEL VIS.	
PV/YP	
GELS	
pH	
FILT/CAKE API	
HP-HT	
Pm	
Pf/Mf	
CHLORIDES ppm	
CALCIUM ppm	
OIL/WATER/SOLIDS	
DAILY/CUM. COST	

BIT DATA

BIT NO.	1
TYPE	ATXG1
IADC CODE	
SIZE	26
JETS	3-21.1-22
DEPTH OUT	
ROT HRS.	33.4
FOOTAGE	705
AVG ft/hr	20.6
GRADE	
HOLE DEV.	
COST/FT	
RPM	107
WOB	22

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	7.5x12	7.5x12
CAPACITY gal/stk	6.54	6.54
PUMP RATE stks/min	80	80
FLOW RATE gal/min	523	523
PRESSURE psi	1900	
PD SURF / DS psi	176/991	
ANN / BIT psi	1/416	
JET VELOCITY ft/sec	234	
JET IMPACT lbs	1040	
BIT HP	245	
HP RATIO / HP/IN2	.5 hp/in2	
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

	LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
9.5X26	690	.636	42	390	14
5X26					

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	301			
OD-inches	5.0	5.0		9..5			30			
ID-inches	4.276	3.0		2.875			28			
CAP-bbls/ft		.0087		.0080			.7616			
DISP-bbls/ft	.	.0181		.0707						
LENGTH-ft		587		103			90			
WEIGHT-lbs/ft	19.5	49		195			310			

REMARKS AND RECOMMENDATIONS

MW GPM JETS ft/mi = sec/std

LAND 30" CSG AT 301'. UNLATCH FROM CASING AND DRILL AHEAD WITH 26" BIT AND MUD MOTOR TO 915'. MONITORING WELL VIA GAS LIFT TO SHALE SHAKERS.BACKGROUND GAS 4-6 UNITS. MAX GAS 8 UNITS.

ADT DON WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

DEPTH	1030			NO.	3
OPERATION	DRLG			DATE	Jul 31 93
FOOTAGE	115			TIME	04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	5	9	
CONNECTION			
TRIP			
FLOWLINE TEMP	NA	degrees F	

SURVEY DATA	1030 1.5 Deg
LITHOLOGY	NA
SAMPLE DEPTH	
TRIP CHLORIDES	
LAG DOWN DP	
LAG OFF BOTTOM	NA

DRILL RATE ft/hr	30
CORRECTED 'D' EXP.	
SHALE DENSITY g/cc	
EWR Res.	

FORMATION PRESSURE DATA

	CASING		BOTTOM HOLE		OPEN HOLE		
PORE PRESSURE	133 psi	8.5 ppg	404 psi	8.5 ppg	psi	ppg	ft
FRACTURE PRESSURE	NA psi	ppg	psi	ppg	psi	ppg	ft
ECD	psi	ppg	psi	ppg	psi	ppg	ft

MUD DATA

TIME	
TYPE	SEA WATER
WEIGHT IN	8.5
FUNNEL VIS.	
PV/YP	
GELS	
pH	
FILT/CAKE API	
HP-HT	
Pm	
Pf/Mf	
CHLORIDES ppm	
CALCIUM ppm	
OIL/WATER/SOLIDS	
DAILY/CUM. COST	

BIT DATA

BIT NO.	1	
TYPE	ATXG1	
IADC CODE		
SIZE	26	
JETS	3-21.1-22	
DEPTH OUT	1030	
ROT HRS.	36.3	
FOOTAGE	819	
AVG ft/hr	22.5	
GRADE		
HOLE DEV.	1.5	
COST/FT	1028	
RPM	111	
WOB	21	

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	7.5x12	7.5x12
CAPACITY gal/stk	6.54	6.54
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC	
PD SURF / DS psi		
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED RATE 1	psi at stk/min	
2	psi at stk/min	

ANNULAR DATA

	LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
20X30	101	.4857			
20X26	704	.2681			

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	301	1017		
OD-inches	5.0	5.0		9..5			30	20		
ID-inches	4.276	3.0		2.875			28	18.75		
CAP-bbls/ft	.0178	.0087		.0080			.7616	.3408		
DISP-bbls/ft	..0075	.0181		.0707						
LENGTH-ft							90	805		
WEIGHT-lbs/ft	19.5	49		195			310	133		

REMARKS AND RECOMMENDATIONS

MW GPM JETS ft/mi = sec/std

DRILL AHEAD WITH 26"BIT AND MUD MOTOR TO 1030'. PUMP SWEEP.DROP SURVEY. SHORT TRIP TO 375'. RIH. CIRC HOLE UNTIL AIRFILT CLEAN. DISPLACE HOLE WITH 9.9 ppg MUD. POOH. RIG UP TO RUN 20" CSG. RUN 19 JTS OF 133 LB/FT 20" CSG. LAND CSG AT 1017'. CMT 20 AND 30 INCH CASING TO MUD LINE.

ADT DON WALTERS

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A Baroid Company

LOGGING SYSTEMS

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

DEPTH 1030
OPERATION RIG BOPS
FOOTAGE 0

NO. 4
DATE Aug 1 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND			
CONNECTION			
TRIP			
FLOWLINE TEMP	NA	degrees F	

SURVEY DATA 1030 1.5 Deg
LITHOLOGY NA
SAMPLE DEPTH
TRIP CHLORIDES
LAG DOWN DP
LAG OFF BOTTOM NA

DRILL RATE ft/hr
CORRECTED 'D' EXP.
SHALE DENSITY g/cc
EWR Res.

FORMATION PRESSURE DATA

	CASING		BOTTOM HOLE		OPEN HOLE		
PORE PRESSURE	450 psi	8.5 ppg	455 psi	8.5 ppg	psi	ppg	ft
FRACTURE PRESSURE	632 psi	11.8 est ppg	psi	ppg	psi	ppg	ft
ECD	psi	ppg	psi	ppg	psi	ppg	ft

MUD DATA

TIME	2400 31 JUL 93
TYPE	GENERIC #2
WEIGHT IN	9.8
FUNNEL VIS.	90
PV/YP	28/19
GELS	4/8
pH	9.5
FILT/CAKE API	5/1
HP-HT	-
Pm	1.8
Pf/Mf	.5/1.8
CHLORIDES ppm	17500
CALCIUM ppm	1560
OIL/WATER/SOLIDS	0/6.4/93.6
DAILY/CUM. COST	

BIT DATA

BIT NO.		1
TYPE		ATXG1
IADC CODE		
SIZE		26
JETS		3-21,1-22
DEPTH OUT		1030
ROT HRS.		36.3
FOOTAGE		819
AVG ft/hr		22.5
GRADE		
HOLE DEV.		1.5
COST/FT		1028
RPM		111
WOB		21

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC	
PD SURF / DS psi		
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

	LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	301	1018		
OD-inches	5.0	5.0					30	20		
ID-inches	4.276	3.0					28	18.75		
CAP-bbls/ft	.0178	.0087					.7616	.3408		
DISP-bbls/ft	..0075	.0181								
LENGTH-ft							90	793		
WEIGHT-lbs/ft	19.5	49					310	133		

REMARKS AND RECOMMENDATIONS

MW GPM JETS ft/mi = sec/std

FINISH CEMENTING 20" CSG TO MUD LINE. WOC. TEST IBOP VALVE. TEST CHOKE MANIFOLD. RIG UP TO RUN BOP STACK.

ADT DON WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 1040
OPERATION TRIP
FOOTAGE 10

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 5
DATE Aug 2 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND			
CONNECTION			
TRIP			
FLOWLINE TEMP	NA	degrees F	

SURVEY DATA 1030 1.5 Deg
LITHOLOGY 100% CLAY
SAMPLE DEPTH 1040
TRIP CHLORIDES
LAG DOWN DP
LAG OFF BOTTOM NA

DRILL RATE ft/hr
CORRECTED 'D' EXP.
SHALE DENSITY g/cc
EWR Res.

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	450 psi	8.5 ppg		500 psi	8.5 ppg		psi	ppg	ft
FRACTURE PRESSURE	697 psi	12.9 ppg		psi	ppg		psi	ppg	ft
ECD	psi	ppg		psi	ppg		psi	ppg	ft

MUD DATA

TIME	2400 1 AUG 93
TYPE	GENERIC #2
WEIGHT IN	9.8
FUNNEL VIS.	50
PV/YP	19/26
GELS	5/8
pH	9.9
FILT/CAKE API	4.8/1
HP-HT	-
Pm	2.2
Pf/Mf	.5/1.81.1/2.9
CHLORIDES ppm	17000
CALCIUM ppm	400
OIL/WATER/SOLIDS	0/5.6/94.4
DAILY/CUM. COST	

BIT DATA

BIT NO.	3	2
TYPE	FDTC	SS33SGJ4
IADC CODE		
SIZE	12.5	17.5
JETS	3x14,1-10	3-18,1-11
DEPTH OUT		1040
ROT HRS.		2.8
FOOTAGE		10
AVG ft/hr		3.6
GRADE		
HOLE DEV.		1.5
COST/FT		4019
RPM		64
WOB		8

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC	
PD SURF / DS psi		
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED RATE 1	psi at stk/min	
2	psi at stk/min	

ANNULAR DATA

	LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
8X12.5		.0836			
5X12.5		.1215			
5X17.5		.2733			
5X18.75		,3083			
5X20		.3644			

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	301	1018		
OD-inches	5.0	5.0		8			30	20		
ID-inches	4.276	3.0		2.875			28	18.75		
CAP-bbls/ft	.0178	.0087		.0076			.7616	.3408		
DISP-bbls/ft	..0075	.0181		.0545						
LENGTH-ft		656		384			90	793		
WEIGHT-lbs/ft	19.5	49		149			310	133		

REMARKS AND RECOMMENDATIONS

MW GPM JETS ft/mi = sec/std

RIG UP STACK AND DIVERTER. RUN STACK AND DIVERTER TO PBG. TEST STACK. RIH AND TEST CASING TO 2200 psi. POOH. PICK UP BHA AND 17.5" BIT. RIH. TAG CMT AT 993'. DRILL CMT TO 1008'. CHANGE HOLE OVER TO 9.8 ppg GENERIC #2 MUD. DRILL CMT,SHOE AND 10' OF NEW HOLE. PERFORM LEAK OFF TEST-170 psi-12.9 ppg. POOH. LAY DOWN BHA AND 17.5" BIT. PICK UP NEW BHA. MWD TOOL AND 12.25" BIT NO. 3.

ADT DON WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 2275
OPERATION DRILL
FOOTAGE 1225

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 6
DATE Aug 3 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	14	28	1185
CONNECTION	0		
TRIP			
FLOWLINE TEMP	33 degrees F		

SURVEY DATA	.24 Deg at 2210'		
LITHOLOGY	90 % CLAY 10% SAND		
SAMPLE DEPTH	2200		
TRIP CHLORIDES		DRILL RATE ft/hr	100
LAG DOWN DP	252 stks	CORRECTED 'D' EXP.	0.79
LAG OFF BOTTOM	4015 stks	SHALE DENSITY g/cc	
		EWR Res.	2

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	450 psi	8.5 ppg		1010 psi	8.5 ppg		psi	ppg	ft
FRACTURE PRESSURE	697 psi	12.9 ppg		psi	ppg		psi	ppg	ft
ECD	524 psi	9.9 ppg		1175 psi	10.0 ppg		psi	ppg	ft

MUD DATA

TIME	2400 1 AUG 93
TYPE	GENERIC #2
WEIGHT IN	9.8
FUNNEL VIS.	50
PV/YP	24/21
GELS	4/5
pH	9.6
FILT/CAKE API	4.6/1
HP-HT	-
Pm	1.3
Pf/Mf	.8/1.7
CHLORIDES ppm	16000
CALCIUM ppm	840
OIL/WATER/SOLIDS	0/6.3/93.7
DAILY/CUM. COST	

BIT DATA

BIT NO.	3	
TYPE	FDTC	
IADC CODE		
SIZE	12.5	
JETS	3x14.1-10	
DEPTH OUT		
ROT HRS.	14.4	
FOOTAGE	1235	
AVG ft/hr	85	
GRADE		
HOLE DEV.	.24	
COST/FT		
RPM	125	
WOB	9	

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min	68	68
FLOW RATE gal/min	334	334
PRESSURE psi	2040	
PD SURF / DS psi	93/862	
ANN / BIT psi	11/1436	
JET VELOCITY ft/sec	405	
JET IMPACT lbs	1368	
BIT HP	558	
HP RATIO / HP/IN2	4.7hp/in2	
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

	LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
8X12.5	384	.0836	191	319	34
5X12.5	851	.1215	131	261	104
5X17.5	22	.2733	58	213	6
5X18.75	853	.3083	50	223	270
5X20	165	.3644	44	216	60

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	301	1018		
OD-inches	5.0	5.0		8			30	20		
ID-inches	4.276	3.0		2.875			28	18.75		
CAP-bbls/ft	.0178	.0087		.0076			.7616	.3408		
DISP-bbls/ft	..0075	.0181		.0545						
LENGTH-ft	1170	656		384			90	793		
WEIGHT-lbs/ft	19.5	49		149			310	133		

REMARKS AND RECOMMENDATIONS

MW ____ GPM ____ JETS ____ ft/mi = ____ sec/std

RUN IN HOLE WITH 12.25" BIT NO. 3. DRILL AHEAD THRU CLAY/SAND WHILE CONTROL DRILLING AT 100ft/hr TO 2275'. NO APPARENT HOLE PROBLEMS.

ADT DON WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 3545
OPERATION DRILL
FOOTAGE 1280

NO. 7
DATE Aug 4 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	16	27	2315
CONNECTION	0		
TRIP		61	2430
FLOWLINE TEMP	34 degrees F		

SURVEY DATA	.40 at 3441'
LITHOLOGY	60 % CLAY 40% SILTSTONE
SAMPLE DEPTH	3440
TRIP CHLORIDES	
LAG DOWN DP	445 stks
LAG OFF BOTTOM	5420 stks

DRILL RATE ft/hr	103
CORRECTED 'D' EXP.	1.10
SHALE DENSITY g/cc	-
EWR Res.	2

FORMATION PRESSURE DATA

	CASING		BOTTOM HOLE		OPEN HOLE	
PORE PRESSURE	450 psi	8.5 ppg	1601 psi	8.7 ppg	psi	ppg ft
FRACTURE PRESSURE	697 psi	12.9 ppg	2577 psi	14 ppg	psi	ppg ft
ECD	529 psi	10.0 ppg	1840 psi	10.0 ppg	psi	ppg ft

MUD DATA

TIME	2400 3 AUG 93
TYPE	GENERIC #2
WEIGHT IN	9.8
FUNNEL VIS.	54
PV/YP	27/23
GELS	3/5
pH	9.5
FILT/CAKE API	4/1
HP-HT	-
Pm	1.3\1
Pf/Mf	.6/1.5
CHLORIDES ppm	16000
CALCIUM ppm	1200
OIL/WATER/SOLIDS	0/8/92
DAILY/CUM. COST	

BIT DATA

BIT NO.	3
TYPE	FDTC
IADC CODE	
SIZE	12.5
JETS	3x14,1-10
DEPTH OUT	
ROT HRS.	28.6
FOOTAGE	2505
AVG ft/hr	85
GRADE	
HOLE DEV.	.40
COST/FT	
RPM	118
WOB	30

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min	72	71
FLOW RATE gal/min	353	349
PRESSURE psi	2390	
PD SURF / DS psi	103/1139	
ANN / BIT psi	20/1599	
JET VELOCITY ft/sec	427	
JET IMPACT lbs	1524	
BIT HP	656	
HP RATIO / HP/IN2	5.6hp/in2	
REDUCED RATE 1	psi at	stk/min
2	psi at	stk/min

ANNULAR DATA

	LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
8X12.5	384	.0836	200	339	34
5X12.5	2121	.1215	138	277	257
5X17.5	22	.2733	61	225	6
5X18.75	853	.3083	53	236	270
5X20	165	.3644	46	228	60

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH				
OD-inches	5.0	5.0		8			301	1018		
ID-inches	4.276	3.0		2.875			30	20		
CAP-bbls/ft	.0178	.0087		.0076			28	18.75		
DISP-bbls/ft	.0075	.0181		.0545			.7616	.3408		
LENGTH-ft	2503	656		384						
WEIGHT-lbs/ft	19.5	49		149			90	793		
							310	133		

REMARKS AND RECOMMENDATIONS

MW ____ GPM ____ JETS ____ ____ ____ ____ ____ ft/mi = ____ sec/std

DRILL AHEAD THRU CLAY/SAND TO 2430'. CIRC OUT. SHORT TRIP TO SHOE. FLOW CHECK EVERY 10 STANDS. HOLE PULLED TIGHT AT 1766'.
RIH.REAM FROM 1729-1761'. WASH TO BOTTOM FROM 2380'. NO FILL. CBU AFTER TRIP. MAX GAS 61u. DRILL AHEAD TO 3545' '. NO APPARENT PROBLEMS.

ADT DON WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 4005
OPERATION CIRC
FOOTAGE 460

NO. 8
DATE Aug 5 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	16	39	3775
CONNECTION	0		
TRIP			
FLOWLINE TEMP		degrees F	

SURVEY DATA .39 at 3977
LITHOLOGY 60 % CLAY 30% SILTSTONE 10% SAND
SAMPLE DEPTH 4005
TRIP CHLORIDES
LAG DOWN DP
LAG OFF BOTTOM

DRILL RATE ft/hr
CORRECTED 'D' EXP.
SHALE DENSITY g/cc
EWR Res.

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	450 psi	8.5 ppg		1601 psi	8.7 ppg		psi	ppg	ft
FRACTURE PRESSURE	697 psi	12.9 ppg		2577 psi	14 ppg		psi	ppg	ft
ECD	psi	ppg		psi	ppg		psi	ppg	ft

MUD DATA

TIME	2400 4 AUG 93
TYPE	GENERIC #2
WEIGHT IN	9.8
FUNNEL VIS.	52
PV/YP	24/22
GELS	3/5
pH	9.5
FILT/CAKE API	4.2/1
HP-HT	
Pm	1.8
Pf/Mf	.6/1.9
CHLORIDES ppm	16000
CALCIUM ppm	800
OIL/WATER/SOLIDS	0/92.2/7.8
DAILY/CUM. COST	

BIT DATA

BIT NO.	3
TYPE	FDTC
IADC CODE	
SIZE	12.5
JETS	3x14,1-10
DEPTH OUT	4005
ROT HRS.	33.7
FOOTAGE	2966
AVG ft/hr	88
GRADE	
HOLE DEV.	.39
COST/FT	311
RPM	122
WOB	14

HYDRAULIC DATA

	1.	2.
PUMPS	ID1600	ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi		
PD SURF / DS psi		
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED RATE 1	psi at stk/min	
2	psi at stk/min	

ANNULAR DATA

	LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	165	.3644			
5X18.75	853	..3083			
5X17.5	22	.2733			
5X12.5	2121	.1215			
8X12.5	384	.0836			

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH				
OD-inches	5.0	5.0		8			301	1018		
ID-inches	4.276	3.0		2.875			30	20		
CAP-bbls/ft	.0178	.0087		.0076			28	18.75		
DISP-bbls/ft	.0075	.0181		.0545			.7616	.3408		
LENGTH-ft	2503	656		384						
WEIGHT-lbs/ft	19.5	49		149			90	793		
							310	133		

REMARKS AND RECOMMENDATIONS

MW GPM JETS ft/mi = sec/std

DRILL AHEAD THRU CLAY/SILTSTONE/SAND TO 4005'. CIRC OUT. POOH. PUMP AND BACK REAM FROM 3651' TO 1016'. MAX OVERPULL 60 K.
LAY DOWN MWD TOOL. RIH. CBU. MAX GAS 85u. CIRC AND CONDITION HOLE. POOH FOR E LOGS.

ADT DON WALTERS

sperry-sun DRILLING SERVICES
A Baroid Company

LOGGING SYSTEMS

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

DEPTH 4005
OPERATION E-LOG
FOOTAGE 0

NO. 9
DATE Aug 6 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	0		
CONNECTION	0		
TRIP	85		4005
FLOWLINE TEMP	NA	degrees F	

SURVEY DATA .39 at 3977
LITHOLOGY 60 % CLAY 30% SILTSTONE 10% SAND
SAMPLE DEPTH 4005
TRIP CHLORIDES
LAG DOWN DP 520
LAG OFF BOTTOM 5900

DRILL RATE ft/hr NA
CORRECTED "D" EXP. NA
SHALE DENSITY g/cc -
EWR Res.

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	450 psi	8.5 ppg		1601 psi	8.7 ppg		psi	ppg	ft
FRACTURE PRESSURE	697 psi	12.9 ppg		2577 psi	14 ppg		psi	ppg	ft
ECD	psi	ppg		psi	ppg		psi	ppg	ft

MUD DATA

TIME	2400 AUG 5 93
TYPE	GENERIC #2
WEIGHT IN	9.8
FUNNEL VIS.	52
PV/YP	24/22
GELS	3/5
pH	9.5
FILT/CAKE API	3.8/1
HP-HT	-
Pm	1.8
Pf/Mf	.8/1.9
CHLORIDES ppm	16000
CALCIUM ppm	200
OIL/WATER/SOLIDS	0/92.2/7.8
DAILY/CUM. COST	

BIT DATA

BIT NO.	3
TYPE	FDTC
IADC CODE	
SIZE	12.5
JETS	3x14.1-10
DEPTH OUT	4005
ROT HRS.	33.7
FOOTAGE	2966
AVG ft/hr	88
GRADE	
HOLE DEV.	.39
COST/FT	311
RPM	122
WOB	14

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC PAST	
PD SURF / DS psi	24 HRS	
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

	LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	165	.3644			
5X18.75	853	..3083			
5X17.5	22	.2733			
5X12.5	2121	.1215			
8X12.5	384	.0836			

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	301	1018		
OD-inches	5.0	5.0		8			30	20		
ID-inches	4.276	3.0		2.875			28	18.75		
CAP-bbls/ft	.0178	.0087		.0076			.7616	.3408		
DISP-bbls/ft	.0075	.0181		.0545						
LENGTH-ft	2503	656		384			90	793		
WEIGHT-lbs/ft	19.5	49		149			310	133		

REMARKS AND RECOMMENDATIONS

MW 9.8 GPM 800 JETS 4-14'S ft/mi = sec/std

POOH FOR E-LOGS. HOLE PULLED WITHOUT EXCESS DRAG. RIG UP SCHLUMBERGER. RUN ELECTRIC LOGS.

ADT J. PATTON

sperry-sun DRILLING SERVICES
A Barold Company

LOGGING SYSTEMS

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

DEPTH	2905	NO.	10
OPERATION	OPEN HOLE	DATE	Aug 7 93
FOOTAGE	1887	TIME	04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	5-10	22	2360
CONNECTION	0		
TRIP	NA		4005
FLOWLINE TEMP	NA	degrees F	

SURVEY DATA	.39 at 3977
LITHOLOGY	60 % CLAY 30% SILTSTONE 10% SAND
SAMPLE DEPTH	4005
TRIP CHLORIDES	
LAG DOWN DP	375
LAG OFF BOTTOM	7100

DRILL RATE ft/hr	375
CORRECTED 'D' EXP.	.66
SHALE DENSITY g/cc	-
EWR Res.	

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	450 psi	8.5 ppg		1601 psi	8.7 ppg		psi	ppg	ft
FRACTURE PRESSURE	697 psi	12.9 ppg		3020 psi	14.5 ppg		psi	ppg	ft
ECD	518 psi	9.8 ppg		psi	ppg		psi	ppg	ft

MUD DATA

TIME	24:00 AUG 6 93
TYPE	GENERIC #2
WEIGHT IN	9.8
FUNNEL VIS.	65
PV/YP	26/30
GELS	3/6
pH	9.2
FILT/CAKE API	4.2 - 1/32
HP-HT	-
Pm	1.3
Pf/Mf	.5/1.6
CHLORIDES ppm	16000
CALCIUM ppm	600
OIL/WATER/SOLIDS	0/91.7/8.3
DAILY/CUM. COST	

BIT DATA

BIT NO.	3	RR3
TYPE	FDTC	FDTC/H.O.
IADC CODE		
SIZE	12.25	12.25/17.5
JETS	3x14,1-10	TFA:1.44
DEPTH OUT	4005	NA
ROT HRS.	33.7	4.2
FOOTAGE	2966	1887
AVG ft/hr	88	449
GRADE	INC	INC
HOLE DEV.	.39	
COST/FT	311	NA
RPM	122	150
WOB	14	10-20

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min	115	115
FLOW RATE gal/min	1132	
PRESSURE psi	2200	
PD SURF / DS psi	100/1545	
ANN / BIT psi	5/550	
JET VELOCITY ft/sec	250	
JET IMPACT lbs	1440	
BIT HP	365	
HP RATIO / HP/IN2	28% - 1.5/IN2	
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

	LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	165	.3644	74	241	
5X18.75	853	.3083	85	249	
5X17.5	1587	.2733	99	238	
5X12.25		.1215	-		
8X17.5	300	.2354	115	263	

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	301	1018		
OD-inches	5.0	5.0		8			30	20		
ID-inches	4.276	3.0		2.875			28	18.75		
CAP-bbls/ft	.0178	.0087		.0076			.7616	.3408		
DISP-bbls/ft	.0075	.0181		.0545						
LENGTH-ft	2179	426		300			90	793		
WEIGHT-lbs/ft	19.5	49		149			310	133		

REMARKS AND RECOMMENDATIONS

MW 9.8 GPM JETS ft/mi = sec/std

RUN ELECTRIC LOGS. MAKE UP NEW BOTTOM HOLE ASSEMBLY RR BIT 3 AND A 17.5" HOLE OPENER. RIH TO BOTTOM OF 20" CASING.

OPEN HOLE TO 17.5" FOR NEXT CASING RUN. GOOD PENETRATION RATES WHILE REAMING.

ADT J. PATTON

sperry-sun DRILLING SERVICES A Baroid Company **LOGGING SYSTEMS**

DEPTH 4005
OPERATION CIRCULATE
FOOTAGE 1100

NO. 11
DATE Aug 8 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	5	28	3850
CONNECTION	0		
TRIP	60		4005
FLOWLINE TEMP	48	degrees F	

SURVEY DATA .39 at 3977
LITHOLOGY 60 % CLAY 30% SILTSTONE 10% SAND
SAMPLE DEPTH 4005
TRIP CHLORIDES
LAG DOWN DP 550
LAG OFF BOTTOM 9700

DRILL RATE ft/hr 140
CORRECTED 'D' EXP. .90
SHALE DENSITY g/cc -
EWR Res.

FORMATION PRESSURE DATA

	CASING				BOTTOM HOLE				OPEN HOLE			
PORE PRESSURE	450	psi	8.5	ppg	1601	psi	8.7	ppg		psi	ppg	ft
FRACTURE PRESSURE	697	psi	12.9	ppg	3020	psi	14.5	ppg		psi	ppg	ft
ECD	518	psi	9.84	ppg	2051	psi	9.85	ppg		psi	ppg	ft

MUD DATA

TIME	24:00 AUG 7 93
TYPE	GENERIC #2
WEIGHT IN	9.8
FUNNEL VIS.	52
PV/YP	24/26
GELS	3/4
pH	9.3
FILT/CAKE API	5.2 - 1/32
HP-HT	-
Pm	1.2
Pf/Mf	.4/1.6
CHLORIDES ppm	16000
CALCIUM ppm	680
OIL/WATER/SOLIDS	0/91.7/8.3
DAILY/CUM. COST	

BIT DATA

BIT NO.	3	RR3
TYPE	FDTC	FDTC/H.O.
IADC CODE		
SIZE	12.25	12.25/17.5
JETS	3x14.1-10	TFA:1.44
DEPTH OUT	4005	4005
ROT HRS.	33.7	10.1
FOOTAGE	2966	2987
AVG ft/hr	88	294
GRADE	INC	INC
HOLE DEV.	.39	
COST/FT	311	NA
RPM	122	145
WOB	14	10-20

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min	115	115
FLOW RATE gal/min	1132	
PRESSURE psi	2475	
PD SURF / DS psi	100/1815	
ANN / BIT psi	10/550	
JET VELOCITY ft/sec	250	
JET IMPACT lbs	1440	
BIT HP	365	
HP RATIO / HP/IN2	28% - 1.5/IN2	
REDUCED RATE 1	psi at stk/min	
2	psi at stk/min	

ANNULAR DATA

	LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	171	.3644	74	221	
5X18.75	847	.3083	85	229	
5X17.5	2687	.2733	99	218	
5X12.25		.1215	-		
8X17.5	300	.2354	115	243	

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER 171	COND. 301	SURF. 1018	
OD-inches	5.0	5.0		8			21.0	30	20	
ID-inches	4.276	3.0		2.875			20.0	28	18.75	
CAP-bbls/ft	.0178	.0087		.0076			.3887	.7616	.3408	
DISP-bbls/ft	.0075	.0181		.0545			NA	.113	.0479	
LENGTH-ft	3279	426		300			170.5	95	812	
WEIGHT-lbs/ft	19.5	49		149				310	133	

REMARKS AND RECOMMENDATIONS

MW 9.8 GPM JETS 13 3/8" CSG 160 ft/mi = 15 sec/std

OPEN HOLE TO 17.5' TO 4005'. CBU. SHORT TRIP TO SHOE. TIGHT HOLE CONDITIONS NOTED ON THE WAY OUT WITH THE HOLE TRYING TO SWAB. BACK REAM TO KEEP FROM SWABBING. WASH AND REAM TO BOTTOM. GAS FROM BOTTOM ON SHORT TRIP = 60 UNITS. CIRCULATE AND CONDITION HOLE FOR RUNNING CASING.

ADT J. PATTON

sperry-sun DRILLING SERVICES A Baroid Company **LOGGING SYSTEMS**

DEPTH 4005
OPERATION CEMENT
FOOTAGE 0

NO. 12
DATE Aug 9 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	5		
CONNECTION	0		
TRIP	10		4005
FLOWLINE TEMP	48	degrees F	

SURVEY DATA .39 at 3977
LITHOLOGY 60 % CLAY 30% SILTSTONE 10% SAND
SAMPLE DEPTH 4005
TRIP CHLORIDES
LAG DOWN DP 4905
LAG OFF BOTTOM 4850

DRILL RATE ft/hr NA
CORRECTED 'D' EXP. NA
SHALE DENSITY g/cc -
EWR Res.

FORMATION PRESSURE DATA

	CASING				BOTTOM HOLE				OPEN HOLE			
PORE PRESSURE	450	psi	8.5	ppg	1601	psi	8.7	ppg		psi	ppg	ft
FRACTURE PRESSURE	697	psi	12.9	ppg	3020	psi	14.5	ppg		psi	ppg	ft
ECD	524	psi	9.9	ppg	2082	psi	10.0	ppg		psi	ppg	ft

MUD DATA

TIME	24:00 AUG 8 93
TYPE	GENERIC #2
WEIGHT IN	9.8
FUNNEL VIS.	50
PV/YP	23/21
GELS	3/4
pH	9.4
FILT/CAKE API	3.8 - 1/32
HP-HT	-
Pm	1.2
Pf/Mf	.4/1.4
CHLORIDES ppm	16000
CALCIUM ppm	640
OIL/WATER/SOLIDS	0/91.7/8.3
DAILY/CUM. COST	

BIT DATA

BIT NO.	3	RR3
TYPE	FDTC	FDTC/H.O.
IADC CODE		
SIZE	12.25	12.25/17.5
JETS	3x14,1-10	TFA:1.44
DEPTH OUT	4005	4005
ROT HRS.	33.7	10.1
FOOTAGE	2966	2987
AVG ft/hr	88	294
GRADE	INC	INC
HOLE DEV.	.39	
COST/FT	311	NA
RPM	122	145
WOB	14	10-20

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min	87	
FLOW RATE gal/min	427	
PRESSURE psi	410	
PD SURF / DS psi	50/355	
ANN / BIT psi	5/-	
JET VELOCITY ft/sec	-	
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

	LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	171	.3644	28	268	
13.375/18.75	847	.2038	61	367	
13.375/17.5	2959	.1238	82	371	

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER 171	COND. 301	SURF. 1018	3977
OD-inches	5.0	5.0		8			21.0	30	20	13.375
ID-inches	4.276	3.0		2.875			20.0	28	18.75	12.415
CAP-bbls/ft	.0178	.0087		.0076			.3887	.7616	.3408	.1498
DISP-bbls/ft	.0075	.0181		.0545			NA	.113	.0479	.024
LENGTH-ft							170.5	95	812	3771
WEIGHT-lbs/ft	19.5	49		149				310	133	68

REMARKS AND RECOMMENDATIONS

MW 9.6 GPM 600 JETS 2-14,1-13 (OR 4-12'S) ft/mi = 15 sec/std

POOH. RIG UP FOR RUNNING CASING. RUN AND LAND 68 LB/FT - 13 3/8" CASING TO 3977'. CIRCULATE TO CONDITION HOLE BEFORE CEMENTING. GOOD RETURNS NOTED WHILE RUNNING CASING. MAX GAS FROM BOTTOMS UP = 10 UNITS. PUMP AND DISPLACE APP. 480 BBL OF CEMENT AND SPACER.

ADT J. PATTON

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 4005
OPERATION RIH
FOOTAGE 0

NO. 13
DATE Aug 10 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	0		
CONNECTION	0		
TRIP	10		4005
FLOWLINE TEMP	48 degrees F		

SURVEY DATA .39 at 3977
LITHOLOGY 60 % CLAY 30% SILTSTONE 10% SAND
SAMPLE DEPTH 4005
TRIP CHLORIDES
LAG DOWN DP 570
LAG OFF BOTTOM 4850

DRILL RATE ft/hr NA
CORRECTED 'D' EXP. NA
SHALE DENSITY g/cc -
EWR Res.

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	1800 psi	8.7 ppg		1601 psi	8.7 ppg		psi	ppg	ft
FRACTURE PRESSURE	psi	NA ppg		3020 psi	14.5 ppg		psi	ppg	ft
ECD	psi	ppg		psi	ppg		psi	ppg	ft

MUD DATA

TIME	24:00 AUG 9 93
TYPE	GENERIC #2
WEIGHT IN	9.8
FUNNEL VIS.	51
PV/YP	15/17
GELS	3/4
pH	9.2
FILT/CAKE API	3.0 - 1/32
HP-HT	-
Pm	1.0
Pf/Mf	.3/1.5
CHLORIDES ppm	16000
CALCIUM ppm	600
OIL/WATER/SOLIDS	0/92/8
DAILY/CUM. COST	

BIT DATA

BIT NO.	4	RR3
TYPE	FDTC	FDTC/H.O.
IADC CODE		
SIZE	12.25	12.25/17.5
JETS	4-12'S	TFA:1.44
DEPTH OUT		4005
ROT HRS.		10.1
FOOTAGE		2987
AVG ft/hr		294
GRADE		INC
HOLE DEV.		
COST/FT		NA
RPM		145
WOB		10-20

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC	
PD SURF / DS psi		
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	DP-RISER	171	.3644			
5X13 3/8	DP-CSG		.1255			
8X13 3/8	DC-CSG		.0876			
8X12.25	DC-HOLE		.0836			

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER 171	COND. 301	SURF. 1018	3977
OD-inches	5.0	5.0		8			21.0	30	20	13.375
ID-inches	4.276	3.0		2.875			20.0	28	18.75	12.415
CAP-bbls/ft	.0178	.0087		.0076			.3887	.7616	.3408	.1498
DISP-bbls/ft	.0075	.0181		.0545			NA	.113	.0479	.024
LENGTH-ft		728		476			170.5	95	812	3771
WEIGHT-lbs/ft	19.5	49		149				310	133	68

REMARKS AND RECOMMENDATIONS

MW 9.6 GPM 600 JETS 2-14,1-13 (OR 4-12'S) ft/mi = 15 sec/std

COMPLETE CEMENTING JOB. GOOD RETURNS NOTED WHILE CEMENTING. R/U SCHLUMBERGER. RUN VSP AND TEMPERATURE LOGS.

TEST BOP. MAKE UP NEW BIT AND BHA. RIH.

ADT J. PATTON

sperry-sun DRILLING SERVICES — A Baroid Company — **LOGGING SYSTEMS**

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

DEPTH 5146
OPERATION DRILLING
FOOTAGE 1141

NO. 14
DATE Aug 11 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	50		
CONNECTION	105	229	4585
TRIP	10		4005
FLOWLINE TEMP	80	degrees F	

SURVEY DATA	.48 at 5043'
LITHOLOGY	70 % CLAY 20% SILTSTONE 10% SAND
SAMPLE DEPTH	5050
TRIP CHLORIDES	
LAG DOWN DP	685
LAG OFF BOTTOM	5950

DRILL RATE ft/hr	105
CORRECTED 'D' EXP.	1.03
SHALE DENSITY g/cc	NA
EWR Res.	2.5

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	1800 psi	8.7 ppg		2382 psi	8.9 ppg		____ psi	____ ppg	____ ft
FRACTURE PRESSURE	3081 psi	14.9 ppg		4094 psi	15.3 ppg		____ psi	____ ppg	____ ft
ECD	2068 psi	10.0 ppg		2703 psi	10.1 ppg		____ psi	____ ppg	____ ft

MUD DATA

TIME	24:00 AUG 10 93
TYPE	GENERIC #2
WEIGHT IN	9.8+
FUNNEL VIS.	58
PV/YP	19/19
GELS	3/4
pH	9.9
FILT/CAKE API	3.2 - 1/32
HP-HT	-
Pm	1.0
Pf/Mf	.3/1.6
CHLORIDES ppm	17000
CALCIUM ppm	860
OIL/WATER/SOLIDS	0/92/8
DAILY/CUM. COST	

BIT DATA

BIT NO.	4	RR3
TYPE	FDTC	FDTC/H.O.
IADC CODE		
SIZE	12.25	12.25/17.5
JETS	4-12'S	TFA:1.44
DEPTH OUT		4005
ROT HRS.	12.4	10.1
FOOTAGE	1141	2987
AVG ft/hr	92	294
GRADE	INC	INC
HOLE DEV.	.48 @ 5043	
COST/FT		NA
RPM	130	145
WOB	25	10-20

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min	61	61
FLOW RATE gal/min	600	
PRESSURE psi	2725	
PD SURF / DS psi	75/960	
ANN / BIT psi	25/1665	
JET VELOCITY ft/sec	435	
JET IMPACT lbs	1325	
BIT HP	580	
HP RATIO / HP/IN2	61% - 5.0/IN2	
REDUCED RATE 1	____ psi at ____ stk/min	
2	____ psi at ____ stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	DP-RISER	171	.3644	39	210	
5X13 3/8	DP-CSG	728	.1255	114	265	
8X13 3/8	DC-CSG	3771	.0876	118	247	
8X12.25	DC-HOLE	476	.0836	171	296	

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND.	SURF.	
OD-inches	5.0	5.0		8			171	301	1018	3977
ID-inches	4.276	3.0		2.875			21.0	30	20	13.375
CAP-bbls/ft	.0178	.0087		.0076			20.0	28	18.75	12.415
DISP-bbls/ft	.0075	.0181		.0545			.3887	.7616	.3408	.1498
LENGTH-ft	3970	728		476			NA	.113	.0479	.024
WEIGHT-lbs/ft	19.5	49		149			170.5	95	812	3771
								310	133	68

REMARKS AND RECOMMENDATIONS

MW 9.8 GPM 600 JETS 2-14,1-13 (OR 4-12'S) ____ ____ ft/mi = 15 sec/std

RIH WITH NB 4. TAG CEMENT AT 3889'. CBU. TEST CASING TO 3500 PSI. DRILL OUT CEMENT AND SHOE PLUS 10' OF NEW HOLE. CBU.
RUN EAK OFF TEST TO 14.9 PPG WITHOUT BREAKING DOWN FORMATION. DRILL AHEAD. CONNECTION GAS LOGGED BELOW 4300' AVERAGING
APP 50 UNITS OVER BACKGROUND. SLIGHT TREND NOTED ON PRESSURE PLOTS. RAISED PORE PRESSURE ESTIMATE TO 8.9 - 9.0 PPG.
DRILL AHEAD.

ADT J. PATTON

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 5925
OPERATION DRILLING
FOOTAGE 779

NO. 15
DATE Aug 12 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	35	250	5220
CONNECTION	92		
TRIP	95		4525
FLOWLINE TEMP	94 degrees F		

SURVEY DATA	1.19 at 5773'
LITHOLOGY	60 % CLAY 30% SILTSTONE 10% SAND
SAMPLE DEPTH	5650
TRIP CHLORIDES	
LAG DOWN DP	805
LAG OFF BOTTOM	6800

DRILL RATE ft/hr	85
CORRECTED 'D' EXP.	1.18
SHALE DENSITY g/cc	NA
EWR Res.	2.5

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	1800 psi	8.7 ppg		2773 psi	9.0 ppg		psi	ppg	ft
FRACTURE PRESSURE	3081 psi	14.9 ppg		4837 psi	15.7 ppg		psi	ppg	ft
ECD	2109 psi	10.2 ppg		3173 psi	10.3 ppg		psi	ppg	ft

MUD DATA

TIME	24:00 AUG 11 93
TYPE	GENERIC #2
WEIGHT IN	10.0
FUNNEL VIS.	55
PV/YP	20/23
GELS	3/6
pH	9.3
FILT/CAKE API	3.0 - 1/32
HP-HT	-
Pm	.7
Pf/Mf	.15/1.4
CHLORIDES ppm	17500
CALCIUM ppm	680
OIL/WATER/SOLIDS	0/91.5/8.8
DAILY/CUM. COST	

BIT DATA

BIT NO.	4	RR3
TYPE	FDTC	FDTC/H.O.
IADC CODE		
SIZE	12.25	12.25/17.5
JETS	4-12'S	TFA:1.44
DEPTH OUT		4005
ROT HRS.	21.4	10.1
FOOTAGE	1920	2987
AVG ft/hr	90	294
GRADE	INC	INC
HOLE DEV.	1.19 @ 5773	
COST/FT		NA
RPM	130	145
WOB	45	10-20

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min	68	69
FLOW RATE gal/min	670	
PRESSURE psi	3450	
PD SURF / DS psi	100/1200	
ANN / BIT psi	35/2115	
JET VELOCITY ft/sec	487	
JET IMPACT lbs	1687	
BIT HP	825	
HP RATIO / HP/IN2	61% - 7.0/IN2	
REDUCED 1	____ psi at ____ stk/min	
RATE 2	____ psi at ____ stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	DP-RISER	171	.3644	44	246	
5X13 3/8	DP-CSG	3906	.1255	127	302	
5X12.25	DP-HOLE	1452	.1215	131	282	
8X12.25	DC-HOLE	476	.0836	191	332	

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER 171	COND. 301	SURF. 1018	3977
OD-inches	5.0	5.0		8			21.0	30	20	13.375
ID-inches	4.276	3.0		2.875			20.0	28	18.75	12.415
CAP-bbls/ft	.0178	.0087		.0076			.3887	.7616	.3408	.1498
DISP-bbls/ft	.0075	.0181		.0545			NA	.113	.0479	.024
LENGTH-ft	4721	728		476			170.5	95	812	3771
WEIGHT-lbs/ft	19.5	49		149				310	133	68

REMARKS AND RECOMMENDATIONS

MW 10.0 GPM 600 JETS 3-13,1-11 ft/mi = 15 sec/std

CONTROL DRILL WITH BIT NO. 4. CONSISTANT CONECTION GAS READINGS AVERAGING ABOUT 50 UNITS ABOVE BACKGROUND. DRILL TO 5525'. CBU. SHORT TRIP TO SHOE. HOLE TRYING TO SWAB WITH TIGHT HOLE ON THE WAY OUT. PUMP-BACKREAM OUT OFF THE HOLE. NO EXCESS DRAG NOTED ON WAY BACK IN. MAX GAS RECORDED WHILE DRILLING AHEAD AFTER GETTING BACK TO BOTTOM = 95 UNITS. DRILL AHEAD.

ADT J. PATTON

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 6593
OPERATION POOH
FOOTAGE 668

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 16
DATE Aug 13 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	40	125	5220
CONNECTION	85		6562
TRIP	95		4525
FLOWLINE TEMP	94 degrees F		

SURVEY DATA	1.40 at 6531'
LITHOLOGY	80 % CLAY 20% SILTSTONE
SAMPLE DEPTH	6580
TRIP CHLORIDES	
LAG DOWN DP	905
LAG OFF BOTTOM	7250

DRILL RATE ft/hr	45
CORRECTED 'D' EXP.	1.32
SHALE DENSITY g/cc	NA
EWR Res.	3.5

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	1800 psi	8.7 ppg		3120 psi	9.1 ppg		psi	ppg	ft
FRACTURE PRESSURE	3081 psi	14.9 ppg		5383 psi	15.7 ppg		psi	ppg	ft
ECD	2109 psi	10.2 ppg		3531 psi	10.3 ppg		psi	ppg	ft

MUD DATA

TIME	24:00 AUG 12 93
TYPE	GENERIC #2
WEIGHT IN	10.0+
FUNNEL VIS.	59
PV/YP	22/28
GELS	5/9
pH	9.1
FILT/CAKE API	2.7 - 1/32
HP-HT	-
Pm	.5
Pf/Mf	.1/1.3
CHLORIDES ppm	17000
CALCIUM ppm	920
OIL/WATER/SOLIDS	0/91.5/8.5
DAILY/CUM. COST	

BIT DATA

BIT NO.	4	RR3
TYPE	FDTC	FDTC/H.O.
IADC CODE		
SIZE	12.25	12.25/17.5
JETS	4-12'S	TFA:1.44
DEPTH OUT	6593	4005
ROT HRS.	34.1	10.1
FOOTAGE	2588	2987
AVG ft/hr	76	294
GRADE	INC	INC
HOLE DEV.	1.4 @ 6531	
COST/FT	370	NA
RPM	130	145
WOB	40	10-20

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min	62	63
FLOW RATE gal/min	615	
PRESSURE psi	3250	
PD SURF / DS psi	100/1320	
ANN / BIT psi	50/1780	
JET VELOCITY ft/sec	447	
JET IMPACT lbs	1422	
BIT HP	640	
HP RATIO / HP/IN2	55% - 5.4/IN2	
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	DP-RISER	171	.3644	40	291	
5X13 3/8	DP-CSG	3906	.1255	117	351	
5X12.25	DP-HOLE	2139	.1215	121	327	
8X12.25	DC-HOLE	476	.0836	175	380	

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER 171	COND. 301	SURF. 1017	3978
OD-inches	5.0	5.0		8			21.0	30	20	13.375
ID-inches	4.276	3.0		2.875			20.0	28	18.75	12.415
CAP-bbls/ft	.0178	.0087		.0076			.3887	.7616	.3408	.1498
DISP-bbls/ft	.0075	.0181		.0545			NA	.113	.0479	.024
LENGTH-ft	4721	728		476			170.5	95	811	3772
WEIGHT-lbs/ft	19.5	49		149				310	133	68

REMARKS AND RECOMMENDATIONS

MW 10.0 GPM 600 JETS 3-13,1-11 ft/mi = 15 sec/std

DRILL AHEAD WITH BIT NO. 4. RAISE MUD WEIGHT TO 10.0 PPG TO STABILIZE HOLE CONDITIONS ON TRIPS. CONNECTION GAS AVERAGING ABOUT 50 UNITS ABOVE BACKGROUND. DRILL TO 6593'. CBU. POOH ON SLOW PENETRATION RATES AND BIT HOURS. SMALL SHOWS NOTED IN SANDS LOGGED DURING THE LAST 100' OF DRILLING. BACKREAM WHILE PULLING OUT OF THE HOLE.. AVERAGE GAS WHILE CIRCULATING IWAS 100 UNITS. MAX GAS RECORDED FOR PAST 24 HRS WAS 344 UNITS - ALSO LOGGED FROM BACKREAMING OUT OF THE HOLE.

ADT J. PATTON

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 6729
OPERATION RIH/CORE#1
FOOTAGE 136

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 17
DATE Aug 14 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	45	525	6700
CONNECTION	85		6562
TRIP	142		6593
FLOWLINE TEMP	88	degrees F	

SURVEY DATA	1.25 at 6625'
LITHOLOGY	30 % CLAY 30% SILTSTONE 40% SAND
SAMPLE DEPTH	6729
TRIP CHLORIDES	
LAG DOWN DP	940
LAG OFF BOTTOM	7500

DRILL RATE ft/hr	85
CORRECTED 'D' EXP.	.72
SHALE DENSITY g/cc	NA
EWR Res.	15

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	1800 psi	8.7 ppg		3149 psi	9.0 ppg		psi	ppg	ft
FRACTURE PRESSURE	3081 psi	14.9 ppg		5494 psi	15.7 ppg		psi	ppg	ft
ECD	2109 psi	10.2 ppg		3569 psi	10.2 ppg		psi	ppg	ft

MUD DATA

TIME	24:00 AUG 13 93
TYPE	GENERIC #2
WEIGHT IN	10.0
FUNNEL VIS.	79
PV/YP	26/32
GELS	5/10
pH	9.0
FILT/CAKE API	2.6 - 1/32
HP-HT	-
Pm	.5
Pf/Mf	.1/1.3
CHLORIDES ppm	17500
CALCIUM ppm	1040
OIL/WATER/SOLIDS	.5/90.5/9
DAILY/CUM. COST	

BIT DATA

BIT NO.	6	5
TYPE	CB-1	DS-40 PDC
IADC CODE		
SIZE	8.5	12.25
JETS	TFA: .7	2-14, 3-13
DEPTH OUT		6729
ROT HRS.		1.8
FOOTAGE		136
AVG ft/hr		76
GRADE		INC
HOLE DEV.		
COST/FT		1360
RPM		130
WOB		5-10

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min	71	71
FLOW RATE gal/min	700	
PRESSURE psi	2650	
PD SURF / DS psi	100/1600	
ANN / BIT psi	50/950	
JET VELOCITY ft/sec	326	
JET IMPACT lbs	1180	
BIT HP	387	
HP RATIO / HP/IN2	36% - 3.3/IN2	
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	DP-RISER	171	.3644	46	314	
5X13 3/8	DP-CSG	3906	.1255	133	380	
5X12.25	DP-HOLE	2284	.1215	137	355	
8X12.25	DC-HOLE	476	.0836	199	414	

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER 171	COND. 301	SURF. 1017	3978
OD-inches	5.0	5.0		8			21.0	30	20	13.375
ID-inches	4.276	3.0		2.875			20.0	28	18.75	12.415
CAP-bbls/ft	.0178	.0087		.0076			.3887	.7616	.3408	.1498
DISP-bbls/ft	.0075	.0181		.0545			NA	.113	.0479	.024
LENGTH-ft	5525	728		476			170.5	95	811	3772
WEIGHT-lbs/ft	19.5	49		149				310	133	68

REMARKS AND RECOMMENDATIONS

MW 10.0 GPM 600 JETS 3-13,1-11 ft/mi = 15 sec/std

RIH WITH NB # 5. REAM LAST TWO STANDS TO BOTTOM. DRILL AHEAD. BREAK IN BIT WITH LOW WEIGHT ON BIT. DRILL AHEAD TO 6729'. CIRCULATE OUT HOLE VOLUME ON POTENTIAL SHOW INDICATED BY MWD TOOL. ZERO DISCHARGE DRILL CUTTINGS FROM ZONE OF INTEREST. MAX GAS FROM SAND FORMATION AT 6700' = 525 UNITS. CIRCULATE AND CONDITION HOLE FOR CORING. BACKGROUND GAS TO LESS THAN 50 UNITS. POOH. HOLE PULLED GOOD ON THIS TRIP. PICK UP CORE BARREL. RIH FOR CORE NO. 1.

ADT J. PATTON

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

DEPTH	7205	NO.	18
OPERATION	DRILLING	DATE	Aug 15 93
FOOTAGE	476	TIME	04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	60	464	6755
CONNECTION	90		7127
TRIP	98		6732
FLOWLINE TEMP	93 degrees F		

SURVEY DATA	.65 at 7094'
LITHOLOGY	40 % CLAY 60% SILTSTONE
SAMPLE DEPTH	7070
TRIP CHLORIDES	
LAG DOWN DP	998
LAG OFF BOTTOM	7950

DRILL RATE ft/hr	80
CORRECTED 'D' EXP.	.75
SHALE DENSITY g/cc	NA
EWR Res.	5

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	1800 psi	8.7 ppg		3372 psi	9.0 ppg		psi	ppg	ft
FRACTURE PRESSURE	3081 psi	14.9 ppg		5920 psi	15.8 ppg		psi	ppg	ft
ECD	2151 psi	10.3 ppg		3896 psi	10.4 ppg		psi	ppg	ft

MUD DATA

TIME	24:00 AUG 14 93
TYPE	GENERIC #2
WEIGHT IN	10.1
FUNNEL VIS.	69
PV/YP	24/34
GELS	5/12
pH	8.9
FILT/CAKE API	3.0 - 1/32
HP-HT	6.8 @ 150
Pm	.3
Pf/Mf	.1/1.3
CHLORIDES ppm	17000
CALCIUM ppm	920
OIL/WATER/SOLIDS	TR/11/89
DAILY/CUM. COST	

BIT DATA

BIT NO.	CB-1	RR5
TYPE	RC-412	DS-40H
IADC CODE	CORE #1	PDC
SIZE	8.5	12.25
JETS	TFA: .7	2-14, 3-13
DEPTH OUT	6732	NA
ROT HRS.	.9	5.6
FOOTAGE	3	473
AVG ft/hr	3.3	84
GRADE		INC
HOLE DEV.		
COST/FT	NA	650
RPM	60	130
WOB	10	5-10

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min	71	70
FLOW RATE gal/min	693	
PRESSURE psi	2650	
PD SURF / DS psi	100/1610	
ANN / BIT psi	70/940	
JET VELOCITY ft/sec	322	
JET IMPACT lbs	1170	
BIT HP	380	
HP RATIO / HP/IN2	36% - 3.2/IN2	
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	DP-RISER	171	.3644	45	334	
5X13 3/8	DP-CSG	3906	.1255	132	396	
5X12.25	DP-HOLE	2751	.1215	136	369	
8X12.25	DC-HOLE	476	.0836	197	423	

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER 171	COND. 301	SURF. 1017	3978
OD-inches	5.0	5.0		8			21.0	30	20	13.375
ID-inches	4.276	3.0		2.875			20.0	28	18.75	12.415
CAP-bbls/ft	.0178	.0087		.0076			.3887	.7616	.3408	.1498
DISP-bbls/ft	.0075	.0181		.0545			NA	.113	.0479	.024
LENGTH-ft	6001	728		476			170.5	95	811	3772
WEIGHT-lbs/ft	19.5	49		149				310	133	68

REMARKS AND RECOMMENDATIONS

MW 10.0 GPM 600 JETS 3-13,1-11 ft/mi = 15 sec/std

RIH FOR CORE NO. 1. ATTEMPT TO CORE. MAX TRIP GAS FROM BOTTOM = 246 UNITS. POOH AFTER PENETRATING 3 FEET OF HOLE.

CORE BIT APPEARED TO BALL UP WITH CLAY. RR BIT NO. 5. DRILL AHEAD.

ADT J. PATTON

sperry-sun DRILLING SERVICES
A Baroid Company

LOGGING SYSTEMS

DEPTH 7865
OPERATION DRILLING
FOOTAGE 660

NO. 19
DATE Aug 16 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	40	180	7250
CONNECTION	NA		
TRIP	625		7698
FLOWLINE TEMP	91	degrees F	

SURVEY DATA	.65 at 7094'		
LITHOLOGY	40 % CLAY 60% SILTSTONE		
SAMPLE DEPTH	7070		
TRIP CHLORIDES		DRILL RATE ft/hr	160
LAG DOWN DP	998	CORRECTED 'D' EXP.	.78
LAG OFF BOTTOM	7950	SHALE DENSITY g/cc	NA
		EWR Res.	7

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	1800 psi	8.7 ppg		3844 psi	9.4 ppg		____ psi	____ ppg	____ ft
FRACTURE PRESSURE	3081 psi	14.9 ppg		6544 psi	16 ppg		____ psi	____ ppg	____ ft
ECD	2151 psi	10.3 ppg		4212 psi	10.3 ppg		____ psi	____ ppg	____ ft

MUD DATA

TIME	24:00 AUG 15 93
TYPE	GENERIC #2
WEIGHT IN	10.0
FUNNEL VIS.	59
PV/YP	25/30
GELS	3/8
pH	8.6
FILT/CAKE API	2.8 - 1/32
HP-HT	6.0 @ 150
Pm	.3
Pf/Mf	.1/1.3
CHLORIDES ppm	17500
CALCIUM ppm	880
OIL/WATER/SOLIDS	TR/9/91
DAILY/CUM. COST	

BIT DATA

BIT NO.	CB-1	RR5
TYPE	RC-412	DS-40H
IADC CODE	CORE #1	PDC
SIZE	8.5	12.25
JETS	TFA: .7	2-14, 3-13
DEPTH OUT	6732	
ROT HRS.	.9	12.1
FOOTAGE	3	1133
AVG ft/hr	3.3	94
GRADE		INC
HOLE DEV.		
COST/FT	NA	596
RPM	60	160
WOB	10	15

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min	72	71
FLOW RATE gal/min	704	
PRESSURE psi	2800	
PD SURF / DS psi	100/1675	
ANN / BIT psi	65/960	
JET VELOCITY ft/sec	328	
JET IMPACT lbs	1195	
BIT HP	395	
HP RATIO / HP/IN2	33% - 3.3/IN2	
REDUCED 1	____ psi at ____ stk/min	
RATE 2	____ psi at ____ stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	DP-RISER	171	.3644	46	295	
5X13 3/8	DP-CSG	3906	.1255	134	360	
5X12.25	DP-HOLE	3411	.1215	138	336	
8X12.25	DC-HOLE	476	.0836	201	393	

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER 171	COND. 301	SURF. 1017	3978
OD-inches	5.0	5.0		8			21.0	30	20	13.375
ID-inches	4.276	3.0		2.875			20.0	28	18.75	12.415
CAP-bbls/ft	.0178	.0087		.0076			.3887	.7616	.3408	.1498
DISP-bbls/ft	.0075	.0181		.0545			NA	.113	.0479	.024
LENGTH-ft	6661	728		476			170.5	95	811	3772
WEIGHT-lbs/ft	19.5	49		149				310	133	68

REMARKS AND RECOMMENDATIONS

MW 10.0 GPM 700 JETS TFA: .68 ft/mi = 15 sec/std

DRILL AHEAD LOOKING FOR CORE POINT. PRESSURE TREND STARTING TO DEVELOP ON D-EXPONENT PLOT AT 7000'. INCREASE ROP APPROXIMATELY 50% BY ADDING WEIGHT ON BIT AND ADDITIONAL RPM BELOW 7500'. SLIGHT INCREASE IN GAS LOGGED FROM BOTTOMS UP ON CONNECTIONS. RAISED PORE PRESSURE ESTIMATE TO 9.4 PPG AT 7675'. DRILL TO 7698'. CBU. POOH TO SHOE. PUMP OUT OF THE HOLE ON STANDS 9,10,11, AND 12. REPAIR TOP DRIVE. RIH. DRILL AHEAD. BOTTOMS UP FROM TRIP = 625 UNITS.

ADT J. PATTON

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 9500
OPERATION POOH
FOOTAGE 1635

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 20
DATE Aug 17 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	90	1513	9020
CONNECTION	165		9488
TRIP	625		7698
FLOWLINE TEMP	95 degrees F		

SURVEY DATA	.80 @ 9376		
LITHOLOGY	60 % CLAY 40% SILTSTONE TR SANDSTONE		
SAMPLE DEPTH	9500		
TRIP CHLORIDES		DRILL RATE ft/hr	88
LAG DOWN DP	1345	CORRECTED 'D' EXP.	.88
LAG OFF BOTTOM	10450	SHALE DENSITY g/cc	NA
		EWR Res.	3.5

FORMATION PRESSURE DATA

	CASING		BOTTOM HOLE		OPEN HOLE		
PORE PRESSURE	1800 psi	8.7 ppg	3844 psi	9.7 ppg	____ psi	____ ppg	____ ft
FRACTURE PRESSURE	3081 psi	14.9 ppg	6544 psi	16.2 ppg	____ psi	____ ppg	____ ft
ECD	2151 psi	10. ppg	4212 psi	____ ppg	____ psi	____ ppg	____ ft

MUD DATA

TIME	24:00 AUG 16 93
TYPE	GENERIC #2
WEIGHT IN	10.4+
FUNNEL VIS.	70
PV/YP	30/40
GELS	5/15
pH	8.8
FILT/CAKE API	2.9 - 1/32
HP-HT	6.8 @ 150
Pm	.3
Pf/Mf	.1/1.4
CHLORIDES ppm	17000
CALCIUM ppm	920
OIL/WATER/SOLIDS	TR/10.5/89.5
DAILY/CUM. COST	

BIT DATA

BIT NO.	CB-1	RR5
TYPE	RC-412	DS-40H
IADC CODE	CORE #1	PDC
SIZE	8.5	12.25
JETS	TFA: .7	2-14, 3-13
DEPTH OUT	6732	9500
ROT HRS.	.9	27.4
FOOTAGE	3	2768
AVG ft/hr	3.3	101
GRADE		INC
HOLE DEV.		
COST/FT	NA	331
RPM	60	160
WOB	10	14

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min	69	70
FLOW RATE gal/min	686	
PRESSURE psi	3600	
PD SURF / DS psi	100/2450	
ANN / BIT psi	105/945	
JET VELOCITY ft/sec	319	
JET IMPACT lbs	1179	
BIT HP	380	
HP RATIO / HP/IN2	26% - 3.2/IN2	
REDUCED 1	____ psi at ____ stk/min	
RATE 2	____ psi at ____ stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	DP-RISER	171	.3644	45	361	
5X13 3/8	DP-CSG	3906	.1255	130	432	
5X12.25	DP-HOLE	5046	.1215	134	403	
8X12.25	DC-HOLE	476	.0836	195	466	

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER 171	COND. 301	SURF. 1017	3978
OD-inches	5.0	5.0		8			21.0	30	20	13.375
ID-inches	4.276	3.0		2.875			20.0	28	18.75	12.415
CAP-bbls/ft	.0178	.0087		.0076			.3887	.7616	.3408	.1498
DISP-bbls/ft	.0075	.0181		.0545			NA	.113	.0479	.024
LENGTH-ft	8296	728		476			170.5	95	811	3772
WEIGHT-lbs/ft	19.5	49		149				310	133	68

REMARKS AND RECOMMENDATIONS

MW 10.4 GPM 650 JETS TFA: .68 ft/mi = 15 sec/std

DRILL AHEAD WITH BIT NO. 5. SLIGHT INCREASE IN BACKGROUND GAS AND CONNECTION GAS LOGGED WITH INCREASING DEPTH. RAISED PORE PRESSURE ESTIMATE TO REFLECT TREND DEVELOPING ON D-EXPONENT AND RESISTIVITY PLOT. CURRENT ESTIMATE IS 9.7 PPG AT THIS DEPTH. THE MUD WEIGHT WAS RAISED IN TWO STAGES TO 10.4 PPG FOR ADDITIONAL OVERBALANCE. CBU AT 9500. POOH.

ADT J. PATTON

sperry-sun DRILLING SERVICES A Baroid Company — *LOGGING SYSTEMS*

DEPTH 9500
OPERATION RIH
FOOTAGE 0

NO. 21
DATE Aug 18 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	0	350	B.REM
CONNECTION	165		9488
TRIP	625		7698
FLOWLINE TEMP	80 degrees F		

SURVEY DATA .80 @ 9376
LITHOLOGY 60 % CLAY 40% SILTSTONE TR SANDSTONE
SAMPLE DEPTH 9500
TRIP CHLORIDES
LAG DOWN DP 1345
LAG OFF BOTTOM 10450

DRILL RATE ft/hr 88
CORRECTED 'D' EXP. .88
SHALE DENSITY g/cc NA
EWR Res. 3.5

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	1800 psi	8.7 ppg		3844 psi	9.7 ppg		psi	ppg	ft
FRACTURE PRESSURE	3081 psi	14.9 ppg		6544 psi	16.2 ppg		psi	ppg	ft
ECD	2151 psi	10.6 ppg		4212 psi	10.6 ppg		psi	ppg	ft

MUD DATA

TIME	24:00 AUG 17 93
TYPE	GENERIC #2
WEIGHT IN	10.4
FUNNEL VIS.	68
PV/YP	23/35
GELS	4/7
pH	8.8
FILT/CAKE API	2.9 - 1/32
HP-HT	6.8 @ 150
Pm	.3
Pf/Mf	.1/1.5
CHLORIDES ppm	17500
CALCIUM ppm	920
OIL/WATER/SOLIDS	TR/10/90
DAILY/CUM. COST	

BIT DATA

BIT NO.	6	RR5
TYPE	DS-40H	DS-40H
IADC CODE	PDC	PDC
SIZE	12.25	12.25
JETS	5-15	2-14, 3-13
DEPTH OUT		9500
ROT HRS.		27.4
FOOTAGE		2768
AVG ft/hr		101
GRADE		INC
HOLE DEV.		
COST/FT		331
RPM		160
WOB		14

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min	69	70
FLOW RATE gal/min	686	
PRESSURE psi	3600	
PD SURF / DS psi	100/2450	
ANN / BIT psi	105/945	
JET VELOCITY ft/sec	319	
JET IMPACT lbs	1179	
BIT HP	380	
HP RATIO / HP/IN2	26% - 3.2/IN2	
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	DP-RISER	171	.3644	45	361	
5X13 3/8	DP-CSG	3906	.1255	130	432	
5X12.25	DP-HOLE	5046	.1215	134	403	
8X12.25	DC-HOLE	476	.0836	195	466	

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND.	SURF.	
OD-inches	5.0	5.0		8			171	301	1017	3978
ID-inches	4.276	3.0		2.875			21.0	30	20	13.375
CAP-bbls/ft	.0178	.0087		.0076			20.0	28	18.75	12.415
DISP-bbls/ft	.0075	.0181		.0545			.3887	.7616	.3408	.1498
LENGTH-ft	8296	728		476			NA	.113	.0479	.024
WEIGHT-lbs/ft	19.5	49		149			170.5	95	811	3772
								310	133	68

REMARKS AND RECOMMENDATIONS

MW 10.4 GPM 700 JETS TFA: .75 ft/mi = 15 sec/std

PUMP OUT OF HOLE ON FIRST 20 STANDS. HOLE PULLED GOOD FOR THE REST OF THE WAY OUT. TEST BOP. PICK UP ADDITIONAL DRILL PIPE ON THE WAY BACK IN.

ADT J. PATTON

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 10551
OPERATION S.TRIP
FOOTAGE 1051

NO. 22
DATE Aug 19 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	50	140	9785
CONNECTION	92		10456
TRIP	1541		9500
FLOWLINE TEMP	105 degrees F		

SURVEY DATA .80 @ 9376
LITHOLOGY 60 % CLAY 40% SILTSTONE TR SANDSTONE
SAMPLE DEPTH 9500
TRIP CHLORIDES
LAG DOWN DP 1505
LAG OFF BOTTOM 11750

DRILL RATE ft/hr 95
CORRECTED 'D' EXP. .81
SHALE DENSITY g/cc NA
EWR Res. 3.5

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	1800 psi	8.7 ppg		5432 psi	9.9 ppg		psi	ppg	ft
FRACTURE PRESSURE	3081 psi	14.9 ppg		9053 psi	16.5 ppg		psi	ppg	ft
ECD	2113 psi	10.7 ppg		5870 psi	10.6 ppg		psi	ppg	ft

MUD DATA

TIME	24:00 AUG 18 93
TYPE	GENERIC #2
WEIGHT IN	10.5
FUNNEL VIS.	64
PV/YP	26/34
GELS	4/12
pH	8.8
FILT/CAKE API	3.4 - 1/32
HP-HT	6.8 @ 150
Pm	.45
Pf/Mf	.25/1.5
CHLORIDES ppm	17000
CALCIUM ppm	920
OIL/WATER/SOLIDS	TR/10/90
DAILY/CUM. COST	

BIT DATA

BIT NO.	6	RR5
TYPE	DS-40H	DS-40H
IADC CODE	PDC	PDC
SIZE	12.25	12.25
JETS	5-15	2-14, 3-13
DEPTH OUT		9500
ROT HRS.	11.6	27.4
FOOTAGE	1051	2768
AVG ft/hr	90	101
GRADE	INC	40% - 1/8
HOLE DEV.		
COST/FT	503	331
RPM	155	160
WOB	8-10	14

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min	69	69
FLOW RATE gal/min	678	
PRESSURE psi	3200	
PD SURF / DS psi	100/2400	
ANN / BIT psi	100/600	
JET VELOCITY ft/sec	252	
JET IMPACT lbs	929	
BIT HP	235	
HP RATIO / HP/IN2	19% - 2.0/IN2	
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	DP-RISER	171	.3644	44	321	
5X13 3/8	DP-CSG	3906	.1255	129	385	
5X12.25	DP-HOLE	6098	.1215	133	359	
8X12.25	DC-HOLE	476	.0836	193	416	

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER 171	COND. 301	SURF. 1017	3978
OD-inches	5.0	5.0		8			21.0	30	20	13.375
ID-inches	4.276	3.0		2.875			20.0	28	18.75	12.415
CAP-bbls/ft	.0178	.0087		.0076			.3887	.7616	.3408	.1498
DISP-bbls/ft	.0075	.0181		.0545			NA	.113	.0479	.024
LENGTH-ft	9347	728		476			170.5	95	811	3772
WEIGHT-lbs/ft	19.5	49		149				310	133	68

REMARKS AND RECOMMENDATIONS

MW 10.5 GPM 700 JETS TFA: .75 ft/mi = 15 sec/std

DRILL AHEAD WITH BIT NO. 6. MAX GAS FROM BOTTOM ON TRIP = 1543 UNITS. VERY GOOD PENETRATION RATES WITH NEW BIT.
RESISTIVITY DATA INDICATING INCREASING PORE PRESSURE GRADIENT CONTINUOUS TO ABOUT 10,000'. RAISED PORE PRESSURE ESTIMATE TO 9.9 PPG AT THIS DEPTH. TREND APPEARS TO STABILIZE BELOW 10,000'. DRILL TO 10551'. SHORT TRIP PAST 9,500' TO CONDITION THE HOLE.

ADT J. PATTON

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 11125
OPERATION S.TRIP
FOOTAGE 574

NO. 23
DATE Aug 20 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA. INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	40	130	10555
CONNECTION	10		10927
TRIP		683	10551
FLOWLINE TEMP		degrees F	

SURVEY DATA 4.03 Deg at 11125'
LITHOLOGY 40 % CLAY 60% SILTSTONE
SAMPLE DEPTH 11125
TRIP CHLORIDES
LAG DOWN DP
LAG OFF BOTTOM

DRILL RATE ft/hr 20
CORRECTED 'D' EXP.
SHALE DENSITY g/cc NA
EWR Res.

FORMATION PRESSURE DATA

	CASING		BOTTOM HOLE		OPEN HOLE		
PORE PRESSURE	1800 psi	8.7 ppg	5432 psi	9.9 ppg	psi	ppg	ft
FRACTURE PRESSURE	3081 psi	14.9 ppg	9053 psi	16.5 ppg	psi	ppg	ft
ECD	psi	ppg	psi	ppg	psi	ppg	ft

MUD DATA

TIME	24:00 AUG 19 93
TYPE	GENERIC #2
WEIGHT IN	10.7
FUNNEL VIS.	58
PV/YP	27/34
GELS	3/9
pH	8.6
FILT/CAKE API	3.1 - 1/32
HP-HT	6.0 @ 150
Pm	.3
Pf/Mf	.2/1.5
CHLORIDES ppm	17000
CALCIUM ppm	960
OIL/WATER/SOLIDS	TR/11.5/88.5
DAILY/CUM. COST	

BIT DATA

BIT NO.	6
TYPE	DS-40H
IADC CODE	PDC
SIZE	12.25
JETS	5-15
DEPTH OUT	11125
ROT HRS.	25.1
FOOTAGE	1625
AVG ft/hr	65
GRADE	
HOLE DEV.	4.03
COST/FT	517
RPM	152
WOB	11

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC	
PD SURF / DS psi		
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED RATE 1	psi at stk/min	
2	psi at stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	DP-RISER	171	.3644			
5X13 3/8	DP-CSG	3906	.1255			
5X12.25	DP-HOLE	6098	.1215			
8X12.25	DC-HOLE	476	.0836			

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER 171	COND. 301	SURF. 1017	3978
OD-inches	5.0	5.0		8			21.0	30	20	13.375
ID-inches	4.276	3.0		2.875			20.0	28	18.75	12.415
CAP-bbls/ft	.0178	.0087		.0076			.3887	.7616	.3408	.1498
DISP-bbls/ft	.0075	.0181		.0545			NA	.113	.0479	.024
LENGTH-ft	9919	728		476			170.5	95	811	3772
WEIGHT-lbs/ft	19.5	49		149				310	133	68

REMARKS AND RECOMMENDATIONS

MW 10.5 GPM 700 JETS TFA: .75 ft/mi = 15 sec/std

RIH AFTER SHORT TRIP. SHORT TRIP GAS = 683. DRILL AHEAD WITH BIT NO 6 THRU SILTSTONE/CLAY TO 11125'. SHORT TRIP TO SHOE TO CONDITION HOLE TO RUN E LOGS. HOLE PULLED TIGHT AT 10261-10071' AND 9057-8767'.

ADT D. WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 11125
OPERATION E LOG
FOOTAGE

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 24
DATE Aug 21 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	NA		
CONNECTION			
TRIP		663	11125
FLOWLINE TEMP		degrees F	

SURVEY DATA 4.03 Deg at 11125'
LITHOLOGY 40 % CLAY 60% SILTSTONE
SAMPLE DEPTH 11125
TRIP CHLORIDES
LAG DOWN DP
LAG OFF BOTTOM

DRILL RATE ft/hr
CORRECTED 'D' EXP.
SHALE DENSITY g/cc NA
EWR Res.

FORMATION PRESSURE DATA

	CASING		BOTTOM HOLE		OPEN HOLE		
PORE PRESSURE	1800 psi	8.7 ppg	5727 psi	9.9 ppg	psi	ppg	ft
FRACTURE PRESSURE	3081 psi	14.9 ppg	9545 psi	16.5 ppg	psi	ppg	ft
ECD	psi	ppg	psi	ppg	psi	ppg	ft

MUD DATA

TIME	1530 AUG 20 93
TYPE	GENERIC #2
WEIGHT IN	10.8
FUNNEL VIS.	56
PV/YP	28/36
GELS	3/13
pH	8.5
FILT/CAKE API	3.0 -1/32
HP-HT	6.2 @ 150
Pm	.3
Pf/Mf	.15/1.4
CHLORIDES ppm	17000
CALCIUM ppm	920
OIL/WATER/SOLIDS	TR/11.5/88.5
DAILY/CUM. COST	

BIT DATA

BIT NO.	6	
TYPE	DS-40H	
IADC CODE	PDC	
SIZE	12.25	
JETS	5-15	
DEPTH OUT	11125	
ROT HRS.	25.1	
FOOTAGE	1625	
AVG ft/hr	65	
GRADE	4-4-X-1/8	
HOLE DEV.	4.03	
COST/FT	517	
RPM	152	
WOB	11	

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC	
PD SURF / DS psi		
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED RATE 1	psi at stk/min	
2	psi at stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	DP-RISER	171	.3644			
5X13 3/8	DP-CSG	3906	.1255			
5X12.25	DP-HOLE	6098	.1215			
8X12.25	DC-HOLE	476	.0836			

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER 171	COND. 301	SURF. 1017	3978
OD-inches	5.0	5.0		8			21.0	30	20	13.375
ID-inches	4.276	3.0		2.875			20.0	28	18.75	12.415
CAP-bbls/ft	.0178	.0087		.0076			.3887	.7616	.3408	.1498
DISP-bbls/ft	.0075	.0181		.0545			NA	.113	.0479	.024
LENGTH-ft	9919	728		476			170.5	95	811	3772
WEIGHT-lbs/ft	19.5	49		149				310	133	68

REMARKS AND RECOMMENDATIONS

MW 10.5 GPM 700 JETS TFA: .75 ft/mi = 15 sec/std

RIH AFTER SHORT TRIP. SHORT TRIP GAS=663. CIRC AND CONDITION HOLE. POH FOR E LOGS. NO PROBLEMS PULLING PIPE. E LOG.

ADT D. WALTERS

sperry-sun DRILLING SERVICES A Baroid Company **LOGGING SYSTEMS**

DEPTH 11125
OPERATION E LOG
FOOTAGE

NO. 25
DATE Aug 22 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	NA		
CONNECTION			
TRIP			
FLOWLINE TEMP		degrees F	

SURVEY DATA 4.03 Deg at 11125'
LITHOLOGY 40 % CLAY 60% SILTSTONE
SAMPLE DEPTH 11125
TRIP CHLORIDES
LAG DOWN DP
LAG OFF BOTTOM

DRILL RATE ft/hr
CORRECTED 'D' EXP.
SHALE DENSITY g/cc NA
EWR Res.

FORMATION PRESSURE DATA

	CASING				BOTTOM HOLE				OPEN HOLE			
PORE PRESSURE	1800	psi	8.7	ppg	5727	psi	9.9	ppg		psi	ppg	ft
FRACTURE PRESSURE	3081	psi	14.9	ppg	9545	psi	16.5	ppg		psi	ppg	ft
ECD		psi		ppg		psi		ppg		psi	ppg	ft

MUD DATA

TIME	2100 21 AUG 93
TYPE	GENERIC #2
WEIGHT IN	10.9
FUNNEL VIS.	68
PV/YP	28/37
GELS	3/12
pH	8.5
FILT/CAKE API	2.6/1
HP-HT	7.0 @ 150
Pm	.3
Pf/Mf	.15/1.4
CHLORIDES ppm	17000
CALCIUM ppm	940
OIL/WATER/SOLIDS	TR/12/88
DAILY/CUM. COST	

BIT DATA

BIT NO.		6
TYPE		D8-40H
IADC CODE		PDC
SIZE		12.25
JETS		5-15
DEPTH OUT		11125
ROT HRS.		25.1
FOOTAGE		1625
AVG ft/hr		85
GRADE		4-4-X-1/8
HOLE DEV.		4.03
COST/FT		517
RPM		152
WOB		11

HYDRAULIC DATA

PUMPS	1.	ID1600	2.	ID1600
SIZE inches		6.5X12		6.5X12
CAPACITY gal/stk		4.91		4.91
PUMP RATE stks/min				
FLOW RATE gal/min				
PRESSURE psi		STATIC		
PD SURF / DS psi				
ANN / BIT psi				
JET VELOCITY ft/sec				
JET IMPACT lbs				
BIT HP				
HP RATIO / HP/IN2				
REDUCED RATE	1	psi at stk/min		
	2	psi at stk/min		

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	DP-RISER	171	.3644			
5X13 3/8	DP-CSG	3906	.1255			
5X12.25	DP-HOLE	6098	.1215			
8X12.25	DC-HOLE	476	.0836			

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER 171	COND. 301	SURF. 1017	INT. 3978
OD-inches	5.0	5.0		8			21.0	30	20	13.375
ID-inches	4.276	3.0		2.875			20.0	28	18.75	12.415
CAP-bbls/ft	.0178	.0087		.0076			.3887	.7616	.3408	.1498
DISP-bbls/ft	.0075	.0181		.0545			NA	.113	.0479	.024
LENGTH-ft	9921	728		476			170.5	95	811	3772
WEIGHT-lbs/ft	19.5	49		149				310	133	68

REMARKS AND RECOMMENDATIONS

MW 10.5 GPM 700 JETS TFA: .75 ft/mi = 15 sec/std

E LOG. HOLE TAKING .5 BBLS/HR

ADT D. WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 11125
OPERATION E LOG
FOOTAGE

NO. 27
DATE Aug 24 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	NA		
CONNECTION			
TRIP			
FLOWLINE TEMP	degrees F		

SURVEY DATA 4.03 Deg at 11125'
LITHOLOGY 40 % CLAY 60% SILTSTONE
SAMPLE DEPTH 11125
TRIP CHLORIDES
LAG DOWN DP
LAG OFF BOTTOM

DRILL RATE ft/hr
CORRECTED 'D' EXP.
SHALE DENSITY g/cc NA
EWR Res.

FORMATION PRESSURE DATA

	CASING				BOTTOM HOLE				OPEN HOLE			
PORE PRESSURE	1800	psi	8.7	ppg	5727	psi	9.9	ppg		psi	ppg	ft
FRACTURE PRESSURE	3081	psi	14.9	ppg	9545	psi	16.5	ppg		psi	ppg	ft
ECD		psi		ppg		psi		ppg		psi	ppg	ft

MUD DATA

TIME	1900 22 AUG 93
TYPE	GENERIC #2
WEIGHT IN	10.9
FUNNEL VIS.	68
PV/YP	28/33
GELS	3/14
pH	8.5
FILT/CAKE API	2.8/1
HP-HT	8.6 @ 150
Pm	.3
Pf/Mf	.15/1.4
CHLORIDES ppm	17000
CALCIUM ppm	960
OIL/WATER/SOLIDS	TR/12/88
DAILY/CUM. COST	

BIT DATA

BIT NO.	6
TYPE	D8-40H
IADC CODE	PDC
SIZE	12.25
JETS	5-15
DEPTH OUT	11125
ROT HRS.	25.1
FOOTAGE	1625
AVG ft/hr	85
GRADE	4-4-X-1/8
HOLE DEV.	4.03
COST/FT	517
RPM	152
WOB	11

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC	
PD SURF / DS psi		
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED 1	psi at stk/min	
RATE 2	psi at stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	DP-RISER	171	.3644			
5X13 3/8	DP-CSG	3906	.1255			
5X12.25	DP-HOLE	6098	.1215			
8X12.25	DC-HOLE	476	.0836			

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER 171	COND. 301	SURF. 1017	INT. 3978
OD-inches	5.0	5.0		8			21.0	30	20	13.375
ID-inches	4.276	3.0		2.875			20.0	28	18.75	12.415
CAP-bbls/ft	.0178	.0087		.0076			.3887	.7616	.3408	.1498
DISP-bbls/ft	.0075	.0181		.0545			NA	.113	.0479	.024
LENGTH-ft	9921	728		476			170.5	95	811	3772
WEIGHT-lbs/ft	19.5	49		149				310	133	68

REMARKS AND RECOMMENDATIONS

MW GPM JETS ft/mi = sec/std

E LOG. LOST 70 BBLS MUD TO HOLE IN 56 HRS. RIH FOR CLEANOUT RUN. HOLE TIGHT AT 10837'. WASH TO BOTTOM. CBU. TRIP GAS=1469.
POOH FOR MORE E LOGS.

ADT D. WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 11125
OPERATION E LOG
FOOTAGE

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 28
DATE Aug 25 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	NA		
CONNECTION			
TRIP			
FLOWLINE TEMP	degrees F		

SURVEY DATA 4.03 Deg at 11125'
LITHOLOGY 40 % CLAY 60% SILTSTONE
SAMPLE DEPTH 11125
TRIP CHLORIDES
LAG DOWN DP
LAG OFF BOTTOM

DRILL RATE ft/hr
CORRECTED 'D' EXP.
SHALE DENSITY g/cc NA
EWR Res.

FORMATION PRESSURE DATA

	CASING		BOTTOM HOLE		OPEN HOLE		
PORE PRESSURE	1800 psi	8.7 ppg	5727 psi	9.9 ppg	psi	ppg	ft
FRACTURE PRESSURE	3081 psi	14.9 ppg	9545 psi	16.5 ppg	psi	ppg	ft
ECD	psi	ppg	psi	ppg	psi	ppg	ft

MUD DATA

TIME	1900 24 AUG 93
TYPE	GENERIC #2
WEIGHT IN	10.9
FUNNEL VIS.	68
PV/YP	28/32
GELS	3/14
pH	8.5
FILT/CAKE API	2.8/1
HP-HT	8.8 @ 150
Pm	.3
Pf/Mf	.15/1.4
CHLORIDES ppm	17000
CALCIUM ppm	960
OIL/WATER/SOLIDS	TR/12/88
DAILY/CUM. COST	

BIT DATA

BIT NO.	6
TYPE	D8-40H
IADC CODE	PDC
SIZE	12.25
JETS	5-15
DEPTH OUT	11125
ROT HRS.	25.1
FOOTAGE	1625
AVG ft/hr	85
GRADE	4-4-X-1/8
HOLE DEV.	4.03
COST/FT	517
RPM	152
WOB	11

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC	
PD SURF / DS psi		
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED RATE 1	psi at stk/min	
2	psi at stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	DP-RISER	171	.3644			
5X13 3/8	DP-CSG	3906	.1255			
5X12.25	DP-HOLE	6098	.1215			
8X12.25	DC-HOLE	476	.0836			

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER 171	COND. 301	SURF. 1017	INT. 3978
OD-inches	5.0	5.0		8			21.0	30	20	13.375
ID-inches	4.276	3.0		2.875			20.0	28	18.75	12.415
CAP-bbls/ft	.0178	.0087		.0076			.3887	.7616	.3408	.1498
DISP-bbls/ft	.0075	.0181		.0545			NA	.113	.0479	.024
LENGTH-ft	9921	728		476			170.5	95	811	3772
WEIGHT-lbs/ft	19.5	49		149				310	133	68

REMARKS AND RECOMMENDATIONS

MW GPM JETS ft/mi = sec/std

E LOG. LOST 15 BBLS MUD TO HOLE IN 20 HRS.

ADT D. WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 11125
OPERATION CIRC
FOOTAGE

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 29
DATE Aug 26 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	NA		
CONNECTION			
TRIP			
FLOWLINE TEMP	degrees F		

SURVEY DATA 4.03 Deg at 11125'
LITHOLOGY 40 % CLAY 60% SILTSTONE
SAMPLE DEPTH 11125
TRIP CHLORIDES
LAG DOWN DP
LAG OFF BOTTOM

DRILL RATE ft/hr
CORRECTED 'D' EXP.
SHALE DENSITY g/cc NA
EWR Res.

FORMATION PRESSURE DATA

	CASING		BOTTOM HOLE		OPEN HOLE		
PORE PRESSURE	1800 psi	8.7 ppg	5727 psi	9.9 ppg	psi	ppg	ft
FRACTURE PRESSURE	3081 psi	14.9 ppg	9545 psi	16.5 ppg	psi	ppg	ft
ECD	psi	ppg	psi	ppg	psi	ppg	ft

MUD DATA

TIME	1900 24 AUG 93
TYPE	GENERIC #2
WEIGHT IN	10.9
FUNNEL VIS.	68
PV/YP	28/32
GELS	3/14
pH	8.5
FILT/CAKE API	2.8/1
HP-HT	8.8 @ 150
Pm	.3
Pf/Mf	.15/1.4
CHLORIDES ppm	17000
CALCIUM ppm	960
OIL/WATER/SOLIDS	TR/12/88
DAILY/CUM. COST	

BIT DATA

BIT NO.	6
TYPE	D8-40H
IADC CODE	PDC
SIZE	12.25
JETS	5-15
DEPTH OUT	11125
ROT HRS.	25.1
FOOTAGE	1625
AVG ft/hr	85
GRADE	4-4-X-1/8
HOLE DEV.	4.03
COST/FT	517
RPM	152
WOB	11

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC	
PD SURF / DS psi		
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED RATE 1	psi at stk/min	
2	psi at stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	DP-RISER	171	.3644			
5X13 3/8	DP-CSG	3906	.1255			
5X12.25	DP-HOLE	6098	.1215			
8X12.25	DC-HOLE	476	.0836			

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER 171	COND. 301	SURF. 1017	INT. 3978
OD-inches	5.0	5.0		8			21.0	30	20	13.375
ID-inches	4.276	3.0		2.875			20.0	28	18.75	12.415
CAP-bbls/ft	.0178	.0087		.0076			.3887	.7616	.3408	.1498
DISP-bbls/ft	.0075	.0181		.0545			NA	.113	.0479	.024
LENGTH-ft	9921	728		476			170.5	95	811	3772
WEIGHT-lbs/ft	19.5	49		149				310	133	68

REMARKS AND RECOMMENDATIONS

MW GPM JETS ft/mi = sec/std

E LOG. LOGGING TOOL STUCK AT 6200'. TRIP IN HOLE STRIPPING OVER WIRELINE TO RECOVER FISH. RECOVER FISH. POOH. RIH FOR CLEANOUT RUN. CIRCULATE AND CONDITION HOLE.

ADT D. WALTERS

sperry-sun DRILLING SERVICES
A Baroid Company

LOGGING SYSTEMS

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

DEPTH 11125
OPERATION CIRC
FOOTAGE

NO. 30
DATE Aug 27 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	NA		
CONNECTION			
TRIP	1231	8/26/93	
FLOWLINE TEMP		degrees F	

SURVEY DATA 4.03 Deg at 11125'
LITHOLOGY 40 % CLAY 60% SILTSTONE
SAMPLE DEPTH 11125
TRIP CHLORIDES
LAG DOWN DP
LAG OFF BOTTOM

DRILL RATE ft/hr
CORRECTED 'D' EXP.
SHALE DENSITY g/cc NA
EWR Res.

FORMATION PRESSURE DATA

	CASING		BOTTOM HOLE		OPEN HOLE		
PORE PRESSURE	1800 psi	8.7 ppg	5727 psi	9.9 ppg	psi	ppg	ft
FRACTURE PRESSURE	3081 psi	14.9 ppg	9545 psi	16.5 ppg	psi	ppg	ft
ECD	psi	ppg	psi	ppg	psi	ppg	ft

MUD DATA

TIME	1900 24 AUG 93
TYPE	GENERIC #2
WEIGHT IN	10.6
FUNNEL VIS.	56
PV/YP	22/26
GELS	3/12
pH	9.8
FILT/CAKE API	4.0/1
HP-HT	9.5 @ 150
Pm	2.0
Pf/Mf	1.7/5.4
CHLORIDES ppm	17000
CALCIUM ppm	240
OIL/WATER/SOLIDS	TR/11/89
DAILY/CUM. COST	

BIT DATA

BIT NO.	6
TYPE	D8-40H
IADC CODE	PDC
SIZE	12.25
JETS	5-15
DEPTH OUT	11125
ROT HRS.	25.1
FOOTAGE	1625
AVG ft/hr	85
GRADE	4-4-X-1/8
HOLE DEV.	4.03
COST/FT	517
RPM	152
WOB	11

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC	
PD SURF / DS psi		
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED RATE 1	psi at stk/min	
2	psi at stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	DP-RISER	171	.3644			
5X13 3/8	DP-CSG	3906	.1255			
5X12.25	DP-HOLE	6098	.1215			
8X12.25	DC-HOLE	476	.0836			

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER 171	COND. 301	SURF. 1017	INT. 3978
OD-inches	5.0	5.0		8			21.0	30	20	13.375
ID-inches	4.276	3.0		2.875			20.0	28	18.75	12.415
CAP-bbls/ft	.0178	.0087		.0076			.3887	.7616	.3408	.1498
DISP-bbls/ft	.0075	.0181		.0545			NA	.113	.0479	.024
LENGTH-ft	9921	728		476			170.5	95	811	3772
WEIGHT-lbs/ft	19.5	49		149				310	133	68

REMARKS AND RECOMMENDATIONS

MW GPM JETS ft/mi = sec/std

CIRCULATE HOLE. TRIP GAS-1231u. POOH. PULLED TIGHT AT 10900 AND 10500. E LOG.

ADT D. WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 11125
OPERATION PLUG
FOOTAGE

NO. 31
DATE Aug 28 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM NO. 2	FIELD/BLOCK	OCS BLK 672 NR6-4
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Jul 28 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	NA		
CONNECTION			
TRIP	1231	8/26/93	
FLOWLINE TEMP		degrees F	

SURVEY DATA 4.03 Deg at 11125'
LITHOLOGY 40 % CLAY 60% SILTSTONE
SAMPLE DEPTH 11125
TRIP CHLORIDES
LAG DOWN DP
LAG OFF BOTTOM

DRILL RATE ft/hr
CORRECTED 'D' EXP.
SHALE DENSITY g/cc NA
EWR Res.

FORMATION PRESSURE DATA

	CASING				BOTTOM HOLE				OPEN HOLE			
PORE PRESSURE	1800	psi	8.7	ppg	5727	psi	9.9	ppg		psi		ppg		ft
FRACTURE PRESSURE	3081	psi	14.9	ppg	9545	psi	16.5	ppg		psi		ppg		ft
ECD		psi		ppg		psi		ppg		psi		ppg		ft

MUD DATA

TIME	1600 24 AUG 93
TYPE	GENERIC #2
WEIGHT IN	10.9
FUNNEL VIS.	5665
PV/YP	28/35
GELS	4/16
pH	9.5
FILT/CAKE API	3.4/2
HP-HT	8.9 @ 150
Pm	1.7
Pf/Mf	1.3/3.7
CHLORIDES ppm	17000
CALCIUM ppm	260
OIL/WATER/SOLIDS	TR/12/88
DAILY/CUM. COST	

BIT DATA

BIT NO.		6
TYPE		D8-40H
IADC CODE		PDC
SIZE		12.25
JETS		5-15
DEPTH OUT		11125
ROT HRS.		25.1
FOOTAGE		1625
AVG ft/hr		85
GRADE		4-4-X-1/8
HOLE DEV.		4.03
COST/FT		517
RPM		152
WOB		11

HYDRAULIC DATA

PUMPS	1. ID1600	2. ID1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.91	4.91
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC	
PD SURF / DS psi		
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED RATE 1	psi at stk/min	
2	psi at stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5X20	DP-RISER	171	.3644			
5X13 3/8	DP-CSG	3906	.1255			
5X12.25	DP-HOLE	6098	.1215			
8X12.25	DC-HOLE	476	.0836			

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER 171	COND. 301	SURF. 1017	INT. 3978
OD-inches	5.0	5.0		8			21.0	30	20	13.375
ID-inches	4.276	3.0		2.875			20.0	28	18.75	12.415
CAP-bbls/ft	.0178	.0087		.0076			.3887	.7616	.3408	.1498
DISP-bbls/ft	.0075	.0181		.0545			NA	.113	.0479	.024
LENGTH-ft	9921	728		476			170.5	95	811	3772
WEIGHT-lbs/ft	19.5	49		149				310	133	68

REMARKS AND RECOMMENDATIONS

MW GPM JETS ft/mi = sec/std

E LOG. RIH TO 7630'. CIRC 15 MIN. PUMP SLUG. PULL 4 STANDS. CEMENT AND PLUG HOLE.

ADT D. WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 405
OPERATION DRILLING
FOOTAGE 189

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 1
DATE Sep 10 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	0	2	
CONNECTION	0		
TRIP	0		
FLOWLINE TEMP	33	degrees F	

SURVEY DATA	NA
LITHOLOGY	NA
SAMPLE DEPTH	
TRIP CHLORIDES	
LAG DOWN DP	25
LAG OFF BOTTOM	NA

DRILL RATE ft/hr	45
CORRECTED "D" EXP.	.91
SHALE DENSITY g/cc	
EWR Res.	

FORMATION PRESSURE DATA

	CASING				BOTTOM HOLE				OPEN HOLE			
PORE PRESSURE	137	psi	8.5	ppg	179	psi	8.5	ppg		psi		ppg		ft
FRACTURE PRESSURE	NA	psi	NA	ppg	200	psi	9.5	ppg		psi		ppg		ft
ECD	137	psi	8.5	ppg	179	psi	8.5	ppg		psi		ppg		ft

MUD DATA

TIME	00:00 9/9/93
TYPE	SWEEP STORAGE
WEIGHT IN	8.8
FUNNEL VIS.	70
PV/YP	16/16
GELS	12/28
pH	9.0
FILT/CAKE API	
HP-HT	
Pm	
Pf/Mf	.15/.3
CHLORIDES ppm	650
CALCIUM ppm	400
OIL/WATER/SOLIDS	
DAILY/CUM. COST	

BIT DATA

BIT NO.	1	
TYPE	ATXG1	
IADC CODE		
SIZE	26"	
JETS	3-21,1-22	
DEPTH OUT		
ROT HRS.	14.6	
FOOTAGE	189	
AVG ft/hr	12.9	
GRADE	INC	
HOLE DEV.		
COST/FT	226	
RPM	160 (CALC)	
WOB	2/10	

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	7.5X12	7.5X12
CAPACITY gal/stk	6.54	6.54
PUMP RATE stks/min	77	77
FLOW RATE gal/min	1007	
PRESSURE psi	1300	
PD SURF / DS psi	100/790	
ANN / BIT psi	0/410	
JET VELOCITY ft/sec	232	
JET IMPACT lbs	1024	
BIT HP	240	
HP RATIO / HP/IN2	30% - .5/IN2	
REDUCED 1	____ psi at ____ stk/min	
RATE 2	____ psi at ____ stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 27	DP-CSG	93	.6842	34	NA	
5 X 26	DP-HOLE		.6326			
9.0 x 27		6	.5905	36		
9.0 X 26	DC-HOLE	96	.5692	41		

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND.		
OD-inches	5.0	5.0		9.5			21	30		
ID-inches	4.276	3.0		2.875			20	27		
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085		
DISP-bbls/ft	.0072	.0181		.0707				.113		
LENGTH-ft		303		102						
WEIGHT-lbs/ft	19.5	49		195				450		

REMARKS AND RECOMMENDATIONS

MW 8.5 GPM ____ JETS ____ ft/mi = ____ sec/std

ON LOCATION 8-30-93. DRILL PILOT HOLE WITH 26" PILOT BIT TO 230'. DRILL 24' GLORY HOLE FROM THE MUD LINE AT 172' TO 211'. LAND 24' PROTECTIVE CAISSON INSIDE OF GLORY HOLE. CONTINUE DRILLING WITH GLORY HOLE BIT WHILE WASHING DOWN CASSION TO 216'. LAND GUIDE BASE. RIH WITH 30" CONDUCTOR CSG IN CONJUNCTION WITH BIT NO. 1 AND MUD MOTOR. JET DRILL CASING. LAND 30" CASING AT 309'. DRILL AHEAD WITH BIT NO. 1.

ADT J. PATTON

sperry-sun DRILLING SERVICES LOGGING SYSTEMS
A Baroid Company

DEPTH 1040
OPERATION R/U F/20"
FOOTAGE 635

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 2
DATE Sep 11 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	0	3	510
CONNECTION	0		
TRIP	0		
FLOWLINE TEMP	33 degrees F		

SURVEY DATA NA
LITHOLOGY NA
SAMPLE DEPTH
TRIP CHLORIDES
LAG DOWN DP 70
LAG OFF BOTTOM NA

DRILL RATE ft/hr 50
CORRECTED "D" EXP. .74
SHALE DENSITY g/cc NA
EWR Res.

FORMATION PRESSURE DATA

	CASING		BOTTOM HOLE		OPEN HOLE	
PORE PRESSURE	137 psi	8.5 ppg	460 psi	8.5 ppg	psi	ppg ft
FRACTURE PRESSURE	NA psi	NA ppg	660 psi	12.2 ppg	psi	ppg ft
ECD	137 psi	8.5 ppg	460 psi	8.5 ppg	psi	ppg ft

MUD DATA

TIME	00:00 9/10/93
TYPE	DISPLACED MUD
WEIGHT IN	9.6
FUNNEL VIS.	58
PV/YP	16/18
GELS	6/14
pH	9.5
FILT/CAKE API	13.0
HP-HT	
Pm	.4
Pf/Mf	.2/.5
CHLORIDES ppm	14000
CALCIUM ppm	560
OIL/WATER/SOLIDS	
DAILY/CUM. COST	

BIT DATA

BIT NO.	1
TYPE	ATXG1
IADC CODE	
SIZE	26"
JETS	3-21,1-22
DEPTH OUT	1040
ROT HRS.	26.7
FOOTAGE	824
AVG ft/hr	30.7
GRADE	
HOLE DEV.	
COST/FT	88
RPM	165 (CALC)
WOB	10

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	7.5X12	7.5X12
CAPACITY gal/stk	6.54	6.54
PUMP RATE stks/min	71	71
FLOW RATE gal/min	927	
PRESSURE psi	1450	
PD SURF / DS psi	100/1000	
ANN / BIT psi	0/350	
JET VELOCITY ft/sec	215	
JET IMPACT lbs	875	
BIT HP	190	
HP RATIO / HP/IN2	24% - .4/IN2	
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 27	DP-CSG	93	.6842	32	NA	
5 X 26	DP-HOLE	722	.6326	35		
9.0 x 27			.5905			
9.0 X 26	DC-HOLE	102	.5692	38		

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND.		
OD-inches	5.0	5.0		9.5			21	30		
ID-inches	4.276	3.0		2.875			20	27		
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085		
DISP-bbls/ft	.0072	.0181		.0707				.113		
LENGTH-ft	217	721		102				100		
WEIGHT-lbs/ft	19.5	49		195				450		

REMARKS AND RECOMMENDATIONS

MW 8.7 GPM JETS ft/mi = sec/std

DRILL AHEAD WITH BIT NO. 1 OCCASIONALLY PUMPING HIGH VIS SWEEPS TO CLEAN THE HOLE. SAND FORMATION INTERPRETED FROM NORMALIZED ROP DATA BETWEEN 770' - 990'. DRILL TO 1040'. CIRCULATE OUT HOLE VOLUME. PUMP HIGH VIS SWEEP. SHORT TRIP TO 30" CASING. PUMP HIGH VIS SWEEP. DISPLACE HOLE WITH 9.6 PPG MUD. POOH. RIG TO RUN 20" CASING.

ADT J. PATTON

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 1040
OPERATION RUN BOP
FOOTAGE 0

NO. 3
DATE Sep 12 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	0	3	510
CONNECTION	0		
TRIP	0		
FLOWLINE TEMP	33 degrees F		

SURVEY DATA	NA
LITHOLOGY	NA
SAMPLE DEPTH	
TRIP CHLORIDES	
LAG DOWN DP	77
LAG OFF BOTTOM	2750

DRILL RATE ft/hr	50
CORRECTED "D" EXP.	.74
SHALE DENSITY g/cc	NA
EWR Res.	

FORMATION PRESSURE DATA

	CASING				BOTTOM HOLE				OPEN HOLE			
PORE PRESSURE	137	psi	8.5	ppg	460	psi	8.5	ppg		psi		ppg		ft
FRACTURE PRESSURE	NA	psi	NA	ppg	660	psi	12.2	ppg		psi		ppg		ft
ECD	137	psi	8.5	ppg	460	psi	8.5	ppg		psi		ppg		ft

MUD DATA

TIME	00:00 9/11/93
TYPE	MUD IN HOLE
WEIGHT IN	9.6
FUNNEL VIS.	58
PV/YP	16/18
GELS	6/14
pH	9.5
FILT/CAKE API	13.0
HP-HT	
Pm	.4
Pf/Mf	.2/.5
CHLORIDES ppm	14000
CALCIUM ppm	560
OIL/WATER/SOLIDS	
DAILY/CUM. COST	

BIT DATA

BIT NO.	1
TYPE	ATXG1
IADC CODE	
SIZE	26"
JETS	3-21,1-22
DEPTH OUT	1040
ROT HRS.	26.7
FOOTAGE	824
AVG ft/hr	30.7
GRADE	
HOLE DEV.	
COST/FT	88
RPM	165 (CALC)
WOB	10

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC PAST	
PD SURF / DS psi	24 HRS	
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED RATE 1	psi at stk/min	
2	psi at stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER		.3644		NA	
5 X 18.73	DP-CSG		.3166			
5 X 12.25	DP-HOLE		.1215			
8.0 X 18.73	DC-CSG		.3265			
8.0 X 12.25	DC-HOLE		.0836			

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND. 309	SURF. 1022	
OD-inches	5.0	5.0		8.0			21	30	20	
ID-inches	4.276	3.0		2.875			20	27	18.73	
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	
LENGTH-ft		721					177	100	812	
WEIGHT-lbs/ft	19.5	49		147				450	133	

REMARKS AND RECOMMENDATIONS

MW 9.6 GPM 650 JETS 4-12'S 3000 PSI ft/mi = sec/std

RUN 20" - 133 LD/FT CASING. LAND CASING AT 1022'. CEMENT 20" & 30" AT THE SAME TIME. START RUNNING BOP STACK.

ADT J. PATTON

sperry-sun
DRILLING SERVICES
A Baroid Company

LOGGING SYSTEMS

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

DEPTH	1040	NO.	4
OPERATION	SQUEEZE	DATE	Sep 13 93
FOOTAGE	0	TIME	04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	0		
CONNECTION	0		
TRIP	0		
FLOWLINE TEMP	33 degrees F		

SURVEY DATA	NA		
LITHOLOGY	NA		
SAMPLE DEPTH			
TRIP CHLORIDES			
LAG DOWN DP	77	DRILL RATE ft/hr	50
LAG OFF BOTTOM	2750	CORRECTED 'D' EXP.	.74
		SHALE DENSITY g/cc	NA
		EWR Res.	

FORMATION PRESSURE DATA

	CASING				BOTTOM HOLE				OPEN HOLE			
PORE PRESSURE	137	psi	8.5	ppg	460	psi	8.5	ppg		psi		ppg		ft
FRACTURE PRESSURE	NA	psi	NA	ppg	660	psi	12.2	ppg		psi		ppg		ft
ECD	137	psi	8.5	ppg	460	psi	8.5	ppg		psi		ppg		ft

MUD DATA

TIME	00:00 9/12/93
TYPE	MUD IN PITS
WEIGHT IN	9.8
FUNNEL VIS.	53
PV/YP	18/19
GELS	4/4
pH	9.0
FILT/CAKE API	4.4
HP-HT	-
Pm	.4
Pf/Mf	.2/.8
CHLORIDES ppm	18000
CALCIUM ppm	1800
OIL/WATER/SOLIDS	
DAILY/CUM. COST	

BIT DATA

BIT NO.	1	2
TYPE	ATXG1	SS33SGJ4
IADC CODE		
SIZE	26"	17.5
JETS	3-21,1-22	3-18,1-11
DEPTH OUT	1040	
ROT HRS.	26.7	
FOOTAGE	824	
AVG ft/hr	30.7	
GRADE		
HOLE DEV.		
COST/FT	88	
RPM	165 (CALC)	
WOB	10	

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min	70	70
FLOW RATE gal/min	689	
PRESSURE psi	1200	
PD SURF / DS psi	90/580	
ANN / BIT psi	0/530	
JET VELOCITY ft/sec	264	
JET IMPACT lbs	800	
BIT HP	212	
HP RATIO / HP/IN2	24% - .9/IN2	
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644	45	TURB.	
5 X 18.73	DP-CSG	845	.3166	52		
5 X 12.25	DP-HOLE		.1215			
8.0 X 18.73	DC-CSG		.3265			
8.0 X 12.25	DC-HOLE		.0836			

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND.	SURF.	
OD-inches	5.0	5.0		8.0			21	30	20	
ID-inches	4.276	3.0		2.875			20	27	18.73	
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	
LENGTH-ft		721					177	100	812	
WEIGHT-lbs/ft	19.5	49		147				450	133	

REMARKS AND RECOMMENDATIONS

MW 9.6 GPM 650 JETS 4-12'S 3000 PSI ft/mi = sec/std

LAND AND TEST BOP STACK. ATTEMPT TO TEST CASING - NO TEST. RIH WITH 17.5" BIT. WASH DOWN TO FLOAT/SHOE. POOH.

RIH WITH STINGER. STING IN AND SUEEZE WITH 83 BBL OF CEMEMT. PULL 4 STANDS. CO.

ADT J. PATTON

sperry-sun DRILLING SERVICES A Baroid Company — ***LOGGING SYSTEMS***

DEPTH	1645
OPERATION	DRILLING
FOOTAGE	595

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO.	5
DATE	Sep 14 93
TIME	04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	25	44	1625
CONNECTION	0		
TRIP	46		1050
FLOWLINE TEMP	41	degrees F	

SURVEY DATA	.31 DEG @ 1548'		
LITHOLOGY	50% SAND 30% CLAY 20% SILT		
SAMPLE DEPTH	1470		
TRIP CHLORIDES	NA	DRILL RATE ft/hr	105
LAG DOWN DP	155	CORRECTED 'D' EXP.	.80
LAG OFF BOTTOM	3325	SHALE DENSITY g/cc	NA
		EWR Res.	2

FORMATION PRESSURE DATA

	CASING				BOTTOM HOLE				OPEN HOLE				
PORE PRESSURE	452	psi	8.5	ppg	727	psi	8.5	ppg		psi		ppg	ft
FRACTURE PRESSURE	760	psi	14.3	ppg	1112	psi	13.0	ppg		psi		ppg	ft
ECD	531	psi	10.0	ppg	855	psi	10.0	ppg		psi		ppg	ft

MUD DATA

TIME	00:00 9/13/93
TYPE	PHPA-SEA WATER
WEIGHT IN	9.7+
FUNNEL VIS.	43
PV/YP	16/18
GELS	3/3
pH	10.0
FILT/CAKE API	5.1
HP-HT	-
Pm	1.5
Pf/Mf	.4/1.3
CHLORIDES ppm	17400
CALCIUM ppm	1560
OIL/WATER/SOLIDS	0/6.5/93.5
DAILY/CUM. COST	

BIT DATA

BIT NO.	3	2
TYPE	FDSS	SS33SGJ4
IADC CODE		
SIZE	12.25	17.5
JETS	3-13,1-12	3-18,1-11
DEPTH OUT		1050
ROT HRS.	5.9	.15
FOOTAGE	595	10
AVG ft/hr	101	60
GRADE	INC	2-2-I
HOLE DEV.	.31	
COST/FT	326	NA
RPM	140	95
WOB	0/10	10

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min	65	65
FLOW RATE gal/min	641	
PRESSURE psi	2050	
PD SURF / DS psi	90/465	
ANN / BIT psi	10/1485	
JET VELOCITY ft/sec	412	
JET IMPACT lbs	1340	
BIT HP	555	
HP RATIO / HP/IN2	72% - .4.7/IN2	
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644	42	211	
5 X 18.73	DP-CSG	845	.3166	48	216	
5 X 12.25	DP-HOLE	147	.1215	126	242	
8.0 X 12.25	DC-HOLE	476	.0836	183	285	

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND.	SURF.	
OD-inches	5.0	5.0		8.0			21	30	20	
ID-inches	4.276	3.0		2.875			20	27	18.73	
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	
LENGTH-ft	442	727		476			177	100	812	
WEIGHT-lbs/ft	19.5	49		147				450	133	

REMARKS AND RECOMMENDATIONS

MW 9.6 GPM 650 JETS 4-12'S 3000 PSI ft/mi = sec/std

CASING TESTED TO 2200 PSI FOR 30 MINUTES. RIH WITH BIT NO. 2. DRILLOUT CEMENT AND FLOAT/SHOE. DRILL 10' OF NEW HOLE.

CO. SPOT HIGH VIS PILL AT BOTTOM. DISPLACE HOLE WITH PHPA-POLY MUD SYSTEM. RUN LEAK OFF TEST = 14.3 PPG. POOH.

P/U NEW BIT 3 AND MWD TOOL. RIH. DRILL AHEAD THROUGH SAND AND CLAY.

ADT J. PATTON

sperry-sun DRILLING SERVICES
A Baroid Company

LOGGING SYSTEMS

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

DEPTH 3100
OPERATION DRILLING
FOOTAGE 1455

NO. 6
DATE Sep 15 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	20	56	2340'
CONNECTION	0		
TRIP	153		2336'
FLOWLINE TEMP	37	degrees F	

SURVEY DATA	.47 DEG @ 2968'
LITHOLOGY	30% SAND 50% CLAY 20% SILT
SAMPLE DEPTH	2970
TRIP CHLORIDES	NA
LAG DOWN DP	365
LAG OFF BOTTOM	4800

DRILL RATE ft/hr	80
CORRECTED 'D' EXP.	1.01
SHALE DENSITY g/cc	NA
EWR Res.	3

FORMATION PRESSURE DATA

	CASING		BOTTOM HOLE		OPEN HOLE		
PORE PRESSURE	452 psi	8.5 ppg	1402 psi	8.7 ppg	psi	ppg	ft
FRACTURE PRESSURE	760 psi	14.3 ppg	2257 psi	14.0 ppg	psi	ppg	ft
ECD	531 psi	10.8 ppg	1612 psi	10.0 ppg	psi	ppg	ft

MUD DATA

TIME	00:00 9/14/93
TYPE	PHPA-SEA WATER
WEIGHT IN	9.7+
FUNNEL VIS.	72
PV/YP	29/35
GELS	4/5
pH	10.1
FILT/CAKE API	3.2
HP-HT	-
Pm	1.3
Pf/Mf	1.1/2.7
CHLORIDES ppm	17300
CALCIUM ppm	880
OIL/WATER/SOLIDS	0/7/93
DAILY/CUM. COST	

BIT DATA

BIT NO.	3	2
TYPE	FDSS	SS33SGJ4
IADC CODE		
SIZE	12.25	17.5
JETS	3-13,1-12	3-18,1-11
DEPTH OUT		1050
ROT HRS.	21.1	.15
FOOTAGE	2050	10
AVG ft/hr	97	60
GRADE	INC	2-2-I
HOLE DEV.	.47	
COST/FT	295	NA
RPM	130	95
WOB	20	10

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min		123
FLOW RATE gal/min		605
PRESSURE psi	2050	
PD SURF / DS psi	90/605	
ANN / BIT psi	25/1330	
JET VELOCITY ft/sec	389	
JET IMPACT lbs	1200	
BIT HP	470	
HP RATIO / HP/IN2	65% - .4.0/IN2	
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644	40	331	
5 X 18.73	DP-CSG	845	.3166	45	340	
5 X 12.25	DP-HOLE	1602	.1215	119	377	
8.0 X 12.25	DC-HOLE	476	.0836	173	440	

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND. 309	SURF. 1022	
OD-inches	5.0	5.0		8.0			21	30	20	
ID-inches	4.276	3.0		2.875			20	27	18.73	
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	
LENGTH-ft	1897	727		476			177	100	812	
WEIGHT-lbs/ft	19.5	49		147				450	133	

REMARKS AND RECOMMENDATIONS

MW 9.6 GPM 650 JETS 4-12'S 3000 PSI ft/mi = sec/std

DRILL AHEAD WITH BIT NO. 3. DRILL TO 2336'. CO. SHORT TRIP TO SHOE. HOLE TRYING TO SWAB ON WAY OUT. PUMP AND BACK REAM FROM STAND NO. 6. MAX GAS FROM TRIP = 153 UNITS. DRILL AHEAD. # 1 PUMP DOWN FOR MOST OF DAY.

ADT J. PATTON

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 3705
OPERATION POOH
FOOTAGE 705

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 7
DATE Sep 16 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	10	60	3400'
CONNECTION	0		
TRIP	313		3705'
FLOWLINE TEMP	37	degrees F	

SURVEY DATA	..22 DEG @ 3676'
LITHOLOGY	10% SAND 80% CLAY 10% SILT
SAMPLE DEPTH	3700
TRIP CHLORIDES	NA
LAG DOWN DP	365
LAG OFF BOTTOM	4800

DRILL RATE ft/hr	45
CORRECTED "D" EXP.	.90
SHALE DENSITY g/cc	NA
EWR Res.	3

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	452 psi	8.5 ppg		1676 psi	8.7 ppg		____ psi	____ ppg	____ ft
FRACTURE PRESSURE	760 psi	14.3 ppg		2735 psi	14.5 ppg		____ psi	____ ppg	____ ft
ECD	531 psi	10.0 ppg		1927 psi	10.0 ppg		____ psi	____ ppg	____ ft

MUD DATA

TIME	21:30 9/15/93
TYPE	PHPA-SEA WATER
WEIGHT IN	9.9
FUNNEL VIS.	82
PV/YP	37/44
GELS	6/9
pH	19.8
FILT/CAKE API	2.2
HP-HT	-
Pm	1.2
Pf/Mf	.9/2.3
CHLORIDES ppm	17100
CALCIUM ppm	680
OIL/WATER/SOLIDS	0/7/93
DAILY/CUM. COST	

BIT DATA

BIT NO.	3	2
TYPE	FDSS	SS33SGJ4
IADC CODE		
SIZE	12.25	17.5
JETS	3-13,1-12	3-18,1-11
DEPTH OUT	3705	1050
ROT HRS.	28.0	.15
FOOTAGE	2655	10
AVG ft/hr	95	60
GRADE	INC	2-2-I
HOLE DEV.	.22	
COST/FT	297	NA
RPM	140	95
WOB	15	10

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min	66	67
FLOW RATE gal/min	653	
PRESSURE psi	2700	
PD SURF / DS psi	100/1020	
ANN / BIT psi	40/1540	
JET VELOCITY ft/sec	420	
JET IMPACT lbs	1390	
BIT HP	587	
HP RATIO / HP/IN2	57% - .5.0/IN2	
REDUCED 1	____ psi at	____ stk/min
RATE 2	____ psi at	____ stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644	43	386	
5 X 18.73	DP-CSG	845	.3166	49	395	
5 X 12.25	DP-HOLE	2207	.1215	128	440	
8.0 X 12.25	DC-HOLE	476	.0836	186	515	

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND. 309	SURF. 1022	
OD-inches	5.0	5.0		8.0			21	30	20	
ID-inches	4.276	3.0		2.875			20	27	18.73	
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	
LENGTH-ft	2502	727		476			177	100	812	
WEIGHT-lbs/ft	19.5	49		147				450	133	

REMARKS AND RECOMMENDATIONS

MW 9.8 GPM 650 JETS 4-12'S 3000 PSI ____ ft/mi = ____ sec/std

DRILL AHEAD WITH BIT NO. 3. DRILL TO 3705'. CO. SHORT TRIP TO SHOE. HOLE TRYING TO SWAB ON WAY OUT. PUMP AND BACK REAM FROM STAND NO. 6. MAX GAS FROM TRIP = 313 UNITS. CIRCULATE AND CONDITION HOLE. POOH. EXCESS DRAG NOTED WHEN BHA REACHED THE 20" SHOE. HOLE AGAIN TRYING TO SWAB. OBSERVE WELL. POOH FOR E-LOGS.

ADT J. PATTON

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 3705
OPERATION E-LOG
FOOTAGE 0

NO. 8
DATE Sep 17 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	10	60	3400'
CONNECTION	0		
TRIP	214		3705'
FLOWLINE TEMP	41	degrees F	

SURVEY DATA	.22 DEG @ 3676'
LITHOLOGY	10% SAND 80% CLAY 10% SILT
SAMPLE DEPTH	3700
TRIP CHLORIDES	NA
LAG DOWN DP	365
LAG OFF BOTTOM	4800

DRILL RATE ft/hr	45
CORRECTED 'D' EXP.	.90
SHALE DENSITY g/cc	NA
EWR Res.	3

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	452 psi	8.5 ppg		1676 psi	8.7 ppg		____ psi	____ ppg	____ ft
FRACTURE PRESSURE	760 psi	14.3 ppg		2735 psi	14.5 ppg		____ psi	____ ppg	____ ft
ECD	531 psi	10.0 ppg		1927 psi	10.0 ppg		____ psi	____ ppg	____ ft

MUD DATA

TIME	21:00 9/16/93
TYPE	PHPA-SEA WATER
WEIGHT IN	10.1
FUNNEL VIS.	74
PV/YP	31/39
GELS	6/9
pH	9.8
FILT/CAKE API	2.4
HP-HT	-
Pm	1.2
Pf/Mf	.9/2.4
CHLORIDES ppm	17000
CALCIUM ppm	720
OIL/WATER/SOLIDS	0/7/93
DAILY/CUM. COST	

BIT DATA

BIT NO.	3	2
TYPE	FDSS	SS33SGJ4
IADC CODE		
SIZE	12.25	17.5
JETS	3-13,1-12	3-18,1-11
DEPTH OUT	3705	1050
ROT HRS.	28.0	.15
FOOTAGE	2655	10
AVG ft/hr	95	60
GRADE	INC	2-2-I
HOLE DEV.	.22	
COST/FT	297	NA
RPM	140	95
WOB	15	10

HYDRAULIC DATA

PUMPS	1.	ID-1600	2.	ID-1600
SIZE inches		6.5X12		6.5X12
CAPACITY gal/stk		4.92		4.92
PUMP RATE stks/min		61		62
FLOW RATE gal/min		605		
PRESSURE psi		2425		
PD SURF / DS psi		190/970		
ANN / BIT psi		40/1325		
JET VELOCITY ft/sec		389		
JET IMPACT lbs		1195		
BIT HP		467		
HP RATIO / HP/IN2		55% - .4.0/IN2		
REDUCED 1	____	psi at ____		stk/min
RATE 2	____	psi at ____		stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644	40	386	
5 X 18.73	DP-CSG	845	.3166	45	395	
5 X 12.25	DP-HOLE	2207	.1215	119	440	
8.0 X 12.25	DC-HOLE	476	.0836	172	515	

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND.	SURF.	
OD-inches	5.0	5.0		8.0				309	1022	
ID-inches	4.276	3.0		2.875			21	30	20	
CAP-bbls/ft	.0178	.0087		.0080			20	27	18.73	
DISP-bbls/ft	.0072	.0181		.0542			.3887	.7085	.3409	
LENGTH-ft	2502	727		476				.113	.0478	
WEIGHT-lbs/ft	19.5	49		147			177	100	812	
								450	133	

REMARKS AND RECOMMENDATIONS

MW 9.8 GPM 650 JETS 4-12'S 3000 PSI ____ ____ ft/mi = ____ sec/std

RIG UP SCHLUMBERGER. FIRST SET OF LOG WOULD NOT GO MUCH BELOW SHOE DEPTH. APPARENT CLAY BALL DRAGGED OFF OF STABILIZERS WHILE PULLING OUT OF THE HOLE. RR BIT 3 BACK INTO HOLE FOR WIPER TRIP. WORK ON TOP DRIVE. RIH. CIRCULATE CONDITION HOLE. PUMP HIGH VIS SWEEP. POOH. RUN ELECTRIC LOGS.

ADT J. PATTON

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 3705
OPERATION W.O.W.
FOOTAGE 0

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 9
DATE Sep 18 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	0	0	
CONNECTION	0		
TRIP	214		3705'
FLOWLINE TEMP	41	degrees F	

SURVEY DATA	.22 DEG @ 3676'
LITHOLOGY	10% SAND 80% CLAY 10% SILT
SAMPLE DEPTH	3700
TRIP CHLORIDES	NA
LAG DOWN DP	365
LAG OFF BOTTOM	4800

DRILL RATE ft/hr	45
CORRECTED 'D' EXP.	.90
SHALE DENSITY g/cc	NA
EWR Res.	3

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	452 psi	8.5 ppg		1676 psi	8.7 ppg		psi	ppg	ft
FRACTURE PRESSURE	760 psi	14.3 ppg		2735 psi	14.5 ppg		psi	ppg	ft
ECD	531 psi	10.0 ppg		1927 psi	10.0 ppg		psi	ppg	ft

MUD DATA

TIME	22:00 9/17/93
TYPE	PHPA-SEA WATER
WEIGHT IN	10.0
FUNNEL VIS.	54
PV/YP	21/26
GELS	3/4
pH	9.5
FILT/CAKE API	2.8
HP-HT	-
Pm	.5
Pf/Mf	.5/1.3
CHLORIDES ppm	17000
CALCIUM ppm	480
OIL/WATER/SOLIDS	0/8/92
DAILY/CUM. COST	

BIT DATA

BIT NO.	3	2
TYPE	FDSS	SS33SGJ4
IADC CODE		
SIZE	12.25	17.5
JETS	3-13,1-12	3-18,1-11
DEPTH OUT	3705	1050
ROT HRS.	28.0	.15
FOOTAGE	2655	10
AVG ft/hr	95	60
GRADE	INC	2-2-I
HOLE DEV.	.22	
COST/FT	297	NA
RPM	140	95
WOB	15	10

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC	
PD SURF / DS psi	PAST 24 HRS.	
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644			
5 X 18.73	DP-CSG	845	.3166			
5 X 12.25	DP-HOLE	2207	.1215			
8.0 X 12.25	DC-HOLE	476	.0836			

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND.	SURF.	
OD-inches	5.0	5.0		8.0			21	30	20	
ID-inches	4.276	3.0		2.875			20	27	18.73	
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	
LENGTH-ft	2502	727		476			177	100	812	
WEIGHT-lbs/ft	19.5	49		147				450	133	

REMARKS AND RECOMMENDATIONS

MW 9.8 GPM 650 JETS 4-12'S 3000 PSI ft/mi = sec/std

COMPLETE ELECTRIC LOGS. DISPLCE RISER WITH SEA WATER AND DISCONNECT FROM WELL BECAUSE OF ROUGH WEATHER.
WAIT ON CONDITIONS TO IMPROVE.

ADT J. PATTON

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 3705 (3375)
OPERATION OPEN HOLE
FOOTAGE 2325

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 10
DATE Sep 19 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	20	35	1680
CONNECTION	0		
TRIP	0		1050
FLOWLINE TEMP	45	degrees F	

SURVEY DATA	.22 DEG @ 3676'
LITHOLOGY	10% SAND 80% CLAY 10% SILT
SAMPLE DEPTH	3700
TRIP CHLORIDES	NA
LAG DOWN DP	427
LAG OFF BOTTOM	8250

DRILL RATE ft/hr	200
CORRECTED "D" EXP.	.85
SHALE DENSITY g/cc	NA
EWR Res.	

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	452 psi	8.5 ppg		1676 psi	8.7 ppg		psi	ppg	ft
FRACTURE PRESSURE	760 psi	14.3 ppg		2735 psi	14.5 ppg		psi	ppg	ft
ECD	531 psi	10.0 ppg		1927 psi	10.0 ppg		psi	ppg	ft

MUD DATA

TIME	22:00 9/18/93
TYPE	PHPA-SEA WATER
WEIGHT IN	9.9
FUNNEL VIS.	60
PV/YP	29/34
GELS	4/6
pH	9.7
FILT/CAKE API	2.0
HP-HT	-
Pm	.5
Pf/Mf	.5/1.5
CHLORIDES ppm	17000
CALCIUM ppm	240
OIL/WATER/SOLIDS	0/7.5/92.5
DAILY/CUM. COST	

BIT DATA

BIT NO.	3	RR3 (4)
TYPE	FDSS	FDTC/H.O.
IADC CODE		
SIZE	12.25	17.5
JETS	3-13,1-12	TFA: 1.44
DEPTH OUT	3705	NA
ROT HRS.	28.0	11.3
FOOTAGE	2655	2325
AVG ft/hr	95	205
GRADE	INC	INC
HOLE DEV.	.22	
COST/FT	297	NA
RPM	140	145
WOB	15	10-20

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min	111	110
FLOW RATE gal/min	1086	
PRESSURE psi	2500	
PD SURF / DS psi	125/1935	
ANN / BIT psi	25/515	
JET VELOCITY ft/sec	240	
JET IMPACT lbs	1335	
BIT HP	325	
HP RATIO / HP/IN2	21% - 1.3/IN2	
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644	71		
5 X 18.73	DP-CSG	845	.3166	82		
5 X 17.5	DP-HOLE	2056	.2733	95		
8.0 X 17.5	DC-HOLE	297	.2354	111		

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND.	SURF.	
OD-inches	5.0	5.0		8.0			21	30	20	
ID-inches	4.276	3.0		2.875			20	27	18.73	
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	
LENGTH-ft	2351	727		297			177	100	812	
WEIGHT-lbs/ft	19.5	49		147				450	133	

REMARKS AND RECOMMENDATIONS

MW 9.8 GPM 900 JETS ft/mi = sec/std

LATCH RISER. RIH WITH 17.5" HOLE OPENER. OPENING HOLE TO 17.5".

ADT J. PATTON

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 3705
OPERATION RUN 13 3/8"
FOOTAGE 0

NO. 11
DATE Sep 20 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	0		
CONNECTION	0		
TRIP	114		3705
FLOWLINE TEMP	45 degrees F		

SURVEY DATA	.22 DEG @ 3676'
LITHOLOGY	10% SAND 80% CLAY 10% SILT
SAMPLE DEPTH	3700
TRIP CHLORIDES	NA
LAG DOWN DP	427
LAG OFF BOTTOM	8250
DRILL RATE ft/hr	200
CORRECTED "D" EXP.	.85
SHALE DENSITY g/cc	NA
EWR Res.	

FORMATION PRESSURE DATA

	CASING		BOTTOM HOLE		OPEN HOLE		
PORE PRESSURE	452 psi	8.5 ppg	1676 psi	8.7 ppg	psi	ppg	ft
FRACTURE PRESSURE	760 psi	14.3 ppg	2735 psi	14.5 ppg	psi	ppg	ft
ECD	531 psi	10.0 ppg	1927 psi	10.0 ppg	psi	ppg	ft

MUD DATA

TIME	22:00 9/19/93
TYPE	PHPA-SEA WATER
WEIGHT IN	9.8+
FUNNEL VIS.	80
PV/YP	30/42
GELS	5/9
pH	9.5
FILT/CAKE API	3.6
HP-HT	-
Pm	.6
Pf/Mf	.5/2.5
CHLORIDES ppm	16800
CALCIUM ppm	100
OIL/WATER/SOLIDS	0/7.5/92.5
DAILY/CUM. COST	

BIT DATA

BIT NO.	3	RR3 (4)
TYPE	FDSS	FDTC/H.O.
IADC CODE		
SIZE	12.25	17.5
JETS	3-13,1-12	TFA: 1.44
DEPTH OUT	3705	3705
ROT HRS.	28.0	13.3
FOOTAGE	2655	2655
AVG ft/hr	95	200
GRADE	INC	INC
HOLE DEV.	.22	
COST/FT	297	NA
RPM	140	145
WOB	15	15

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min	111	110
FLOW RATE gal/min	1086	
PRESSURE psi	2500	
PD SURF / DS psi	125/1935	
ANN / BIT psi	25/515	
JET VELOCITY ft/sec	240	
JET IMPACT lbs	1335	
BIT HP	325	
HP RATIO / HP/IN2	21% - 1.3/IN2	
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644	71		
5 X 18.73	DP-CSG	845	.3166	82		
5 X 17.5	DP-HOLE	2056	.2733	95		
8.0 X 17.5	DC-HOLE	297	.2354	111		

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND. 309	SURF. 1022	
OD-inches	5.0	5.0		8.0			21	30	20	
ID-inches	4.276	3.0		2.875			20	27	18.73	
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	
LENGTH-ft	2351	727		297			177	100	812	
WEIGHT-lbs/ft	19.5	49		147				450	133	

REMARKS AND RECOMMENDATIONS

MW 9.8 GPM 700 JETS 2-12,3-13'S ft/mi = sec/std

OPENING HOLE TO 17.5" TO 3705'. CIRCULATE OUT. PUMP HIGH VIS SWEEP. SHORT TRIP TO SHOE. PUMP OUT OF HOLE ON LAST THREE STANDS AT CASING SHOE. MAX GAS FROM SHORT TRIP = 114 UNITS. CIRCULATE AND CONDITION HOLE. POOH. RIG UP FOR RUNNING CASING. RUN 13 3/8" - 68 LB/FT CASING.

ADT J. PATTON

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 3705
OPERATION C. DRLG LINE
FOOTAGE 0

NO. 12
DATE Sep 21 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	0		
CONNECTION	0		
TRIP	35		3705
FLOWLINE TEMP	45 degrees F		

SURVEY DATA .22 DEG @ 3676'
LITHOLOGY 10% SAND 80% CLAY 10% SILT
SAMPLE DEPTH 3700
TRIP CHLORIDES NA
LAG DOWN DP 475
LAG OFF BOTTOM 4200

DRILL RATE ft/hr
CORRECTED 'D' EXP.
SHALE DENSITY g/cc NA
EWR Res.

FORMATION PRESSURE DATA

	CASING		BOTTOM HOLE		OPEN HOLE		
PORE PRESSURE	1627 psi	8.7 ppg	1676 psi	8.7 ppg	psi	ppg	ft
FRACTURE PRESSURE	psi	NA ppg	2735 psi	14.5 ppg	psi	ppg	ft
ECD	psi	ppg	psi	ppg	psi	ppg	ft

MUD DATA

TIME	22:00 9/20/93
TYPE	PHPA-SEA WATER
WEIGHT IN	9.9
FUNNEL VIS.	62
PV/YP	22/21
GELS	3/6
pH	9.9
FILT/CAKE API	2.4
HP-HT	-
Pm	.6
Pf/Mf	.6/1.9
CHLORIDES ppm	17000
CALCIUM ppm	320
OIL/WATER/SOLIDS	0/7.5/92.5
DAILY/CUM. COST	

BIT DATA

BIT NO.	3	4
TYPE	FDSS	DS40-H
IADC CODE		PDC
SIZE	12.25	12.25
JETS	3-13,1-12	5-13'S
DEPTH OUT	3705	
ROT HRS.	28.0	
FOOTAGE	2655	
AVG ft/hr	95	
GRADE	INC	
HOLE DEV.	.22	
COST/FT	297	
RPM	140	
WOB	15	

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC	
PD SURF / DS psi		
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644			
5 X 18.73	DP-CSG		.3166			
5 X 12.25	DP-HOLE		.1215			
8.0 X 12.25	DC-HOLE		.0836			

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND. 309	SURF. 1022	3681
OD-inches	5.0	5.0		8.0			21	30	20	13 3/8
ID-inches	4.276	3.0		2.875			20	27	18.73	12.415
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	.1498
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	.0240
LENGTH-ft							177	100	812	3774
WEIGHT-lbs/ft	19.5	49		147				450	133	68

REMARKS AND RECOMMENDATIONS

MW 9.8 GPM 700 JETS 2-12,3-13'S ft/mi = sec/std

LAND 13 3/8" CASING. SHOE DEPTH AT 3681'. CIRCULATE AND CONDITION HOLE BEHIND CASING. MAX GAS FROM BOTTOM = 35 UNITS.
PUMP AP. 388 BBL OF CEMENT AND DISPLACE WITH MUD. TEST BOP. SLIP AND CUT DRILL LINE.

ADT J. PATTON

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 3705
OPERATION W.O.W.
FOOTAGE 0

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 13
DATE Sep 22 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	0		
CONNECTION	0		
TRIP	10		3600
FLOWLINE TEMP	60	degrees F	

SURVEY DATA	.22 DEG @ 3676'
LITHOLOGY	10% SAND 80% CLAY 10% SILT
SAMPLE DEPTH	3700
TRIP CHLORIDES	NA
LAG DOWN DP	475
LAG OFF BOTTOM	4200

DRILL RATE ft/hr	NA
CORRECTED "D" EXP.	NA
SHALE DENSITY g/cc	NA
EWR Res.	

FORMATION PRESSURE DATA

	CASING				BOTTOM HOLE				OPEN HOLE			
PORE PRESSURE	1627	psi	8.7	ppg	1676	psi	8.7	ppg		psi		ppg		ft
FRACTURE PRESSURE		psi	NA	ppg	2735	psi	14.5	ppg		psi		ppg		ft
ECD	1914	psi	10.0	ppg	1927	psi	10.0	ppg		psi		ppg		ft

MUD DATA

TIME	22:00 9/21/93
TYPE	PHPA-SEA WATER
WEIGHT IN	9.8
FUNNEL VIS.	58
PV/YP	19/20
GELS	3/4
pH	9.0
FILT/CAKE API	3.4
HP-HT	-
Pm	.6
Pf/Mf	.25/1.5
CHLORIDES ppm	17000
CALCIUM ppm	360
OIL/WATER/SOLIDS	0/7.2/92.8
DAILY/CUM. COST	

BIT DATA

BIT NO.	4	5
TYPE	FDSS	40-HF
IADC CODE		PDC
SIZE	12.25	12.25
JETS	3-13,1-12	5-13'S
DEPTH OUT	3705	3600
ROT HRS.	28.0	
FOOTAGE	2655	0
AVG ft/hr	95	
GRADE	INC	
HOLE DEV.	.22	
COST/FT	297	
RPM	140	50-120
WOB	15	0-20

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min	72	73
FLOW RATE gal/min	712	
PRESSURE psi	2450	
PD SURF / DS psi	100/1240	
ANN / BIT psi	20/1090	
JET VELOCITY ft/sec	352	
JET IMPACT lbs	1273	
BIT HP	450	
HP RATIO / HP/IN2	45% - 3.8/IN2	
REDUCED RATE 1	____ psi at ____ stk/min	
2	____ psi at ____ stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644	47	223	
5 X 12.415	DP-CSG	2947	.1255	135	278	
5 X 12.25	DP-HOLE	-	.1215			
8 X 12.415		476	.0876	194	327	
8 X 12.25	DC-HOLE	-	.0836			

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND. 309	SURF. 1022	3681
OD-inches	5.0	5.0		8.0			21	30	20	13 3/8
ID-inches	4.276	3.0		2.875			20	27	18.73	12.415
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	.1498
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	.0240
LENGTH-ft	2397	727		476			177	100	812	3774
WEIGHT-lbs/ft	19.5	49		147				450	133	68

REMARKS AND RECOMMENDATIONS

MW 9.8 GPM 700 JETS 2-12,3-13'S ft/mi = sec/std

RIH WITH BIT NO. 4 - PDC TYPE. TEST CASING. ATTEMPT TO DRILL OUT FLOAT COLLAR AFTER TAGGING UP. BIT WOULD NOT DRILL.
POOH TO CHANGE BIT. DISPLACE RISER WITH SEA WATER AND DISCONNECT - WAIT ON WEATHER CONDITIONS TO IMPROVE.

ADT J. PATTON

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

DEPTH	3705	NO.	14
OPERATION	W.O.W.	DATE	Sep 23 93
FOOTAGE	0	TIME	04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	0		
CONNECTION	0		
TRIP	10		3600
FLOWLINE TEMP	60 degrees F		

SURVEY DATA	.22 DEG @ 3676'
LITHOLOGY	10% SAND 80% CLAY 10% SILT
SAMPLE DEPTH	3700
TRIP CHLORIDES	NA
LAG DOWN DP	475
LAG OFF BOTTOM	4200

DRILL RATE ft/hr	NA
CORRECTED 'D' EXP.	NA
SHALE DENSITY g/cc	NA
EWR Res.	

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	1627 psi	8.7 ppg		1676 psi	8.7 ppg		psi	ppg	ft
FRACTURE PRESSURE	psi	NA ppg		2735 psi	14.5 ppg		psi	ppg	ft
ECD	1914 psi	10.0 ppg		1927 psi	10.0 ppg		psi	ppg	ft

MUD DATA

TIME	22:00 9/22/93
TYPE	PHPA-SEA WATER
WEIGHT IN	9.7+
FUNNEL VIS.	56
PV/YP	18/20
GELS	3/4
pH	9.0
FILT/CAKE API	3.4
HP-HT	8.0
Pm	.6
Pf/Mf	.25/1.5
CHLORIDES ppm	17000
CALCIUM ppm	360
OIL/WATER/SOLIDS	0/7.2/92.8
DAILY/CUM. COST	

BIT DATA

BIT NO.		5
TYPE		40-HF
IADC CODE		PDC
SIZE		12.25
JETS		5-13'S
DEPTH OUT		3600
ROT HRS.		
FOOTAGE		0
AVG ft/hr		
GRADE		
HOLE DEV.		
COST/FT		
RPM		50-120
WOB		0-20

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC PAST	
PD SURF / DS psi	24 HRS	
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644			
5 X 12.415	DP-CSG	2947	.1255			
5 X 12.25	DP-HOLE	-	.1215			
8 X 12.415		476	.0876			
8 X 12.25	DC-HOLE	-	.0836			

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND. 309	SURF. 1022	3681
OD-inches	5.0	5.0		8.0			21	30	20	13 3/8
ID-inches	4.276	3.0		2.875			20	27	18.73	12.415
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	.1498
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	.0240
LENGTH-ft	2397	727		476			177	100	812	3774
WEIGHT-lbs/ft	19.5	49		147				450	133	68

REMARKS AND RECOMMENDATIONS

MW 9.8 GPM 650 JETS 2-12,2-13 ft/mi = sec/std

WAIT ON WEATHER CONDITIONS TO IMPROVE.

ADT J. PATTON

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 4285
OPERATION DRILL
FOOTAGE 604

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 15
DATE Sep 24 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	35	303	4058
CONNECTION	145	145	4116
TRIP	8		3681
FLOWLINE TEMP	80	degrees F	

SURVEY DATA	.51 @ 4274'
LITHOLOGY	50% CLAY 20% SLT 30 % SAND TR COAL
SAMPLE DEPTH	3960
TRIP CHLORIDES	NA
LAG DOWN DP	540
LAG OFF BOTTOM	4751

DRILL RATE ft/hr	110
CORRECTED 'D' EXP.	1.16
SHALE DENSITY g/cc	NA
EWR Res.	3.09

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE			
PORE PRESSURE	1665 psi	8.7 ppg		1863 psi	8.7 ppg		____ psi	____ ppg	____ ft	
FRACTURE PRESSURE	2871 psi	14.8 ppg		2871 psi	15.0 ppg		____ psi	____ ppg	____ ft	
ECD	1933 psi	10.1 ppg		2272 psi	10.2 ppg		____ psi	____ ppg	____ ft	

MUD DATA

TIME	2300 23 SEP 93
TYPE	PHPA-SEA WATER
WEIGHT IN	9.8+
FUNNEL VIS.	62
PV/YP	23/25
GELS	3/5
pH	9.0
FILT/CAKE API	3.8/1
HP-HT	6.8
Pm	.25
Pf/Mf	.15/2.9
CHLORIDES ppm	17000
CALCIUM ppm	360
OIL/WATER/SOLIDS	0/8/92
DAILY/CUM. COST	

BIT DATA

BIT NO.	6	
TYPE	FDT	
IADC CODE		
SIZE	12.25	
JETS	3X13 1-12	
DEPTH OUT		
ROT HRS.	5.9	
FOOTAGE	604	
AVG ft/hr	102	
GRADE		
HOLE DEV.	.51	
COST/FT		
RPM	135	
WOB	15/25	

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min	68	67
FLOW RATE gal/min	334	329
PRESSURE psi	2775	
PD SURF / DS psi	83/1145	
ANN / BIT psi	30/1617	
JET VELOCITY ft/sec	426	
JET IMPACT lbs	1452	
BIT HP	628	
HP RATIO / HP/IN2	7.8/in2	
REDUCED 1	____ psi at ____ stk/min	
RATE 2	____ psi at ____ stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644	43	260	65
5 X 12.415	DP-CSG	3504	.1255	126	322	440
5 X 12.25	DP-HOLE	128	.1215	130	324	16
8 X 12.415						
8 X 12.25	DC-HOLE	476	.0836	189	381	40

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND. 309	SURF. 1022	3681
OD-inches	5.0	5.0		8.0			21	30	20	13 3/8
ID-inches	4.276	3.0		2.875			20	27	18.73	12.415
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	.1498
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	.0240
LENGTH-ft	3082	727		476			177	100	812	3774
WEIGHT-lbs/ft	19.5	49		147				450	133	68

REMARKS AND RECOMMENDATIONS

MW 9.8 GPM 650 JETS 2-12,2-13 ____ ____ ____ ft/mi = ____ sec/std

WAIT ON WEATHER CONDITIONS TO IMPROVE. RIH WITH NB 4 AND MWD TOOL. TEST CASING TO 3000 psi. DRILL FLOAT COLLAR, SHOE AND 20' OF FORMATION. LEAKOFF TEST PERFORMED TO 14.8 ppg EQUIVALENT MUD WEIGHT. DRILL AHEAD THRU SAND/SILT TO 4285'.

ADT D. WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 5475
OPERATION DRILL
FOOTAGE 890

NO. 16
DATE Sep 25 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	85	324	5470
CONNECTION	100	132	5335
TRIP	520		4584
FLOWLINE TEMP	82 degrees F		

SURVEY DATA	.19 @ 5400		
LITHOLOGY	60% CLAY 20% SLT 20 % SAND		
SAMPLE DEPTH	5310		
TRIP CHLORIDES	NA	DRILL RATE ft/hr	109
LAG DOWN DP	735	CORRECTED 'D' EXP.	.78
LAG OFF BOTTOM	6140	SHALE DENSITY g/cc	NA
		EWR Res.	4.00

FORMATION PRESSURE DATA

	CASING		BOTTOM HOLE		OPEN HOLE		
PORE PRESSURE	1665 psi	8.7 ppg	2533 psi	8.9 ppg	____ psi	____ ppg	____ ft
FRACTURE PRESSURE	2871 psi	15 ppg	4270 psi	15.0 ppg	____ psi	____ ppg	____ ft
ECD	1971 psi	10.3 ppg	2960 psi	10.4 ppg	____ psi	____ ppg	____ ft

MUD DATA

TIME	2300 24 SEP 93
TYPE	PHPA-SEA WATER
WEIGHT IN	9.8+
FUNNEL VIS.	62
PV/YP	29/27
GELS	3/7
pH	9.0
FILT/CAKE API	3.4/1
HP-HT	7.8
Pm	.5
Pf/Mf	.2/2.8
CHLORIDES ppm	17000
CALCIUM ppm	240
OIL/WATER/SOLIDS	TR/7.5/92.5
DAILY/CUM. COST	

BIT DATA

BIT NO.	7	6
TYPE	DS40HF	FDT
IADC CODE		
SIZE	12.25	12.25
JETS	TFA .751	3X13, 1-12
DEPTH OUT		4585
ROT HRS.	9.0	9.1
FOOTAGE	891	880
AVG ft/hr	99	96
GRADE		
HOLE DEV.	.19	.51
COST/FT		379
RPM	160	131
WOB	2/3	22

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min	70	70
FLOW RATE gal/min	344	344
PRESSURE psi	2210	
PD SURF / DS psi	54/1431	
ANN / BIT psi	41/765	
JET VELOCITY ft/sec	293	
JET IMPACT lbs	1034	
BIT HP	307	
HP RATIO / HP/IN2	15.9 hp/in2	
REDUCED 1	____ psi at ____ stk/min	
RATE 2	____ psi at ____ stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644	45	262	65
5 X 12.415	DP-CSG	3504	.1255	131	333	583
5 X 12.25	DP-HOLE	1318	.1215	135	326	16
8 X 12.415						
8 X 12.25	DC-HOLE	476	.0836	196	378	40

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND. 309	SURF. 1022	3681
OD-inches	5.0	5.0		8.0			21	30	20	13 3/8
ID-inches	4.276	3.0		2.875			20	27	18.73	12.415
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	.1498
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	.0240
LENGTH-ft	4272	727		476			177	100	812	3774
WEIGHT-lbs/ft	19.5	49		147				450	133	68

REMARKS AND RECOMMENDATIONS

MW 9.8 GPM 650 JETS 2-12,2-13 ft/mi = sec/std

DRILL AHEAD THRU CLY/SILT/SAND TO 4584'. POOH DUE TO SLOW PENETRATION RATES. HOLE PULLED TIGHT FROM 3937 TO SHOE. BACK REAM TO SHOE. RIH W/NB 7 (PDC) AND MWD TOOL. DRILL TO 5475'. ESTIMATED PORE PRESSURE RAISED TO 8.9 ppg AT 4600'.

ADT D. WALTERS

sperry-sun DRILLING SERVICES
A Baroid Company

LOGGING SYSTEMS

DEPTH 6658
OPERATION TRIP
FOOTAGE 1183

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 17
DATE Sep 26 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	60	630	6350
CONNECTION	160	422	6563
TRIP			
FLOWLINE TEMP		degrees F	

SURVEY DATA	.78 @ 6628
LITHOLOGY	70% CLAY 30% SLT
SAMPLE DEPTH	6658
TRIP CHLORIDES	NA
LAG DOWN DP	915
LAG OFF BOTTOM	7250

DRILL RATE ft/hr	60
CORRECTED 'D' EXP.	.81
SHALE DENSITY g/cc	NA
EWR Res.	4.00

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	1665 psi	8.7 ppg		3185 psi	9.2 ppg		psi	ppg	ft
FRACTURE PRESSURE	2871 psi	15 ppg		5366 psi	15.5 ppg		psi	ppg	ft
ECD	2067 psi	10.8 ppg		3739 psi	10.8 ppg		psi	ppg	ft

MUD DATA

TIME	2300 25 SEP 93
TYPE	PHPA-SEA WATER
WEIGHT IN	10.4
FUNNEL VIS.	64
PV/YP	30/41
GELS	4/8
pH	9.1
FILT/CAKE API	3.0/1
HP-HT	6.6
Pm	.5
Pf/Mf	.25/2.9
CHLORIDES ppm	17000
CALCIUM ppm	200
OIL/WATER/SOLIDS	0/10/90
DAILY/CUM. COST	

BIT DATA

BIT NO.	7
TYPE	DS40HF
IADC CODE	
SIZE	12.25
JETS	TFA .751
DEPTH OUT	
ROT HRS.	23.2
FOOTAGE	2074
AVG ft/hr	89
GRADE	
HOLE DEV.	.78
COST/FT	
RPM	155
WOB	4

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min	71	71
FLOW RATE gal/min	349	349
PRESSURE psi	2350	
PD SURF / DS psi	54/1653	
ANN / BIT psi	78/804	
JET VELOCITY ft/sec	293	
JET IMPACT lbs	1086	
BIT HP	323	
HP RATIO / HP/IN2	16.8 hp/in2	
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644	45	368	65
5 X 12.415	DP-CSG	3504	.1255	131	439	583
5 X 12.25	DP-HOLE	2501	.1215	135	441	267
8 X 12.415						
8 X 12.25	DC-HOLE	476	.0836	196	471	40

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND. 309	SURF. 1022	3681
OD-inches	5.0	5.0		8.0			21	30	20	13 3/8
ID-inches	4.276	3.0		2.875			20	27	18.73	12.415
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	.1498
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	.0240
LENGTH-ft	5455	727		476			177	100	812	3774
WEIGHT-lbs/ft	19.5	49		147				450	133	68

REMARKS AND RECOMMENDATIONS

MW 10.2 GPM 650 JETS 2-12,2-13 ft/mi = sec/std

DRILL TO 6373' LOOKING FOR CORE POINT. CBU. DRILL TO 6658'. CBU. SHORT TRIP TO SHOE TO CONDITION HOLE. HOLE PULLED TIGHT.
BACKREAM AND PUMP OUT TO SHOE. BIT APPARENTLY BALLING UP WITH CLAY. ESTIMATED PORE PRESSURE RAISED TO 9.2 ppg. CONDENSED
RESISTIVITY PLOT INDICATES INCREASING PORE PRESSURE AT 5000'. MUD WEIGHT RAISED IN STAGES TO 10.4 ppg.

ADT D. WALTERS

sperry-sun DRILLING SERVICES
A Baroid Company

LOGGING SYSTEMS

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

DEPTH	7036			NO.	18
OPERATION	W.O.W.			DATE	Sep 27 93
FOOTAGE	387			TIME	04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	85	220	7036
CONNECTION	100	240	6846
TRIP	365		6658
FLOWLINE TEMP		degrees F	

SURVEY DATA	.57 @ 6911
LITHOLOGY	40% CLAY 60% SLT
SAMPLE DEPTH	7036
TRIP CHLORIDES	NA
LAG DOWN DP	994
LAG OFF BOTTOM	7810

DRILL RATE ft/hr	60
CORRECTED "D" EXP.	.81
SHALE DENSITY g/cc	NA
EWR Res.	4.00

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE			
PORE PRESSURE	1665 psi	8.7 ppg		3366 psi	9.2 ppg			psi	ppg	ft
FRACTURE PRESSURE	2832 psi	14.8 ppg		5671 psi	15.5 ppg			psi	ppg	ft
ECD	2048 psi	10.7 ppg		3914 psi	10.7 ppg			psi	ppg	ft

MUD DATA

TIME	2300 26 SEP 93
TYPE	PHPA-SEA WATER
WEIGHT IN	10.5
FUNNEL VIS.	57
PV/YP	25/29
GELS	4/8
pH	9.2
FILT/CAKE API	2.8/1
HP-HT	6.6
Pm	.6
Pf/Mf	.3/2.0
CHLORIDES ppm	17000
CALCIUM ppm	320
OIL/WATER/SOLIDS	0/10/90
DAILY/CUM. COST	

BIT DATA

BIT NO.	7
TYPE	DS40HF
IADC CODE	
SIZE	12.25
JETS	TFA .751
DEPTH OUT	
ROT HRS.	28.8
FOOTAGE	2455
AVG ft/hr	85
GRADE	
HOLE DEV.	..57
COST/FT	
RPM	171
WOB	5

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min	71	71
FLOW RATE gal/min	349	349
PRESSURE psi	2650	
PD SURF / DS psi	54/1654	
ANN / BIT psi	56/812	
JET VELOCITY ft/sec	293	
JET IMPACT lbs	1096	
BIT HP	326	
HP RATIO / HP/IN2	19.2 hp/in2	
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644	45	280	65
5 X 12.415	DP-CSG	3504	.1255	131	344	583
5 X 12.25	DP-HOLE	2879	.1215	135	346	206
8 X 12.415						
8 X 12.25	DC-HOLE	476	.0836	196	377	40

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND. 309	SURF. 1022	3681
OD-inches	5.0	5.0		8.0			21	30	20	13 3/8
ID-inches	4.276	3.0		2.875			20	27	18.73	12.415
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	.1498
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	.0240
LENGTH-ft	5842	727		476			177	100	812	3774
WEIGHT-lbs/ft	19.5	49		147				450	133	68

REMARKS AND RECOMMENDATIONS

MW 10.2 GPM 650 JETS 2-12,2-13 ft/mi = sec/std

TRIP IN HOLE AFTER SHORT TRIP. TRIP GAS=365. DRILL AHEAD TO 7036' LOOKING FOR CORE POINT. WEATHER DETERIORATING. POOH TO SHOE AND HANG OFF. WAIT ON WEATHER. RAISED MW TO 10.5 ppg.

ADT D. WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 7518
OPERATION DRILL
FOOTAGE 482

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 19
DATE Sep 28 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	47	100	7518
CONNECTION	75	135	7415
TRIP	876		7036
FLOWLINE TEMP	77	degrees F	

SURVEY DATA	1.09 @ 7384
LITHOLOGY	20% CLAY 70% SLT 10% SAND
SAMPLE DEPTH	7330
TRIP CHLORIDES	NA
LAG DOWN DP	1042
LAG OFF BOTTOM	8333

DRILL RATE ft/hr	187
CORRECTED "D" EXP.	.80
SHALE DENSITY g/cc	NA
EWR Res.	4.00

FORMATION PRESSURE DATA

	CASING				BOTTOM HOLE				OPEN HOLE				
PORE PRESSURE	1665	psi	8.7	ppg	3675	psi	9.4	ppg		psi		ppg	ft
FRACTURE PRESSURE	2832	psi	14.8	ppg	5671	psi	15.5	ppg		psi		ppg	ft
ECD	2208	psi	11.0	ppg	4300	psi	11.0	ppg		psi		ppg	ft

MUD DATA

TIME	2300 27 SEP 93
TYPE	PHPA-SEA WATER
WEIGHT IN	10.5
FUNNEL VIS.	60
PV/YP	25/30
GELS	3/8
pH	9.2
FILT/CAKE API	2.8/1
HP-HT	8.0
Pm	.6
Pf/Mf	.3/2.0
CHLORIDES ppm	17000
CALCIUM ppm	280
OIL/WATER/SOLIDS	0/10.5/89.5
DAILY/CUM. COST	

BIT DATA

BIT NO.	7
TYPE	DS40HF
IADC CODE	
SIZE	12.25
JETS	TFA .751
DEPTH OUT	
ROT HRS.	32.5
FOOTAGE	2934
AVG ft/hr	90
GRADE	
HOLE DEV.	1.08
COST/FT	
RPM	170
WOB	6

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min	74	71
FLOW RATE gal/min	364	349
PRESSURE psi	2670	
PD SURF / DS psi	54/1847	
ANN / BIT psi	64/881	
JET VELOCITY ft/sec	306	
JET IMPACT lbs	1191	
BIT HP	369	
HP RATIO / HP/IN2	19.2 hp/in2	
REDUCED 1	____ psi at ____ stk/min	
RATE 2	____ psi at ____ stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644	47	290	65
5 X 12.415	DP-CSG	3504	.1255	136	353	583
5 X 12.25	DP-HOLE	3361	.1215	141	355	265
8 X 12.415						
8 X 12.25	DC-HOLE	476	.0836	204	385	40

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND.	SURF.	
OD-inches	5.0	5.0		8.0			21	30	20	13 3/8
ID-inches	4.276	3.0		2.875			20	27	18.73	12.415
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	.1498
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	.0240
LENGTH-ft	6315	727		476			177	100	812	3774
WEIGHT-lbs/ft	19.5	49		147				450	133	68

REMARKS AND RECOMMENDATIONS

MW 10.4 GPM 650 JETS 2-12,2-13 ft/mi = sec/std

WAIT ON WEATHER. RUN BACK IN HOLE FROM SHOE. SHORT TRIP GAS-876. DRILL AHEAD THRU SILTSTONE/CLAY/SAND TO 7518'.

CONDENSED RESISTIVITY PLOT INDICATES PORE RRESSURE INCREASING. RAISED ESTIMATED PORE PRESSURE TO 9.4 ppg.

HOLE OCCASIONALLY PACKING OFF. CONTINUE DRILLING LOOKING FOR CORE POINT.

ADT D. WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 8000
OPERATION E LOG
FOOTAGE 482

NO. 20
DATE Sep 29 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND	55	100	8000
CONNECTION	75	150	7604
TRIP	525		8000
FLOWLINE TEMP	79 degrees F		

SURVEY DATA 2.18 @ 7951
LITHOLOGY 20% CLAY 70% SLT 10% SAND
SAMPLE DEPTH 8000
TRIP CHLORIDES NA
LAG DOWN DP
LAG OFF BOTTOM

DRILL RATE ft/hr 111
CORRECTED "D" EXP. ..78
SHALE DENSITY g/cc NA
EWR Res. 4.73

FORMATION PRESSURE DATA

	CASING		BOTTOM HOLE		OPEN HOLE		
PORE PRESSURE	1665 psi	8.7 ppg	4035 psi	9.7 ppg	psi	ppg	ft
FRACTURE PRESSURE	2832 psi	14.8 ppg	5671 psi	15.5 ppg	psi	ppg	ft
ECD	2124 psi	11.1 ppg	4617 psi	11.1 ppg	psi	ppg	ft

MUD DATA

TIME	2300 28 SEP 93
TYPE	PHPA-SEA WATER
WEIGHT IN	10.6
FUNNEL VIS.	6060
PV/YP	31/43
GELS	4/9
pH	9.1
FILT/CAKE API	3.0/1
HP-HT	7.6
Pm	.6
Pf/Mf	.2/2.0
CHLORIDES ppm	17000
CALCIUM ppm	320
OIL/WATER/SOLIDS	0/11/89
DAILY/CUM. COST	

BIT DATA

BIT NO.	7
TYPE	DS40HF
IADC CODE	
SIZE	12.25
JETS	TFA .751
DEPTH OUT	8000
ROT HRS.	36.5
FOOTAGE	2934
AVG ft/hr	90
GRADE	
HOLE DEV.	1.08
COST/FT	317
RPM	172
WOB	66.4

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min	74	71
FLOW RATE gal/min	364	349
PRESSURE psi	3100	
PD SURF / DS psi	58/2029	
ANN / BIT psi	99/898	
JET VELOCITY ft/sec	306	
JET IMPACT lbs	1213	
BIT HP	376	
HP RATIO / HP/IN2	19.54 hp/in2	
REDUCED RATE 1	psi at stk/min	
2	psi at stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644	47	374	65
5 X 12.415	DP-CSG	3504	.1255	136	445	583
5 X 12.25	DP-HOLE	3843	.1215	141	447	454
8 X 12.415						
8 X 12.25	DC-HOLE	476	.0836	204	477	40

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND. 309	SURF. 1022	3681
OD-inches	5.0	5.0		8.0			21	30	20	13 3/8
ID-inches	4.276	3.0		2.875			20	27	18.73	12.415
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	.1498
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	.0240
LENGTH-ft	6797	727		476			177	100	812	3774
WEIGHT-lbs/ft	19.5	49		147				450	133	68

REMARKS AND RECOMMENDATIONS

MW 10.7 GPM 650 JETS 2-12,2-13 ft/mi = sec/std

DRILL AHEAD THRU SILTSTONE/CLAY/SAND TO 8000' -TD. SHORT TRIP TO SHOE. HOLE PULLED TIGHT FROM BOTTOM TO 6120'. RIH. SHORT TRIP GAS=525. CBU PUMPING SWEEPS TO CLEAN HOLE FOR LOGGING OPS. POOH. COMMENCE E LOGGING. CONDENSED RESISTIVITY PLOT INCREASING PORE PRESSURE FROM 4700' TO 6100' AND 6800' TO 7800'. ESTIMATED PORE PRESSURE RAISED TO 9.7 ppg AT 7500'. MUD WEIGHT RAISED TO 10.7 ppg.

ADT D. WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 8000
OPERATION TRIP
FOOTAGE

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 21
DATE Sep 30 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND			
CONNECTION			
TRIP		181	8000
FLOWLINE TEMP	degrees F		

SURVEY DATA	2.18 @ 7951		
LITHOLOGY	20% CLAY 70% SLT 10% SAND		
SAMPLE DEPTH	8000		
TRIP CHLORIDES	NA	DRILL RATE ft/hr	
LAG DOWN DP		CORRECTED "D" EXP.	.78
LAG OFF BOTTOM		SHALE DENSITY g/cc	NA
		EWR Res.	4.73

FORMATION PRESSURE DATA

	CASING				BOTTOM HOLE				OPEN HOLE			
PORE PRESSURE	1665	psi	8.7	ppg	4035	psi	9.7	ppg		psi	ppg	ft
FRACTURE PRESSURE	2832	psi	14.8	ppg	5671	psi	15.5	ppg		psi	ppg	ft
ECD	2124	psi	11.1	ppg	4617	psi	11.1	ppg		psi	ppg	ft

MUD DATA

TIME	2300 29 SEP 93
TYPE	PHPA-SEA WATER
WEIGHT IN	10.7
FUNNEL VIS.	62
PV/YP	30/42
GELS	7/16
pH	9.0
FILT/CAKE API	3.0/1
HP-HT	7.8
Pm	.4
Pf/Mf	.15/1.9
CHLORIDES ppm	17000
CALCIUM ppm	360
OIL/WATER/SOLIDS	0/11.5/88.5
DAILY/CUM. COST	

BIT DATA

BIT NO.	7
TYPE	DS40HF
IADC CODE	
SIZE	12.25
JETS	TFA .751
DEPTH OUT	8000
ROT HRS.	36.5
FOOTAGE	2934
AVG ft/hr	90
GRADE	
HOLE DEV.	1.08
COST/FT	317
RPM	172
WOB	66.4

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC	
PD SURF / DS psi		
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED 1	____ psi at ____ stk/min	
RATE 2	____ psi at ____ stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644	47	374	65
5 X 12.415	DP-CSG	3504	.1255	136	445	583
5 X 12.25	DP-HOLE	3843	.1215	141	447	454
8 X 12.415						
8 X 12.25	DC-HOLE	476	.0836	204	477	40

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND.	SURF.	
OD-inches	5.0	5.0		8.0			21	30	20	13 3/8
ID-inches	4.276	3.0		2.875			20	27	18.73	12.415
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	.1498
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	.0240
LENGTH-ft	6797	727		476			177	100	812	3774
WEIGHT-lbs/ft	19.5	49		147				450	133	68

REMARKS AND RECOMMENDATIONS

MW 10.7 GPM 650 JETS 2-12,2-13 ft/mi = sec/std

LOGGING TOOL WOULD NOT PENETRATE PAST CASING SHOE. RIH TO 2350'. WASH AND REAM CASING FROM 2350 TO 3760'. MAX GAS=80.
POOH FOR LOGGING RUN. LOGGING TOOL WOULD NOT GO TO BOTTOM. RIH. WASH AND REAM FROM 6500' TO 6782'. RUN TO BOTTOM. CBU
TRIP GAS=181. POOH. BACKREAM FROM 6400' TO 6120'. CBU AT SHOE. POOH.

ADT D. WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 8000
OPERATION W.O.W
FOOTAGE

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 22
DATE Oct 1 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND			
CONNECTION			
TRIP			
FLOWLINE TEMP	degrees F		

SURVEY DATA	2.18 @ 7951
LITHOLOGY	20% CLAY 70% SLT 10% SAND
SAMPLE DEPTH	8000
TRIP CHLORIDES	NA
LAG DOWN DP	
LAG OFF BOTTOM	

DRILL RATE ft/hr	
CORRECTED "D" EXP.	..78
SHALE DENSITY g/cc	NA
EWR Res.	4.73

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	1665 psi	8.7 ppg		4035 psi	9.7 ppg		psi	ppg	ft
FRACTURE PRESSURE	2832 psi	14.8 ppg		5671 psi	15.5 ppg		psi	ppg	ft
ECD	2124 psi	11.1 ppg		4617 psi	11.1 ppg		psi	ppg	ft

MUD DATA

TIME	2300 30 SEP 93
TYPE	PHPA-SEA WATER
WEIGHT IN	10.7
FUNNEL VIS.	65
PV/YP	28/40
GELS	5/14
pH	9.0
FILT/CAKE API	3.0/1
HP-HT	8.0
Pm	.3
Pf/Mf	.15/2.0
CHLORIDES ppm	17500
CALCIUM ppm	360
OIL/WATER/SOLIDS	0/11.5/88.5
DAILY/CUM. COST	

BIT DATA

BIT NO.	7	
TYPE	DS40HF	
IADC CODE		
SIZE	12.25	
JETS	TFA .751	
DEPTH OUT	8000	
ROT HRS.	36.5	
FOOTAGE	2934	
AVG ft/hr	90	
GRADE		
HOLE DEV.	1.08	
COST/FT	317	
RPM	172	
WOB	66.4	

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC	
PD SURF / DS psi		
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED RATE 1	psi at stk/min	
2	psi at stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644			65
5 X 12.415	DP-CSG	3504	.1255			583
5 X 12.25	DP-HOLE	3843	.1215			454
8 X 12.415						
8 X 12.25	DC-HOLE	476	.0836			40

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND.	SURF.	
OD-inches	5.0	5.0		8.0			21	30	20	13 3/8
ID-inches	4.276	3.0		2.875			20	27	18.73	12.415
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	.1498
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	.0240
LENGTH-ft	6797	727		476			177	100	812	3774
WEIGHT-lbs/ft	19.5	49		147				450	133	68

REMARKS AND RECOMMENDATIONS

MW 10.7 GPM 650 JETS 2-12,2-13 ft/mi = sec/std

E LOG. WEATHER DETERIORATING. HANG OFF. WAIT ON WEATHER.

ADT D. WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 8000
OPERATION E LOG
FOOTAGE

NO. 23
DATE Oct 2 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND			
CONNECTION			
TRIP			
FLOWLINE TEMP	degrees F		

SURVEY DATA 2.18 @ 7951
LITHOLOGY 20% CLAY 70% SLT 10% SAND
SAMPLE DEPTH 8000
TRIP CHLORIDES NA
LAG DOWN DP
LAG OFF BOTTOM

DRILL RATE ft/hr
CORRECTED "D" EXP. ..78
SHALE DENSITY g/cc NA
EWR Res. 4.73

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	1665 psi	8.7 ppg		4035 psi	9.7 ppg		psi	ppg	ft
FRACTURE PRESSURE	2832 psi	14.8 ppg		5671 psi	15.5 ppg		psi	ppg	ft
ECD	2124 psi	11.1 ppg		4617 psi	11.1 ppg		psi	ppg	ft

MUD DATA

TIME	2300 1 OCT 93
TYPE	PHPA-SEA WATER
WEIGHT IN	10.7
FUNNEL VIS.	81
PV/YP	25/33
GELS	4/9
pH	9.0
FILT/CAKE API	2.6/1
HP-HT	8.2
Pm	.3
Pf/Mf	.15/1.7
CHLORIDES ppm	17800
CALCIUM ppm	320
OIL/WATER/SOLIDS	0/11.5/88.5
DAILY/CUM. COST	

BIT DATA

BIT NO.	7
TYPE	DS40HF
IADC CODE	
SIZE	12.25
JETS	TFA .751
DEPTH OUT	8000
ROT HRS.	36.5
FOOTAGE	2934
AVG ft/hr	90
GRADE	
HOLE DEV.	1.08
COST/FT	317
RPM	172
WOB	66.4

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC	
PD SURF / DS psi		
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED 1	psi at stk/min	
RATE 2	psi at stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644			65
5 X 12.415	DP-CSG	3504	.1255			583
5 X 12.25	DP-HOLE	3843	.1215			454
8 X 12.415						
8 X 12.25	DC-HOLE	476	.0836			40

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND. 309	SURF. 1022	3681
OD-inches	5.0	5.0		8.0			21	30	20	13 3/8
ID-inches	4.276	3.0		2.875			20	27	18.73	12.415
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	.1498
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	.0240
LENGTH-ft	6797	727		476			177	100	812	3774
WEIGHT-lbs/ft	19.5	49		147				450	133	68

REMARKS AND RECOMMENDATIONS

MW 10.7 GPM 650 JETS 2-12,2-13 ft/mi = sec/std

WAIT ON WEATHER. LATCH UP. CONTINUE E LOGGING.

ADT D. WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 8000
OPERATION E LOG
FOOTAGE

NO. 24
DATE Oct 3 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)				
BACKGROUND				SURVEY DATA	2.18 @ 7951		
CONNECTION				LITHOLOGY	20% CLAY 70% SLT 10% SAND		
TRIP				SAMPLE DEPTH	8000		
FLOWLINE TEMP		degrees F		TRIP CHLORIDES	NA	DRILL RATE ft/hr	
				LAG DOWN DP		CORRECTED "D" EXP.	.78
				LAG OFF BOTTOM		SHALE DENSITY g/cc	NA
						EWR Res.	4.73

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	1665 psi	8.7 ppg		4035 psi	9.7 ppg		psi	ppg	ft
FRACTURE PRESSURE	2832 psi	14.8 ppg		5671 psi	15.5 ppg		psi	ppg	ft
ECD	2124 psi	11.1 ppg		4617 psi	11.1 ppg		psi	ppg	ft

MUD DATA

TIME	2300 2 OCT 93
TYPE	PHPA-SEA WATER
WEIGHT IN	10.5
FUNNEL VIS.	59
PV/YP	20/24
GELS	3/6
pH	9.1
FILT/CAKE API	3.2/1
HP-HT	8.2
Pm	.3
Pf/Mf	.15/1.6
CHLORIDES ppm	18000
CALCIUM ppm	320
OIL/WATER/SOLIDS	0/10.5/89.5
DAILY/CUM. COST	

BIT DATA

BIT NO.	7
TYPE	DS40HF
IADC CODE	
SIZE	12.25
JETS	TFA .751
DEPTH OUT	8000
ROT HRS.	36.5
FOOTAGE	2934
AVG ft/hr	90
GRADE	
HOLE DEV.	1.08
COST/FT	317
RPM	172
WOB	66.4

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC	
PD SURF / DS psi		
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644			65
5 X 12.415	DP-CSG	3504	.1255			583
5 X 12.25	DP-HOLE	3843	.1215			454
8 X 12.415						
8 X 12.25	DC-HOLE	476	.0836			40

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND. 309	SURF. 1022	3681
OD-inches	5.0	5.0		8.0			21	30	20	13 3/8
ID-inches	4.276	3.0		2.875			20	27	18.73	12.415
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	.1498
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	.0240
LENGTH-ft	6797	727		476			177	100	812	3774
WEIGHT-lbs/ft	19.5	49		147				450	133	68

REMARKS AND RECOMMENDATIONS

MW 10.7 GPM 650 JETS 2-12,2-13 ft/mi = sec/std

WAIT ON WEATHER. LATCH UP. CONTINUE E LOGGING. SUSPEND E LOGGING. HANG OFF. LATCH UP. CONTINUE E LOGGING. TIH FOR CLEANOUT RUN.

ADT D. WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 8000
OPERATION E LOG
FOOTAGE

NO. 25
DATE Oct 4 93
TIME 04 00

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND			
CONNECTION			
TRIP		517	8000
FLOWLINE TEMP		degrees F	

SURVEY DATA 2.18 @ 7951
LITHOLOGY 20% CLAY 70% SLT 10% SAND
SAMPLE DEPTH 8000
TRIP CHLORIDES NA
LAG DOWN DP
LAG OFF BOTTOM

DRILL RATE ft/hr
CORRECTED 'D' EXP. ..78
SHALE DENSITY g/cc NA
EWR Res. 4.73

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	1665 psi	8.7 ppg		4035 psi	9.7 ppg		psi	ppg	ft
FRACTURE PRESSURE	2832 psi	14.8 ppg		5671 psi	15.5 ppg		psi	ppg	ft
ECD	2124 psi	11.1 ppg		4617 psi	11.1 ppg		psi	ppg	ft

MUD DATA

TIME	2300 3 OCT 93
TYPE	PHPA-SEA WATER
WEIGHT IN	10.5
FUNNEL VIS.	61
PV/YP	19/24
GELS	3/6
pH	9.1
FILT/CAKE API	3.2/1
HP-HT	8.2
Pm	.3
Pf/Mf	.15/1.5
CHLORIDES ppm	18000
CALCIUM ppm	360
OIL/WATER/SOLIDS	0/10.5/89.5
DAILY/CUM. COST	

BIT DATA

BIT NO.	7
TYPE	DS40HF
IADC CODE	
SIZE	12.25
JETS	TFA .751
DEPTH OUT	8000
ROT HRS.	36.5
FOOTAGE	2934
AVG ft/hr	90
GRADE	
HOLE DEV.	1.08
COST/FT	317
RPM	172
WOB	66.4

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC	
PD SURF / DS psi		
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED RATE 1	psi at stk/min	
2	psi at stk/min	

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644			65
5 X 12.415	DP-CSG	3504	.1255			583
5 X 12.25	DP-HOLE	3843	.1215			454
8 X 12.415						
8 X 12.25	DC-HOLE	476	.0836			40

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND. 309	SURF. 1022	3681
OD-inches	5.0	5.0		8.0			21	30	20	13 3/8
ID-inches	4.276	3.0		2.875			20	27	18.73	12.415
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	.1498
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	.0240
LENGTH-ft	6797	727		476			177	100	812	3774
WEIGHT-lbs/ft	19.5	49		147				450	133	68

REMARKS AND RECOMMENDATIONS

MW 10.7 GPM 650 JETS 2-12,2-13 ft/mi = sec/std

RIH FOR CLEAN OUT RUN. PUMP SWEEP. CBU. TRIP GAS=517. POOH. E LOG

ADT D. WALTERS

sperry-sun DRILLING SERVICES *LOGGING SYSTEMS*
A Baroid Company

DEPTH 8000
OPERATION E LOG
FOOTAGE

APPLIED DRILLING TECHNOLOGY
MORNING REPORT

NO. 26
DATE Oct 5 93
TIME 04 00

OPERATOR	ARCO ALASKA, INC.	WELL NAME	KUVLUM #3	FIELD/BLOCK	NR 6-4 BLK 673
CONTRACTOR	CANMAR	RIG NAME	KULLUK	AREA	BEAUFORT SEA
START DATE	Sep 9 93	LOC.	OFFSHORE	STATE	ALASKA

LOGGING DATA

	AVG GAS (units)	MAX GAS (units)	AT DEPTH (feet)
BACKGROUND			
CONNECTION			
TRIP			
FLOWLINE TEMP	degrees F		

SURVEY DATA	2.18 @ 7951		
LITHOLOGY	20% CLAY 70% SLT 10% SAND		
SAMPLE DEPTH	8000		
TRIP CHLORIDES	NA	DRILL RATE ft/hr	
LAG DOWN DP		CORRECTED "D" EXP.	..78
LAG OFF BOTTOM		SHALE DENSITY g/cc	NA
		EWR Res.	4.73

FORMATION PRESSURE DATA

	CASING			BOTTOM HOLE			OPEN HOLE		
PORE PRESSURE	1665 psi	8.7 ppg		4035 psi	9.7 ppg		psi	ppg	ft
FRACTURE PRESSURE	2832 psi	14.8 ppg		5671 psi	15.5 ppg		psi	ppg	ft
ECD	2124 psi	11.1 ppg		4617 psi	11.1 ppg		psi	ppg	ft

MUD DATA

TIME	2300 3 OCT 93
TYPE	PHPA-SEA WATER
WEIGHT IN	10.5
FUNNEL VIS.	61
PV/YP	19/24
GELS	3/6
pH	9.1
FILT/CAKE API	3.2/1
HP-HT	8.2
Pm	.3
Pf/Mf	.15/1.5
CHLORIDES ppm	18000
CALCIUM ppm	360
OIL/WATER/SOLIDS	0/10.5/89.5
DAILY/CUM. COST	

BIT DATA

BIT NO.	7
TYPE	DS40HF
IADC CODE	
SIZE	12.25
JETS	TFA .751
DEPTH OUT	8000
ROT HRS.	36.5
FOOTAGE	2934
AVG ft/hr	90
GRADE	E-2-i
HOLE DEV.	1.08
COST/FT	317
RPM	172
WOB	66.4

HYDRAULIC DATA

PUMPS	1. ID-1600	2. ID-1600
SIZE inches	6.5X12	6.5X12
CAPACITY gal/stk	4.92	4.92
PUMP RATE stks/min		
FLOW RATE gal/min		
PRESSURE psi	STATIC	
PD SURF / DS psi		
ANN / BIT psi		
JET VELOCITY ft/sec		
JET IMPACT lbs		
BIT HP		
HP RATIO / HP/IN2		
REDUCED 1	psi at	stk/min
RATE 2	psi at	stk/min

ANNULAR DATA

		LENGTH - FT.	VOLUME BBLS/FT.	VELOCITY FT/MIN	CRIT-VEL FT/MIN	ANN-VOL BBLS
5 X 20	DP-RISER	177	.3644			65
5 X 12.415	DP-CSG	3504	.1255			583
5 X 12.25	DP-HOLE	3843	.1215			454
8 X 12.415						
8 X 12.25	DC-HOLE	476	.0836			40

PIPE DATA

	DRILL STRING DP	HWDP		DC		CASING: DEPTH	RISER	COND. 309	SURF. 1022	3681
OD-inches	5.0	5.0		8.0			21	30	20	13 3/8
ID-inches	4.276	3.0		2.875			20	27	18.73	12.415
CAP-bbls/ft	.0178	.0087		.0080			.3887	.7085	.3409	.1498
DISP-bbls/ft	.0072	.0181		.0542				.113	.0478	.0240
LENGTH-ft	6797	727		476			177	100	812	3774
WEIGHT-lbs/ft	19.5	49		147				450	133	68

REMARKS AND RECOMMENDATIONS

MW 10.7 GPM 650 JETS 2-12,2-13 ft/mi = sec/std

COMPLETE E LOGGING. P&A.

ADT D. WALTERS