Development of a Mud-Pulse High-Temperature Measurement-While-Drilling (MWD) System

Final Report

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Executive Summary

The overall program objective is to develop a mud-pulse measurement-while-drilling (MWD) tool for oil and gas drilling operations that can be used where downhole temperatures are as high as 195ºC (383ºF). The work was planned to be completed in two phases: Phase I and an optional Phase II.

The objectives of Phase I were first to identify critical components of existing MWD systems that can or cannot operate at 195ºC. For components not able to meet the higher standard, one of several strategies was pursued: 1) locate high-temperature replacement components, 2) develop new designs that eliminate the unavailable components, or 3) use cooling to keep components at acceptable operating temperatures (under 195ºC). New designs and components were then tested under high temperatures in the laboratory. The final goal of Phase I was to assemble two high-temperature MWD prototype tools and test each in at least one low-temperature well to verify total system performance.

Phase II was also envisioned as part of this development. Its objective would be to test the two new high-temperature MWD prototype tools in wells being drilled in the United States where the bottom-hole temperatures were 195ºC (or the highest temperatures attainable).

The high-temperature MWD tool (**Figure i**) is designed to send directional and formation data to the surface via mud pulses, to aid in the drilling of guided wellbores. The modules that comprise the tool are housed in sealed barrels that protect the electronics from exposure to down-hole fluids and pressures. These pressure barrels are hung inside a non-magnetic collar located above the drilling assembly.

A number of significant accomplishments were achieved during the course of the Phase I project, including:

- Tested two MWD strings for function in an oven at 195ºC
- Conducted field test of prototype 195ºC MWD tool (at well temperatures up to 140-180ºC)

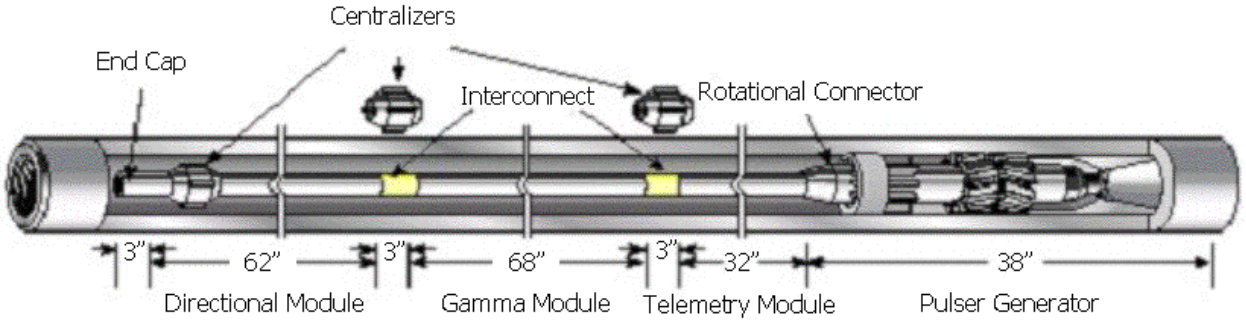


Figure i. High-Temperature MWD Tool

- Tested ELCON hybrid chip with processor, clock, and memory in a custom package for 700 hours at 200º C
- Contracted with APS Technology to conduct study of thermoelectric cooling of downhole electronics
- Conducted successful Peltier cooling test with APS Technology
- Tested and improved the electronics of Sperry Sun's Geiger Muller-based gamma detector for operation at 195º C
- Developed two high-temperature magnetometers (one in-house, one with Tensor)
- Encouraged outside source to develop lithium/magnesium high-temperature batteries (operating temperature of 125 to 215º C)

One of this project's greatest achievements was improvement in Sperry Sun's current tool with changes made as a direct result of work performed under this project. These improvements have resulted in longer life and a more robust MWD tool at the previous temperature rating of 175º C, as well as at higher temperatures.

A field test of two prototype 195º C MWD tools was conducted in Lavaca County, Texas. The purpose of this operation was to provide directional services on a sidetrack of a straight hole. The sidetrack was to intersect the formation up-dip above the water/gas interface. In addition, the gamma tool provided formation data including seam tops and thickness. Results from these field tests indicate progress in the development of a 195º C tool. Although the pulsers failed downhole in both tools, failure of the pulsers was determined to be from mechanical rather than electrical causes.

Analysis of the economics of the 195º C tool highlights the greatest obstacle to future commercialization. Costs to screen individual components, then subassemblies, and finally completed tools for high-temperature operations are very high. Tests to date also show a relatively short life for high-temperature tools – on the order of 300 hours. These factors mean that the daily cost of the tool will be higher (3 to 5 times more) than a conventional tool.

Sperry Sun and the MWD industry have benefited from this program in the following areas:

Pulser Improvements. Several improvements were implemented in "O" ring selection, oil selection, and other areas.

Magnetometer and Calibration Improvements. Work on the magnetometer included upgrades to Sperry Sun magnetometers. This has led to improvements to the design of Sperry Sun's existing magnetometers, which will be beneficial across all directional work.

Software Improvements, Resetting and Power-Up Problems. Software changes that were required in the downhole code and tool programming code provided another opportunity to improve the robustness of the downhole tool string.

Identification of Circuit Design Weaknesses. While screening components for high temperatures, unexpected problems were observed, including voltage reference drift problems and capacitor failures. Voltage reference drift is another candidate for high-temperature semiconductor technology. The capacitor issue identified a failure in the QC process of production.

The project has helped in clearly demonstrating the limitations of the methods Sperry Sun is currently using to produce high-temperature tools. Based on this work, they are considering the available high-temperature technologies and looking at approaches for introducing these technologies over the longer term.

Conclusions and Recommendations

1. Results of this development effort showed that, while it is possible to build a mud-pulse MWD tool that can operate at 195ºC, performance of the current tool is probably not sufficient for commercial success.

2. Industry's current R&D goals and perception of future MWD requirements do not focus on operations in hotter and deeper formations.

3. Due to the extensive testing required and the high percentage of failing components, use of a binning qualification process to build high-temperature (195ºC) MWD tools is cost-prohibitive.

4. Increasing the operating temperature of current MWD tools to 195ºC and above will require development of a new platform for the electronics used in these tools. This new platform will be based on silicon-on-insulator (SOI) components.

5. There are several hindrances to the development of SOI tools for the MWD industry. Most are economic, rather than technological factors.

6. DOE leadership and partership with industry can play a significant role in encouraging the development of high-temperature MWD tools to prepare for the future.

7. A critical leadership role for the DOE is to convince the industry that future gas reserves will be produced from high-temperature reservoirs.

Development of a Mud-Pulse High-Temperature Measurement-While-Drilling (MWD) System

Project Objectives

The overall objective of this program is to develop a mud-pulse measurement-while-drilling (MWD) tool for oil and gas drilling operations that can be used where downhole temperatures are as high as 195ºC (383ºF). The tool is to include a high-temperature (195ºC) gamma-ray detector to serve as the formation identification component of the MWD system. Other components in the assembly include triaxial accelerometer and magnetometer suites to provide directional data.

The work was planned to be completed in two phases: Phase I and an optional Phase II. The objectives of Phase I were to:

- Identify critical components of existing MWD systems that can or cannot operate at 195ºC
- For those components that cannot meet the new 195ºC limit, employ one of the following strategies to achieve required performance: 1) locate high-temperature replacement components, 2) develop new designs that eliminate the unavailable components, or 3) use cooling to keep components at acceptable operating temperatures (under 195ºC)
- Test new designs and components under high temperatures in the laboratory
- Assemble two high-temperature MWD prototype tools and test each in at least one low-temperature well to verify total system performance

Phase II was also envisioned as part of this development. Its objective would be to test the two new high-temperature MWD prototype tools in wells being drilled in the United States where the bottom-hole temperatures were 195ºC (or the highest temperature attainable in current U.S. deep drilling operations, although at least 185ºC). Up to five directional/horizontal wells were planned to be used for the field tests to establish system reliability and the tool's mean-time-between-failure (MTBF) performance.

Project Background

This project was co-proposed by Maurer Technology Inc. (MTI) and Halliburton Energy Services (HES) through its Halliburton Drilling Systems Division. During the course of the project, HES and Dresser Industries merged. The Federal Trade Commission, in their approval of the merger, required Halliburton Drilling Systems to be spun off as a separate company. This new company, called Pathfinder, continued with

the improvement of HES's MWD tools, but had limited funding and could not meet the program's cost-sharing requirements. Halliburton's MWD and LWD services would now be handled by Sperry Sun, a former Dresser Industries company. This significantly impacted the project. Under the original proposal, HES's HDS-1 MWD tool was to be upgraded for operation in temperatures up to 195°C. HES had significant corporate motivation to achieve this objective since their standard tool could only be operated up to 150°C and was below the latest industry standards in reliability. The engineering approach to increase temperature limits was to first test the existing tool using highly-accelerated life testing (HALT) equipment to identify components that would function at higher temperatures and components that would fail at higher temperatures. Once components that fail were identified, improved replacement components were to be located and tested. If these could not be found, new designs were to be developed to replace the missing components. This MWD system development process was well under way when Halliburton and Dresser Industries merged.

The first effect of the merger was a complete work stoppage on the project. Halliburton-Sperry Sun now owned the Solar 175 tool previously developed by Sperry Sun. This tool's upper operating temperature is 175°C. The new company thus had different incentives with respect to continuing the project. It took one year to resolve how the contractual obligations were to be meet. In the end, Halliburton-Sperry Sun decided to continue with the project, but would upgrade the existing Solar 175 tool for operations to 195°C.

The new engineering approach was a continuation of Sperry Sun's current "binning" process. In this method, tool components are tested at the desired working conditions. Component lots found to perform satisfactorily are set aside ("binned"). Lots not meeting required performance levels are returned to the manufacturer or discarded. After binning, assemblies and sub-assemblies of components are then tested. This process is very costly, since many components and sub-assemblies must be tested to find enough components that meet acceptable standards. Assembly testing also includes determining failure modes by post-mortem examinations. In cases where component binning or change-out would not achieve required performance, the board design was modified. However, this was considered a last resort, and only minor changes were to be acceptable. The objective was to produce an upgraded Solar 175 tool, not a new 195°C tool.

The effort was also impacted by a complete change in Halliburton personnel assigned to the project. As would be expected, it took time before the new team came "up to speed" on the goals and objectives of the project, and progress could resume. This was further complicated as changeovers in tools and procedures were enacted under the merged companies. In addition, since the Sperry Sun tool was already rated to 175°C (best in the industry at that time) compared to 150°C for HES's HDS-1 tool, the high-temperature MWD market was considered after the merger as a niche market rather than as an opportunity to become the industry leader in high-temperature MWD. These factors led to minimal resources being allocated to the project and slowed its progress. Fortunately, interest in the effort was soon heightened after an important

customer independently approached Sperry Sun and requested MWD tools with higher temperature capabilities.

The merger resulted in some of the work accomplished previously during the project by HES later becoming superfluous to the Halliburton-Sperry Sun effort. That work is still reported here since it was good science and the knowledge gained could help in development with the Solar 195 tool. Other planned activities no longer needed to be pursued since a solution already existed in the merged companies. An example of this was the development of a high-temperature gamma detector based on Geiger Muller tubes. Sperry Sun already had this type of detector available, so that effort was stopped after the merger.

At the end of the effort, Sperry Sun constructed two prototype MWD tools that were successfully tested in the laboratory at 195ºC and then field tested in Phase I. Results of these field tests are described in this report.

System Description

The high-temperature measurement-while-drilling (MWD) tool (**Figure 1**) is designed to send directional and formation data to the surface via mud pulses, to aid in the drilling of guided wellbores. The modules that comprise the tool are housed in sealed barrels that protect the electronics from exposure to down-hole fluids and pressures. These pressure barrels are hung inside a non-magnetic collar located above the drilling assembly. Descriptions of the modules and their functions are presented below.

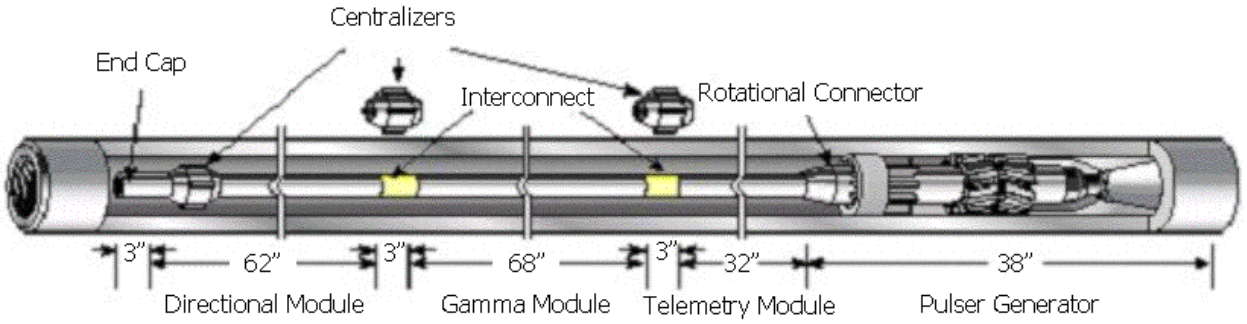


Figure 1. High-Temperature MWD Tool

Telemetry Module (TM). The telemetry module controls the entire tool. It communicates with other modules over the communications line. Data are gathered from the gamma module and directional module, formatted for transmission, and stored in random access memory (RAM) on the TM board. These data can be downloaded at the surface even if they are not relayed via the pulser. The TM also conditions the electric power from the pulser/generator for use by the other modules. The TM uses 512 kB of static RAM divided into 8 kB blocks for continuous memory storage.

Gamma Module (GM). The gamma module measures naturally occurring gamma radiation from formations encountered. It incorporates Geiger Muller tubes because they are rugged and able to survive high temperatures. Conventional gamma sensors based on scintillation technology cannot be used in high-temperature environments because detector performance degrades rapidly at elevated temperatures. Three stacked banks of four Geiger Mueller tubes each make up the sensor section of the GM. None of these tubes are redundant, but are what is required to achieve a statistically accurate count. The Geiger Muller tubes contain a gas that becomes ionized when gamma energy passes through it. This allows high voltage to pass between an anode and cathode, which is recorded as a single pulse. The pulses from all the tubes are added to provide the gamma count. The gamma count is used to determine formation type and transition depths between formations. In horizontal drilling, gamma data are used to steer the drilling assembly within the producing formation.

Pulser/Generator. The pulser module has two functions: to generate electrical power and to restrict the mud flow to create a pressure pulse that can be detected at the surface. It is always connected to the TM and is unique among the modules in this aspect. The pulser contains turbine blades that are driven by the flowing mud to turn a generator and a small hydraulic pump. Power from the generator is sent to the TM for conditioning prior to being sent to the remainder of the tool. The hydraulic pump is used to operate a poppet valve that blocks the flow of mud in the drill string, thereby creating a pressure pulse. The TM controls the pulser operations and encodes data into the pulses that are received and decoded at the surface using a pressure transducer and computer. The pulser is typically found at the top of the MWD stack.

Battery Module (BM). The battery module provides power to the tool when there is no flow of drilling fluid to operate the generator. The MWD tool can operate without a BM, but then could not store data when the rig pumps were off. The BM allows operation during these periods. High-temperature lithium batteries are used in the BM. Halliburton worked with Battery Engineering to develop higher temperature batteries for this project.

Directional Module (DM). The directional module uses magnetometers and accelerometers to measure the compass direction of the bottom-hole assembly and the angle of the hole. These data along with depth are then used to calculate the trajectory of the well. The DM is usually placed near the bottom of the MWD stack so that it will be as close as possible to the drill bit.

Accomplishments

A number of accomplishments were achieved during the course of the project. These are listed below. (More detail is provided in other sections of this report.)

- Tested two MWD strings for function in an oven at 195º C
- Conducted field test of prototype 195º C MWD tool (at well temperatures from 140 to 180º C)
- Tested ELCON hybrid chip with processor, clock, and memory in a custom package for 700 hours at 200º C (see **Figure 3**)
- Contracted with APS Technology to conduct study of thermoelectric cooling of downhole electronics
- Conducted Peltier cooling test with APS Technology
- Tested and improved the electronics of Sperry Sun's Geiger Muller-based gamma detector for operation at 195º C
- Developed two high-temperature magnetometers (one in-house, one with Tensor)
- Encouraged outside source to develop lithium/magnesium high-temperature batteries (operating temperature of 125 to 215º C)

One of this project's greatest achievements was improvement in Sperry Sun's current tool with changes made as a direct result of work performed under this project. Table 1 lists many of the modifications. These have resulted in improved life and a more robust MWD tool at the previous temperature rating of 175º C, as well as at higher temperatures.

Table 1. Solar 175 System Upgrades to Increase Operating Temperature to 195º C

I. Directional Module (DM)

- Increased the life of the DC-DC converter and reduced the amount of 5-volt drift via modifications to the DM power board.
- Special software was used to create the thermal models at 195º C.
- Developed magnetometer that operated at 200º C at Cheltenham Engineering Center.

- Worked with Honeywell to develop and test magnetometer package for operation up to 200°C.

- Worked with JAE to provide accelerometer package for operation up to 200°C.

- Changed the download of HC811 code. The appropriate code is stored in all 4 banks of the external EEPROM. This corrects reset problems at temperatures above 175º C.

- Added a brown-out monitor to the power board to insure that HC811 is reset properly.

- Upgraded the CMOS analog switch on the power board.

II. Processor Board

- No hardware was changed in the processor board to reach the 195º C temperatures.

- Changed software to add additional time delay during initialization to allow processor to recover from a Power On Reset when operating above 190º C.

- The only circuit that does not operate reliably at temperatures above 180º C is the Real Time Clock.

III. Power Board

- To solve problems with voltage drift of the precision 5-volt reference with time and temperature, it was necessary to decrease the amount of output current the device must source. This increased the life of the reference to approximately 150 hours at 200º C. A reference manufactured by a different vendor was located, that required minor modification to work in Sperry Sun circuit. Five-volt reference used in the power supply circuits prevents drift with temperature and time. Tested three different parts; the ceramic part did not fail after approximately 500 hours at 200º C. Built two 195º C telemetry modules and gamma modules using the new reference chip.

- Increased main power input electrolytic capacitor life to 300 hours at 195º C by lowering the generator supply from 24 volts to 22 volts.

IV. Gamma Module (GM)

- Screened timer chip to operate at higher temperatures. During tests on the first GM's built, we discovered that the high-voltage supply would shut down at temperatures above 183º C. A timer chip used in the high-voltage supply circuit was found to be the cause. We screened different date

codes on these devices to find those that would work above the required 195º C. Also tested two other timers from different vendors that will also work in this circuit. Qualification of these new devices is still in process. The GM's built for this project used the screened timers.

- The 5-volt reference chip was changed to the new type.

V. Battery Module

- Changed 5-volt reference chip to a Maxim brand.
- Changed 5-volt supply from just a reference chip to a reference chip with a buffer and current pump system.
- Change of voltage measurements for Battery and Sub-bus by the PIC A/D. Changed divider networks from high impedance to less than 10 k-Ohms.
- Changed instantaneous current measurement impedance to PIC A/D by decreasing from 50 k-Ohms to 10 k-Ohms.
- Added 10 k-Ohm input impedance lines to PIC on the pulse accumulation measurement. This improves long-term average current draw measurement reliability in the PIC.

VI. Pulser

There were three areas (wear, oil compensation, and sealing) where improvements were made to the pulser for high temperatures.

A. Wear

- Conical rams redesigned with increased contact area for reduced wear
- Conical rams retained with anti-rotation spider to eliminate coil spring wear
- Angle plate bearing races changed to high-grade M50 bearing steel
- Angle plate bearing elements changed to Silicon Nitride balls and precision machined cage
- Tapered roller bearing mounting changed to minimize mechanical shock related spalling
- Oil changed to Mobil SHC 1025 to eliminate viscosity breakdown
- 25-micron filter and auger to circulate oil and trap particles

- Metal screen (70 micron) oil filter with conical rams

B. **Oil Compensation**

- Piston pressure compensation system replaced boot-style design
- Kemlon caps to reduce oil volume
- Pump outer case

C. **Sealing**

- Changed to 90-durometer O-rings
- Tee-seals on the bulkhead
- HPHT feed-through connectors for the bulkhead

Project Tasks and Work Completed

Following are listed the Phase I tasks with a discussion of the work conducted under each task. Work on many tasks was accomplished both before and after the Halliburton/Sperry Sun merger. To clarify this distinction, work performed before the merger is referred to as "Halliburton" and work after the merger as "Sperry Sun."

Task 1. High-Temperature Characterization of HDS-1 MWD/Gamma Tool

Both Halliburton and Sperry Sun used HALT (highly-accelerated life testing) to characterize the HDS-1 and Solar 175 tools. **Figure 2** shows the HALT equipment used by Sperry Sun. HALT allows accelerated life testing of components by subjecting them to vibration and temperature fluctuations. HALT equipment allows desired cycles and rates to be programmed for each test. The product is monitored during the test for function. When components fail, they can be replaced and testing continued, if desired. Good correlation between HALT and field life has been observed.

Figure 2. Sperry Sun HALT Equipment

Halliburton and Sperry Sun were both able to identify components or circuit designs that failed as temperatures were increased to 200°C. For circuit design failures, eliminating components or altering the design addressed the shortcomings. Other failures required that new components be substituted for those that could not meet the temperature requirements.

Task 2. Evaluation of High-Temperature Components

Work under this task highlighted a fundamental difference in the approaches of Halliburton and Sperry Sun. Halliburton's goal was to identify, test, and use components that were either designed to operate at higher temperatures or had been specially modified to operate at higher temperatures. Sperry Sun chose to keep the same components (when possible), but identify batches from the manufacturer that functioned at elevated temperatures. One reason for the difference in this philosophy is that Halliburton's then-current tool was initially only rated to 150ºC and they realized that their product was falling behind the industry standard as a whole. Sperry Sun's tool currently achieved a rating of 175ºC and was a leader in the industry for temperature capabilities. Sperry Sun believed that they had already identified components with superior temperature performance and that the project's goal to increase temperature capability to 195ºC could be accomplished by locating exceptional batches of components that could survive even higher temperatures.

Figure 3. ELCON Hybrid Processor Chip for Test

Halliburton was successful in finding several components that demonstrated improved high-temperature performance. Many of the components were radiation hardened. A major concern at the onset of the project was the performance of the microprocessor and memory chips. Halliburton located a hybrid chip manufactured by ELCON Technology of Phoenix, Arizona, that was successfully tested at 200ºC for over 700 hours. The test was halted at the time of the merger, and was never completed or repeated. Since the chip did not meet Sperry Sun's configuration, it was not considered in their development. **Figure 3** shows the hybrid chip on a test board. It has been isolated so that only the chip will be placed in the test oven and not the circuit used to operate the chip.

Task 2a. Design of Active Cooling System

At part of the contract, Halliburton undertook and paid for the work under this subtask, which involved analytical and experimental work on an active cooling system. Halliburton contracted this work to APS Technology of Cromwell, Connecticut. They developed an analytical model to simulate cooling of an MWD system and a dummy board, using resistance heating to simulate electrical components. **Figure 4** shows

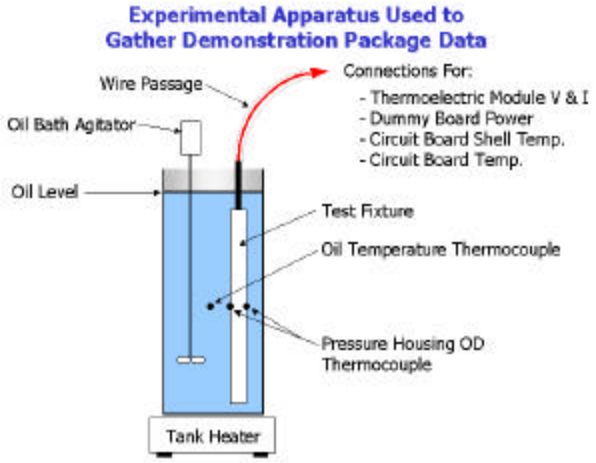


Figure 4. TEC Test Setup

the test set-up employed by APS; **Figure 5** summarizes temperatures during the test.

Thermoelectric coolers (TEC) were used to remove heat from within a pressure barrel containing the dummy MWD board. Temperature and power data were recorded as the assembly was operated in an oil bath. The oil bath represented fluids in a hot well just as the dummy board represented the heat generated by MWD components. The data show that TECs can reduce the temperature inside the pressure barrel and on the circuit boards to acceptable levels. Table 2 summarizes the test data. The temperature of the oil bath was manually controlled and held at 200ºC while temperatures where measured at two locations on the housing 180º apart at the inside surface of the pressure housing at the TEC and on the dummy board. Power to the TEC was monitored, as was power to the dummy board. The heat that leaks into the pressure barrel is estimated from the analytical model, and the efficiency of the thermoelectric device (ratio of heat pumped to thermoelectric power consumed – COP) calculated. The data show that the thermal model effectively represented the test. Results indicated that the TEC can reduce the board temperature from 40 to 54ºC below ambient temperature. Since this is a sufficient reduction to keep the board cool in wells that are 195ºC, it was found that a TEC is a possible solution.

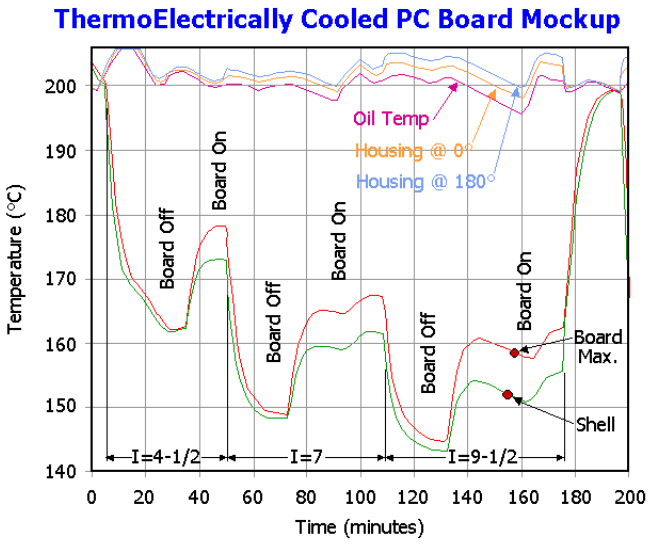


Figure 5. Thermoelectric Cooling Tests

Table 2. Thermoelectric Cooling Test Data

Time (min)	Temperatures							Thermoelectric Coolers			Power			COP
	Oil	Housing @TEC	Housing @180º	Shell	Board Max.	Board Avg	ÄT TEC	Amps	Volts	Watts	Board	Leak	Total	
4	202.4	203.1	202.9	162.3	162.5	162.4	40.8	4.5	8.25	37.125	0	21.4	21.4	0.58
48	200.0	201.1	200.6	173.0	178.3	175.7	28.1	4.5	9.52	42.84	15	14.7	29.7	0.69
72	200.5	202.3	201.5	148.3	148.8	148.5	53.9	7	14.26	99.82	0	28.3	28.3	0.28
105	200.5	202.6	201.8	161.9	167.6	164.7	40.7	7	14.06	98.42	15	21.4	36.4	0.37
131	201.3	204.6	203.2	143.2	144.5	143.8	61.4	9.5	18.96	180.12	0	32.2	32.2	0.18
173	200.8	204.9	203.2	155.2	162.0	158.6	49.7	9.5	18.78	178.41	15	26.1	41.1	0.23

The test data also show that a TEC would consume considerable electrical power, thus requiring the use of a turbine generator. Power would then only be available when the pumps were operating, so a Dewar-type pressure housing would be

needed to insulate the MWD electronics and keep them at rated temperatures for acceptable periods of time while the pumps were off. Both the generator and housing increase the cost of this system. In addition, to achieve higher efficiency, the inside of the Dewar would need to be filled with a dielectric fluid. This makes assembly more difficult since the normal potting medium is not a good heat conductor and space would need to be provided for the dielectric when potting the system.

Despite these drawbacks, a cooling system should be considered in the future for high-temperature MWD systems. The market size for these systems will likely remain small and the potential for development of new high-temperature components is not well defined. Both of these factors will dictate whether cooling is a more economical approach.

Task 3. Design of a High-Temperature Gamma-Ray Detector

Many MWD suppliers, including Halliburton, normally use solid-state gamma detectors. Unfortunately, these devices cannot be used at high temperatures because materials used in their construction will break down. The best way to measure gamma radiation at higher temperatures is with Geiger Muller tubes. One advantage to the Halliburton/Sperry Sun merger was that Sperry Sun already had a gamma detector based on Geiger Muller tubes. Halliburton had received designs from two different companies, but neither of these systems was constructed before the merger. CBG group in Austin, Texas, was one of the companies that quoted on the construction of a Geiger Muller-based gamma detector. Halliburton was preparing to release a purchase order at the time of the merger. Instead, Sperry Sun later performed HALT to determine changes needed to upgrade their Geiger Muller unit to 195°C. Testing highlighted problems in the unit's electronics which were modified and repaired successfully.

Task 4. Selection of High-Temperature Components for Use in MWD/Gamma Tool

Both Halliburton and Sperry Sun used HALT to identify components or batches of components that performed adequately at high temperatures. Halliburton sought to develop new components and designs while Sperry Sun identified areas that could not be addressed through the batch process and redesigned the circuits to eliminate these components.

Halliburton had selected many different high-temperature elements before the project was temporarily halted (due to the merger). The processor and memory selected would likely have been the ELCON hybrid chip set. High-temperature passive components such as resistors and capacitors had been purchased. In addition, board, solder, and potting materials for the 195°C tool had all be selected.

Halliburton had made progress on developing high-temperature magnetometers and accelerometers. ATEC agreed to manufacture high-temperature magnetometers at no cost in return for test data from the project. Japan Aviation Electronics in Tokyo completed tests on accelerometers and it appeared that they had solved problems with long-term drift. Halliburton had also located a radiation-hardened hex buffer IC that was test to 250°C (the limit of their oven).

Halliburton ran HALT on the TCM (telemetry communications module), which developed failures at 160 to 165ºC due to E-prom read or write errors. This problem had been anticipated and would have been solved by using flash memory in place of the E-prom.

Halliburton, working with Battery Engineering Inc. of Hyde Park, Massachusetts, had developed a lithium-magnesium battery that would operate in the temperature range of 125-214ºC. Lithium thionyl chloride batteries are normally used to provide power for MWD tools. Unfortunately, lithium has a melting point of 180ºC, and standard lithium batteries are normally limited to operating temperatures of 160ºC and below. If magnesium is alloyed with the lithium anode, operating temperature can be increased, although with a reduction in current capacity (Table 3).

Table 3. Temperature Performance of Li-Mg Batteries (DD size)

Anode Type	% Magnesium	Melting Point (ºC)	Max Oper Temp (ºC)	Current Capacity (A-hr)
Lithium	0	180	160	26
Li-Mg	10	202	180	20
Li-Mg	25	220	200	15

Battery Engineering developed high-temperature batteries based on the lithium/magnesium alloy. A size DD battery with 25% magnesium can be safely used to 200ºC (as required for this MWD development). Current capacity, while reduced to 15 A-hr, is sufficient for at least 250 circulating hours downhole. The primary disadvantage of this recipe is that power output below 100ºC is poor.

At the time the project was paused due to the merger, discussions were taking place to decide if heaters would be used to maintain the temperature of the lithium/magnesium batteries at minimum operational levels, or if a sacrificial nickel-cadmium battery pack would be used to power the tool at lower temperatures. For the approach incorporating a sacrificial battery, a low-temperature battery pack would shut down and the high-temperature batteries come on-line as the tool's temperature rose above 125ºC. The low-temperature batteries would be replaced after each run.

Sperry Sun had difficulty in proving two directional packages (magnetometers and accelerometers) for the test. These were the last individual components proven. One was from Sperry Sun's internal research department in Cheltenham, England and the other from Tensor in Austin, Texas. Work with Tensor began under Halliburton, but no contract was ever placed. Tensor had indicated that they could build the 195ºC directional package, but never provided a quote to Halliburton. Only one of three units supplied to Sperry Sun was found to qualify at higher temperatures. This area remains as a key item requiring additional work.

The problem components identified by Halliburton for the directional package (magnetometers and accelerometers) were never tested because they did not fit the

form that Sperry Sun needed. However, the manufacturers felt confident they had succeeded in developing high-temperature components.

Task 5. Design High-Temperature MWD/Gamma Tool

Both Halliburton and Sperry Sun took advantage of the opportunity presented by the project to make changes in the design of their MWD tools. Sperry Sun enhanced many areas of their tool (Table 1 presents a list of major changes that were made and incorporated into their current line of tools). Halliburton was just beginning this task when the merger took place; however, through HALT testing they had identified many changes that would be required to meet the temperature goals.

Task 6. System Fabrication

Halliburton did not have the opportunity to advance as far as system fabrication. Sperry Sun was, in one sense, working on fabrication throughout Tasks 4 and 5 since they used their current system as a base and were only modifying and substituting parts that qualified for higher-temperature service for existing parts. **Figure 6** shows the Sperry Sun tool being loaded into an oven for a high-temperature proof test. **Figure 7** shows the temperature controller during the test. The temperature is 193ºC with a set point of 195ºC. Both tools were tested and proven in this oven before field testing.

Figure 6. Sperry Sun MWD Tool Being Prepared for Oven Test

Figure 7. Oven Controllers

Task 7. Laboratory Testing

The Sperry Sun tool was under constant laboratory testing during the proofing process. Task 7 was originally conceived for the Halliburton MWD tool since it was basically a new tool (in contrast to Sperry Sun's tool, which had already undergone significant development and testing).

Task 8. Low-Temperature Field Test

A field test was conducted with the two Sperry Sun MWD tools prepared under this project. Originally, this test was to be a shake-out of a new Halliburton tool and therefore was to be conducted at lower temperatures so that problems not related to temperature could be identified. Since the Sperry Sun tool was much closer to a conventional (market-ready) tool, the first test was conducted at elevated temperatures (180ºC). While not the tool's limit, this temperature range still represented an ambitious test. (See next section for details on field testing.)

Field Test

A field test of two 195ºC MWD tools was conducted in Lavaca County, Texas (**Figure 8**). Sperry Sun's field report is presented in **Appendix A**. The purpose of this operation was to provide directional services on a sidetrack of a straight hole. The sidetrack was to intersect the formation up-dip above the water/gas interface. In addition, the gamma tool provided formation data including seam tops and thickness.

Figure 8. Rig Site

Conventional Solar 175 tools were used in the beginning of the operation. The well temperature at 16,500 ft was 160ºC. The prototype 195ºC tools were then run instead of the standard Solar 175 tools. The first prototype tool went below the rotary table on August 1, 2001 at 17:30 hours (**Figure 9**). Thirty minutes later, a shallow test was conducted to check for proper operation. At 11:45 hours on August 2, 2001, the tool reached bottom and drilling was begun. (The long trip time is the result of a rig shut-down for BOP repair.) The first recorded temperature was 178ºC. The tool stopped pulsing on August 4, 2001 at 23:00 hours, after operating on bottom for 59 hours. Data downloaded at the surface at the end of the test showed that the tool continued to record data until 1:44 hours on August 5, 2001 – an additional 27 hours. The tool was pulled from the well at 2:30 hours on August 6, 2001. Total downhole hours (from the time the tool moves below the rotary table until it is returned to the surface or fails down hole) was 115 hours.

Figure 9. Tool Preparation

The second prototype tool was run into the well at 3:30 hours on August 6, 2001. Gamma logging of a missed interval from the previous run was begun at 18:30 hours the same day. At 22:00 the tool was on bottom drilling. At 5:30 hours on August 7, 2001 the tool stopped pulsing. The highest temperature recorded was 187.2ºC. Drilling continued blind and the tool was pulled from the well on August 13, 2001 at 22:00 hours. Total time below the rotary table was 186.5 hours. Total time before data transmission was lost was 26 hours.

Each of the tools was given a post-mortem examination. The first tool was found to have a failed pulser. Drilling fluid had entered the tool past the poppet seals. The poppet bearings also showed unusual wear. Although the barite content of the field mud was high, the amount of wear on the bearing was unexpected. A typical tolerance for this bearing is 0.003 inches. The

bearing in the first tool was found to have a clearance of 0.015 inches. This allowed the poppet to move laterally and damage the seal, ultimately leading to the failure of the pulser. Data from the tool's telemetry module were successfully downloaded after the operation, demonstrating that the electronics had not failed during this run. Battery voltage was very low (which could have been caused by exposure to high temperatures). The special high-temperature batteries do not begin functioning at full voltage until they reach 125ºC.

On the second tool, the pulser was also found to have failed. However, a bearing that had been inadvertently left out during assembly caused the premature failure. It was also found that the back-up battery in the telemetry module had vented, which damaged wiring and electronic components. After the battery was removed, attempts to unload memory were unsuccessful due to damage from the battery fluid. Data from this run were determined to be lost. It was not apparent why the battery had vented. Heat could have been a factor, although these batteries should have been capable of operations up to 214ºC.

Results from these field tests indicate some progress in the development of a 195ºC tool. Failure of the pulsers appears to have been from mechanical rather than electrical causes. The vented battery may indicate that more work is needed in this area, but only further field tests would conclusively highlight the weakness(es). It was particularly unfortunate that the second tool was improperly assembled. Even with a vented battery, data collected from the run would have helped determine how the electronics were performing under elevated temperatures.

Economic Analysis

Analysis of the economics of the 195ºC tool highlights the greatest obstacle to future commercialization. Costs to screen individual components, then subassemblies, and finally completed tools for high-temperature operations are very high. Tests to date also show a relatively short life for high-temperature tools – on the order of 300 hours (as compared to approximately 1000 hours for a commercial MWD tool operating at temperatures up to 150ºC). These factors mean that the daily cost of the tool will be much higher than a conventional tool. In addition, high-temperature MWD tools are difficult to prepare. For these development efforts, the engineering department made use of highly trained technicians and engineers to prepare these tools. While the normal production staff is well qualified to manufacture tools for conventional applications, it would be difficult for them to prepare, trouble-shoot, and maintain the 195ºC tools on a continuing basis.

Table 4 summarizes costs for the extra labor required to produce 195ºC tools. These data are then used to calculate a daily cost for the tool. Daily costs are based on an operating life of 300 hours, which was determined from the laboratory testing of the 195ºC tools. Table 4 shows additional screening costs to run HALT on components to find those that will function at 195ºC.

Table 4. Screening Costs for Higher Temperature Components

Tool Module	Standard Cost	Additional Screening Cost	Total Cost
Pulser	-	-	-
TM	-	-	-
DM	-	-	-
GM	-	-	-
BM	-	-	-
Expendables (flow gear, interconnects)	-	-	-
TOTAL	$129,062	$48,000	$177,062

Table 5 shows the recovered costs after a field run. This is calculated by subtracting the standard (expected) repair costs from the new equipment cost. The cost of a nonmagnetic drill collar to house the tool is approximately $30,000.

Table 5. Recovered Costs

Tool Module	Standard Cost	Repair Costs	Total Recovered Costs
Pulser	-	-	$6,927
TM	-	-	$1,300
DM	-	-	$2,426
GM	-	-	$2,426
BM	-	-	$2,426
Total	$119,753	$104,248	$15,505

The total cost to operate the tool, excluding manpower, will be the cost of a standard tool plus the cost for additional screening minus the recoverable costs or;

Operating Cost = $129,062 + $48,000 – $15,505 = **$161,557**

The operating time of 300 hours is equivalent to 12 days; thus, the day rate will be $13,463. This cost does not include the cost of capital to build the tools or the cost associated with the loss of technical personnel's time when they are needed to keep these tools operating.

Other costs include depreciation ($282/day) and crew charges (estimated at $1000/day). The total estimated daily cost for the new tool is $14,745/day. This cost compares to $3,000 to $4,000/day for a Solar 175. Thus, the cost of the 195ºC tool is 3 to 5 times more than a conventional tool. It is unlikely that many operators will be willing to pay this price, making the 195ºC tool uneconomical to offer commercially.

These estimates are based on an operating life of 300 hours, high costs of screening parts, and a highly technical labor force needed to maintain the prototype

tools. It is difficult to determine whether operational experience could increase operational life and reduce manufacturing and maintenance costs, and thereby reduce the daily rate. Currently, Sperry Sun does not foresee sufficient market size to justify the expense to estimate these parameters. However, it is clear that new gas discoveries will be from increasingly deeper and hotter wells, and that the DOE should aid in the development of tools for these applications. It is also clear that an important area for additional work is to determine what is possible in reducing the costs and extending the life of the 195ºC tools.

Benefits to the MWD Industry

Sperry Sun and the MWD industry have benefited from this program in the following areas:

Pulser Improvements. Several improvements were implemented in "O" ring selection, oil selection, and other areas. Many improvements were made to the positive pulser as a result of the 175ºC programs, which had taken place before this contract was started with Sperry Sun. Based on project tests, relatively few components of the system needed to be upgraded.

Magnetometer and Calibration Improvements. Work on the magnetometer included upgrades to Sperry Sun (i.e., Tewkesbury) magnetometers in response to higher temperature requirements. This has led to improvements to the design of Sperry Sun's existing magnetometers as used in the Tewkesbury tool family, which will be beneficial across all directional work. Further work was done with Tensor (then Honeywell) in Austin to obtain high temperature. This work showed clearly some of the limitations in the screening strategy Sperry Sun was following. Tensor has included a redesign of the magnetometers with some high-temperature electronics. It proved very difficult to get magnetometers built that perform consistently. This work in turn revealed deficiencies in the modeling methods used to correct errors introduced by temperature. Required modifications to address these findings are still ongoing within Sperry Sun. They are re-evaluating calibration methods for all of our directional tools used in the USA and internationally.

Software Improvements, Resetting and Power-Up Problems. It was discovered as part of this effort that the processor Sperry Sun was using has anomalous behavior when being reset at high temperatures. This required software changes to be made both in the downhole code and tool programming code. The changes that were required provided another opportunity to improve the robustness of the downhole tool string. This is one of the indicators that translating the processor to a high-temperature semiconductor would be very beneficial in producing a new range of high-temperature tools.

Identification of Circuit Design Weaknesses. As the process of screening MWD components for higher and higher temperatures was conducted, unexpected problems were observed, including voltage reference drift problems

and capacitor failures. Voltage reference drift proved difficult to solve because of its impact on the power supply. (This is another candidate for high-temperature semiconductor technology.) The capacitor issue identified a failure in the QC process of production and led to a re-evaluation of tantalum capacitors and testing under high-stress conditions. This work was undertaken independently (not as part of this contract) with a company, which Sperry Sun subcontracted to investigate this issue. A further conclusion regarding capacitor problems is that only improving the silicon is not enough. To make high-temperature tools, we need to develop designs which eliminate the need for these types of capacitors or work with manufacturers to build very high-temperature (high-capacitance) capacitors. Sperry Sun believes the temperature range of some low (<100,000 pF) capacitor technologies can be extended; however, they are less certain that it will be possible to economically extend high value technologies.

The project has helped in clearly demonstrating the limitations of the methods Sperry Sun is currently using to produce high-temperature tools. Based on this work, they are considering the available high-temperature technologies and looking at approaches for introducing these technologies over the longer term.

Conclusions and Recommendations

1. **Results of this development effort showed that, while it is possible to build a mud-pulse MWD tool that can operate at 195º C, performance of the current tool is probably not sufficient for commercial success.** The current temperature limit of 175ºC is apparently the practical limit for conventional electronics. This conclusion is further supported by Sperry Sun's decision to market two tools, one for service up to 150ºC and another (the Solar 175) tool for service from 150 to 175ºC. This decision was made based on the additional costs to screen components for the Solar tools, which make if more difficult to compete with lower temperature tools from other manufacturers. Currently, the bulk of commercial MWD work is at temperatures below 150ºC.

2. **Industry's current R&D goals and perception of future MWD requirements do not focus on operations in hotter and deeper formations.** Sperry Sun (for example) is pursuing the larger segment of the market (operations at less than 150ºC). Their corporate vision is not in strict agreement with the DOE's vision that future gas needs for the USA will be met with gas produced from deeper, hotter reservoirs. However, businesses almost always trend toward the high-volume sector(s) of business. This apparent difference in vision may indicate that the service industry does not currently recognize what the future needs will be. The DOE can help bridge this gap in perception by presenting data that demonstrate how much gas is located in high-temperature reservoirs. If this information describing future markets is not readily available, the DOE could fund a study to highlight the quantity and location of current and future high-temperature reserves. These data may then serve to encourage the MWD industry to place resources into development of tools for high-temperature operations.

3. **Due to the extensive testing required and the high percentage of failing components, use of a binning qualification process to build high-temperature (195º C) MWD tools is very costly**. Costs to screen individual components, then subassemblies, and finally completed tools for high-temperature operations are very high. Tests also show a relatively short life for high-temperature tools. These factors mean that the daily cost of an MWD tool developed through binning processes will be much higher than a conventional tool.

4. **Increasing the operating temperature of current MWD tools will require development of a new platform for the electronics used in these tools.** This technology already exists in a limited number of components, and has been used to develop some special geothermal tools. Sandia National Laboratory has taken the lead role in this area and is developing or interested in the development of tools based on silicon-on-insulator (SOI) technology to overcome high geothermal temperatures. Oilfield MWD could make use of SOI technology to develop the next generation of tools that could allow raising the current temperature limit (175ºC) not marginally (as seems to be the limit with conventional electronics), but to as high as 300ºC.

5. **There are several hindrances to the development of silicon-on-insulator (SOI) tools for the MWD industry.** First is the size of the task at hand. Since this represents a new platform, programming would have to be extensively modified. Sperry Sun and MTI estimate that this is at least a 2-man-year effort. This does not include testing and debugging after programming. Completely new circuits would have to be developed to use the SOI chips now available. In addition, some components still need to be improved for high-temperature use including magnetometers and accelerometers needed for determining direction and trajectory of the well. This project has advanced the development of these components, but more work is needed, including examining other non-conventional technologies to measure primary MWD parameters, angle, and direction. Perhaps one of the most challenging obstacles to the development of the next generation of MWD tools is the (understandable) reluctance of service companies to make obsolete their current inventories of tools.

6. **DOE leadership and partership with industry can play a significant role in encouraging the development of high-temperature MWD tools to prepare for the future.** If the DOE's prediction of future requirements for higher and higher temperatures is correct, then the oil and gas industries could find themselves without proper means to exploit reserves to meet the nation's demand. This could have a significant impact on the US economy. The price of oil and gas is very volatile, and an inability to meet demand can result in rapid price increases. If reserves from hotter reservoirs were soon needed, it could require 2-3 years to develop the tools to efficiently recover them. During this period, prices would continue to rise, increasing the cost of US products and the costs to maintain the current standard of living. The DOE can encourage industry to develop critical components needed to construct new high-

temperature platforms. Providing funding will help reduce the risk and offset the loss for obsolescence of current inventories. Critical components include the magnetometer and accelerometers, as well as the new circuits that implement SOI technology. The final critical area for DOE assistance is in programming required for the new platform. MTI and Sperry Sun believe that the best area to start this work is to develop the primary processor chip using SOI technology. It may be possible to build the current processor using this method, which could reduce reprogramming time. Development of high-temperature directional packages is equally important since these are common to all MWD tools.

Appendix A
Field Test Report

sperry-sun
DRILLING SERVICES

a Halliburton company

Technical Services

Job Number: HD-MJ-10113

Solar 195

Lavaca Co., Texas

<1 Aug to 14 Aug 2001>

Tech Services Engineers: Harvey Mueller

Contents

Objectives

– Purpose of Job

This well was a sidetrack to the original straight hole. The target zone produced only water. The well was sidetracked to intersect the target payzone updip and above gas/water contact. The open hole sidetrack was done using Solar 175 directional tools. Directional tools were run to maintain directional control of the wellpath and the Natural Gamma Ray logging tool was included to correlate with offset wells, determine formation tops and payzone thickness.

– Goals

The development Solar 195 tools were run in this well to test the operation and survivability of these tools. Anticipated BHT was expected to be 360° F at a depth of 18400 ft. using 18.5# oil base mud. This would test of the operational capabilities of these tools.

– Test Plan

BHT was 321° F at a depth of 16500 toward the end of run 400 using Solar 175 tools. The Solar 195 tools were run on the following and all subsequent runs. The Solar 195 tools are a drop in replacement and will provide surveys and Gamma data.

– NEPA Information

4. Project/Activity Description: The proposed action involves field testing a new drilling services system, specifically a **Solar 195 Directional Gamma MWD tool,** in order to assess the system's performance level. DOE's contractor is responsible for identifying field test opportunities, i.e., a well, and arranging all logistics with the operator (owner) of the well to conduct the drilling system performance test. A wellbore or section of wellbore will be drilled with the motor/bit combination for an appropriately permitted well.

Drill cuttings (sandstone, shale, & limestone fragments) will be generated during operation/testing of the product. These cuttings, however, are not incremental waste. The cuttings will be generated by the well owner's own actions (drilling operations), whether testing of the DOE-sponsored product(s) occurs or not. The well operator/owner is responsible for proper treatment and disposition of the cuttings.

The DOE-sponsored drilling product will be "on location" (at the wellsite) for varying lengths of time. It is anticipated that the drilling system will be on location for about **1** weeks, beginning on or about **24 Jul 2001.**

5. Brief Description of Affected Environment: Field performance testing of the drilling system will occur in an appropriately permitted well. Testing of the motor/bits will take place in the **John W. Hancock, Sr A-1 ST,** a **new well,** located **29° 18' N Latitude and 96° 38' W Longitude.** The well is owned/operated by **Louis Dreyfus Natural Gas** and will be located **10 mi SE of Hallettsville, TX.** The surface environment in the immediate vicinity is **gently rolling grassland associated with local farms and ranches.**

The affected environment will be primarily below ground level (subsurface, as a well is being drilled). The drilling, using the **Solar 195 Directional Gamma MWD tool,** will take place in an appropriately permitted well, thus all penetrated strata will be treated in an approved manner, e.g., aquifers isolated, etc.

Summary

Run 500 Timeline

01 Aug 17:30 Below rotary
01 Aug 18:00 Shallow test
02 Aug 11:45 On bottom and start drilling; First recorded temperature- 353° F
04 Aug 23:00 Tool quit pulsing; Drill ahead blind
05 Aug 01:44 Last good data point in Gamma memory; After this point all Bank A, B and C were filled with 7590 or 7650.
05 Aug 01:54 Gap in gamma data 01:54:42 to 01:58:41
05 Aug 10:16 Gap in gamma data from 10:16:13 to 12:49:49
05 Aug 15:13 Gap in gamma data from 15:13:11 to 06 Aug 02:57:02
06 Aug 02:30 End of run

Run 500 Post Run Evaluation

Mk 8 Pulser 8176

Incoming:

Passed resistance test but failed poppet extension and bench test. No signs of mud leaking out of the tool.

Tear down:

The pulser was full of drilling fluids. The origin of the drill fluid intrusion was the seal pack and the o-ring seal on the poppet shaft. The o-rings in the seal pack was nibbled. Where the poppet shaft rides on the seal pack the shaft showed some pitting on it. The o-ring on the poppet shaft was extruded and blown inward into the pulser. All the case seal o-rings looked good. The o-rings on the kemlon feedthru's were still sealing but showed some sign's of extrusion. The intermediate case was checked and it had no cracks.

Over view:

The upper bearing was also very worn. The upper bearing in this pulser measured .4491. The old bearing was worn out so far it couldn't be pressed out. A new bearing in the end plug measured .4341 This leaves a gap of .015. This upper bearing ring ID has an extreme amount of wear. We control the ID to within a

.0003" tolerance. It wore .015" oversized diametral in a relatively short amount of time. The wear would have allowed for more and more lateral deflection of the poppet.

A new end plug assembly was picked out at random and was measured.

New housing = .5650

New bearing O.D. = .5675

New bearing I.D. = .4353

New bearing I.D. installed = .4341

Poppet shaft O.D. = .4341

BM 146746

Incoming:

Downloaded memory data successfully using INSITE. Manually enabled sub bus power from the batteries. Sub bus power was ~10 V. and would fail once CIM I/O card power was removed from the SBM. It appears the batteries were depleted, perhaps due to the short in the end plug.

Tear down:

Tested the SBM electronics at 195°C. The board is still working as it is supposed to. It is measuring the battery voltages, currents, and temperature correctly. The battery over-current protection is also still functioning as specified.

The cells do appear to be near dead from room temperature evaluation. In the next 2 weeks I plan on getting the cells heated up and tested again at or above 125°C. Their present poor performance could be due to the cold room temperature.

Overview:

Run 600 Timeline

06 Aug 03:30 Below Rotary
06 Aug 18:30 Begin reaming to log Gamma over section lost when tool failed on previous run
06 Aug 22:00 On bottom; begin drilling
06 Aug 05:30 Tool quit pulsing; Drill ahead blind.
13 Aug 22:00 End of run

Run 600 Post Run Evaluation

Mk 8 Pulser 8178

Incoming:

Passed resistance test but failed poppet extension and bench test. The poppet cap was broken.

Tear down:

The pulser was full of drilling fluids. The origin of the drill fluid intrusion was the seal pack and the o-ring seal on the poppet shaft. The poppet shaft had two groves in it where it was hitting the end cap. There was no upper bearing in the end cap. This caused premature failure in the bootless top end and the breaking of the poppet cap. All the case seal o-rings looked good. The o-rings on the kemlon feedthru's were still sealing but showed some sign's of extrusion.

The intermediate case was checked and it had no cracks.

Over view:

The upper bearing was not installed and caused the failure of the pulser.

TM 146620

Incoming:

We were unable to communicate with the TM.

Tear down:

Upon pulling the electronics from the case it was found that the backup battery had vented which damaged the wiring to the electronics package. The backup battery was removed and we attempted to communicate with the electronics but were unable to as the vented cell damaged the boards.

Overview:

The backup battery caused the failure on the TM. It has not yet been determined what caused the backup battery to vent.

BM 146747

Recommendations

Job Report

– End of Well Report

End of Well Report
for
Louis Dreyfus Natural Gas

Rig:	H & P 89
Well:	John W. Hancock Sr. #A-1 ST
Field:	Wildcat
Country:	U.S.A.
Job No:	HD-MJ-10113
Date:	08-Jul-01
API No:	42-285-32871-01

Table of Contents

General Information

Company:	Louis Dreyfus Natural Gas	
Rig:	H & P 89	
Well:	John W. Hancock Sr. #A-1 ST	
Field:	Wildcat	
Country:	U.S.A.	
API Number:	42-285-32871-01	
Sperry-Sun Job Number:	HD-MJ-10113	
Job start date:	08-Jul-01	
Job end date:	09-Aug-01	
North reference:	Grid	
Declination:	5.138	deg
Dip angle:	58.842	deg
Total magnetic field:	48529.223	nt
Date of magnetic data:	01-Jan-70	
Wellhead coordinates N:	29 deg. 18 min 1.640 sec North	
Wellhead coordinates E:	96 deg. 38 min 34.350 sec West	
Vertical section direction:	122.526	deg
MWD Engineers:	K. McCoy	T. Bufford
	L. Motl	
Company Representatives:	D. Patton	R. Coates
Company Geologist:		
Lease Name:	John W. Hancock Sr.	
Unit Number:		
State:	Texas	
County:	Lavaca	

Operational Overview

Sperry-Sun Drilling Services was contracted to provide Solar 175 MWD and directional drilling services for sidetracking the John W. Hancock Sr. A-1 well. MWD services began 08-Jul-01. The sidetrack was completed 12-Aug at a measured depth of 17777. Run 100 was a directional only run to open hole sidetrack the well at 14153' MD. The run started 09-Jul and was completed at 14212' MD 12-Jul after 50 circulating hours. MWD tool RPM's dropped from 3200 to 2200 during the run, but caused no problems during the run. Post-run inspection revealed damaged marine bearings. Run 200 directional / gamma run began 12-Jul and was completed at 15094' MD after 136 circulating hours. MWD tool RPM's caused the intermittent pulsing during the run and ranged from 3200 at run start to 1200 at end of run. Pulser failed post-run poppet extension test. Run 300 began 19-Jul and was completed 20-Jul after MWD quit pulsing after 16.5 circulating hours. Tool sent to R & M for testing. Run 400 began 21-Jul and was completed 31-Jul after 213 circulating hours. MWD setup was changed to compensate for RPM loss during run. Tool RPM's ran from 3900 at start of run to 2200 at end of run. Post run inspection revealed damaged marine bearings. Maximum temperature during run was 332°F. Pulser failed post-run retraction test. Run 500 was the first run for the Solar 195 tool. The run started 01-Aug. at 16719' MD. MWD quit pulsing after 55 circulating hours. Drilled ahead 19 hours without real-time MWD. Tool logged 2 hours after failure before short in end plug turned the subbus off. Maximum temperature prior to failure was 360°F. and maximum temperature recorded in tool was 367 deg. F. Pulser failed post-run retraction test. Run 600 with Solar 195 tool began 06-Aug 17173' MD. Logged 130' of data lost on prior run and started drilling at 2200 06-Aug. MWD quit pulsing at 05:30 07-Aug. Drilled ahead to TD without MWD.[a]«

Summary of MWD runs

Run No.	Bit No.	Hole Size (in)	MWD Sensors	Start Depth (ft)	End Depth (ft)	Drill/Wipe Distance (ft)	Run Start Date Time	Run End Date Time	BRT Hrs.	Oper. Hrs.	Circ. Hrs.	Max. Temp. (degF)	Serv. Int.	Trip for MWD	Failure Type
0100	0100	6.75	DIR	14153.00	14212.00	59.00	09-Jul-01 20:00	12-Jul-01 14:00	66.00	66.00	50.00	302.00	No	No	
0200	0200	6.75	DIR-GR	14212.00	15094.00	882.00	12-Jul-01 14:00	19-Jul-01 11:00	165.00	165.00	136.00	289.00	Yes	Yes	Pulser
0300	0300	6.75	DIR-GR	15094.00	15195.00	101.00	19-Jul-01 12:00	20-Jul-01 23:00	35.00	35.00	18.00	304.00	Yes	Yes	Pulser
0400	0400	6.75	DIR-GR	15195.00	16719.00	1524.00	21-Jul-01 01:00	31-Jul-01 13:30	252.50	252.50	213.00	318.00	No	No	
0500	0500	6.75	DIR-GR	16719.00	17173.00	454.00	01-Aug-01 17:30	06-Aug-01 02:30	105.00	105.00	74.00	353.00	Yes	Yes	Pulser
0600	0600	6.75	DIR-GR	17173.00	17777.00	604.00	06-Aug-01 03:30	13-Aug-01 22:00	186.50	186.50	106.00	360.00	Yes	No	Pulser
0601	0600	0.00		17173.00	17777.00	604.00	06-Aug-01 03:30	13-Aug-01 22:00	186.50	186.50	106.00	360.00	Yes	No	
4000	0	0.00		0.00	0.00	0.00	09-Aug-01 16:17	09-Aug-01 16:17	0.00	0.00	0.00	0.00	No	No	
TOTALS	====>					4228.00			996.50	996.50	703.00		5	3	

Bitrun Summary

Run Time Data

MWD Run :	0100
Rig Bit No:	0100
Hole Size :	6.75 in
Run Start :	09-Jul-01 20:00
Run End :	12-Jul-01 14:00
BRT Hrs :	66.00
Circ. Hrs :	50.00
Oper. Hrs :	66.00

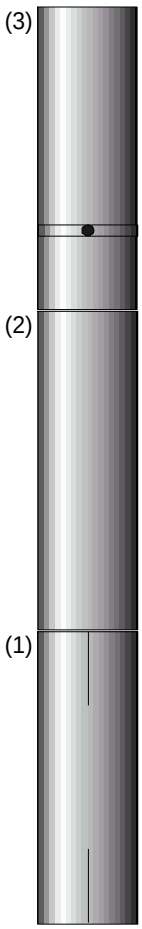
Drilling Data

Start Depth :	14153.00	ft
End Depth :	14212.00	ft
Footage :	59.00	ft
Avg. Flow Rate :	234.00	gpm
Avg. RPM :	40.00	rpm
Avg. WOB :	2.00	klb
Avg. ROP :	2.00	fph
Avg. SPP :	3000.00	psig

Mud Data

Mud Type :	Oil Based			
Weight / Visc :	18.10	ppg /	90.00	spqt
Chlorides :	0.00	mg/l		
PV / YP :	58.00	cp /	15.00	lhf2
Solids/Sand :	40	% /	TR	%
%Oil / O:W :	53.5	% /	90/10	
pH/Fluid Loss:	0.00	pH /	0.00	mptm
Max. Temp. :	302.00	degF		

MWD Schematics

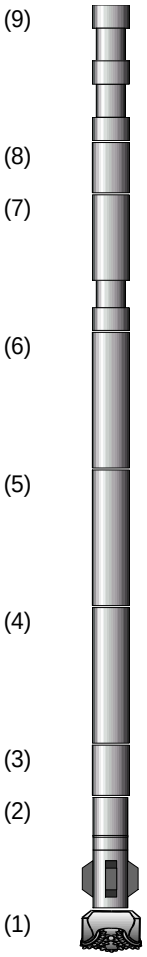


3. MARK VII
SN : 102

2. Telemetry Module
SN : 132003
0.00 ft Distance from Bit

1. Directional Module
SN : 90554
0.00 ft Distance from Bit

BHA Schematics



	Component	Length (ft)	O.D. (in)	I.D. (in)
09.	6x HWDP	184.78	4.000	2.560
08.	Cross Over Sub	2.67	5.188	2.250
07.	Drilling Jars	30.15	4.750	2.250
06.	3x Drill collar	89.41	4.750	2.250
05.	1 x Non-Mag Drill Collar	31.19	4.750	2.250
04.	DWD SlimHole	28.61	4.750	2.810
03.	Float Sub	2.33	4.750	2.250
02.	4-3/4"SperryDrillLobe 4/5-6.3s	25.12	4.750	2.794
01.	Diamond	0.54	6.750	1.920

Comments

Time drilled to sidetrack well.
POOH to change bit type and BHA.
100% MWD Run. Tool Setup: 35 IMP / 30 IFA Stator / 1.675 DT

MWD Performance

Tool OD / Type :	4.75	in /	HH	
MWD Real-time%:	100.00	% /	100.00	%
MWD Recorded%:	0.00	% /	0.00	%
Min. Inc. :	4.40	deg /	14145.00	ft
Max. Inc. :	4.50	deg /	14113.00	ft
Final Az. :	120.50	deg		
Max Op. Press. :	13270.92	psig		

Bitrun Summary

Run Time Data

MWD Run :	0200
Rig Bit No:	0200
Hole Size :	6.75 in
Run Start :	12-Jul-01 14:00
Run End :	19-Jul-01 11:00
BRT Hrs :	165.00
Circ. Hrs :	136.00
Oper. Hrs :	165.00

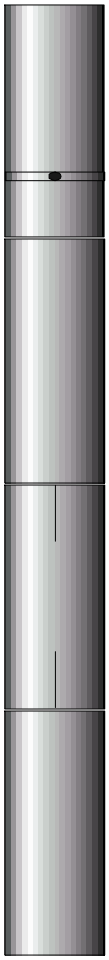
Drilling Data

Start Depth :	14212.00	ft
End Depth :	15094.00	ft
Footage :	882.00	ft
Avg. Flow Rate :	234.00	gpm
Avg. RPM :	45.00	rpm
Avg. WOB :	10.00	klb
Avg. ROP :	5.00	fph
Avg. SPP :	3200.00	psig

Mud Data

Mud Type :	Oil Based			
Weight / Visc :	17.90	ppg /	64.00	spqt
Chlorides :	0.00	mg/l		
PV / YP :	63.00	cp /	16.00	lhf2
Solids/Sand :	39.44	% /		%
%Oil / O:W :	54	% /	90/10	
pH/Fluid Loss:	0.00	pH /	0.00	mptm
Max. Temp. :	289.00	degF		

MWD Schematics



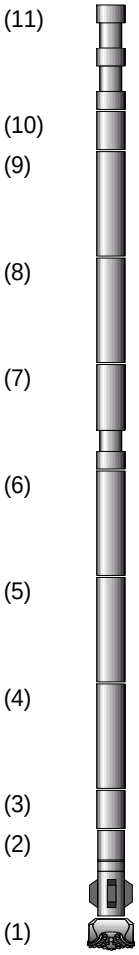
4. MARK VII
SN : 90

3. Telemetry Module
SN : 86654
0.00 ft Distance from Bit

2. Directional Module
SN : 90554
0.00 ft Distance from Bit

1. Gamma Module
SN : 156070
0.00 ft Distance from Bit

BHA Schematics



	Component	Length (ft)	O.D. (in)	I.D. (in)
11.	6x HWDP	184.78	4.000	2.560
10.	Cross Over Sub	2.67	5.188	2.250
09.	3x Drill collar	91.90	4.750	2.250
08.	2x Drill collar	60.00	4.750	2.375
07.	Drilling Jars	30.15	4.750	2.250
06.	Drill collar	29.41	4.750	2.375
05.	1 x Non-Mag Drill Collar	31.19	4.750	2.250
04.	DGWD SlimHole	28.61	4.750	2.810
03.	Float Sub	2.33	4.750	2.250
02.	4-3/4"SperryDrillLobe 4/5-6.3s	25.10	4.750	2.794
01.	PDC	1.00	6.750	2.560

Comments

Drilled ahead with sliding to build angle.
POOH to switch MWD tool failure, change bit and motor.
Tool config.30 deg. stator, 35 deg. imp, 1.675 DT orifice.

MWD Performance

Tool OD / Type :	4.75	in /	HH	
MWD Real-time%:	100.00	% /	100.00	%
MWD Recorded%:	100.00	% /	0.00	%
Min. Inc. :	3.20	deg /	14174.00	ft
Max. Inc. :	30.20	deg /	15004.00	ft
Final Az. :	116.10	deg		
Max Op. Press. :	13868.92	psig		

Bitrun Summary

Run Time Data

MWD Run :	0300
Rig Bit No:	0300
Hole Size :	6.75 in
Run Start :	19-Jul-01 12:00
Run End :	20-Jul-01 23:00
BRT Hrs :	35.00
Circ. Hrs :	18.00
Oper. Hrs :	35.00

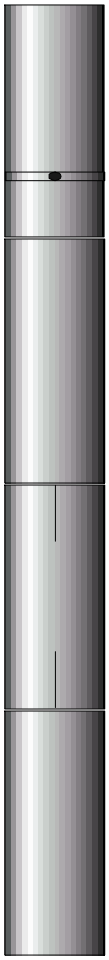
Drilling Data

Start Depth :	15094.00	ft
End Depth :	15195.00	ft
Footage :	101.00	ft
Avg. Flow Rate :	238.00	gpm
Avg. RPM :	45.00	rpm
Avg. WOB :	5.00	klb
Avg. ROP :	5.00	fph
Avg. SPP :	3200.00	psig

Mud Data

Mud Type :	Oil Based			
Weight / Visc :	17.90	ppg /	75.00	spqt
Chlorides :	0.00	mg/l		
PV / YP :	60.00	cp /	16.00	lhf2
Solids/Sand :	40.5	% /		%
%Oil / O:W :	54	% /	91/9	
pH/Fluid Loss:	0.00	pH /	0.00	mptm
Max. Temp. :	304.00	degF		

MWD Schematics



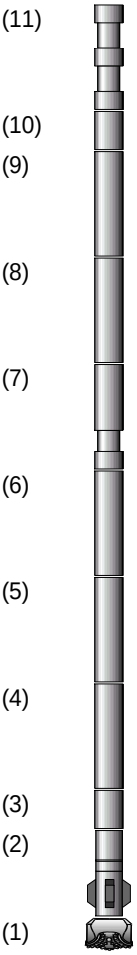
4. MARK VII
SN : 102

3. Telemetry Module
SN : 132003
0.00 ft Distance from Bit

2. Directional Module
SN : 122099
0.00 ft Distance from Bit

1. Gamma Module
SN : 78005
0.00 ft Distance from Bit

BHA Schematics



	Component	Length (ft)	O.D. (in)	I.D. (in)
11.	6x HWDP	184.78	4.000	2.560
10.	Cross Over Sub	2.67	5.188	2.250
09.	3x Drill collar	91.90	4.750	2.250
08.	2x Drill collar	60.00	4.750	2.375
07.	Drilling Jars	30.15	4.750	2.250
06.	Drill collar	29.41	4.750	2.375
05.	1 x Non-Mag Drill Collar	31.19	4.750	2.250
04.	SOLAR DGWD SlimHole	28.61	4.750	2.810
03.	Float Sub	2.33	4.750	2.250
02.	4-3/4" SperryDrill 4/5 6.3 stg	25.01	4.750	2.794
01.	PDC	1.00	6.750	2.560

Comments

POOH for MWD. Tool flatlined after 16.5 circ. hrs..

Tool Setup: 35 IMP / 30 IFA / 1.675 DT

MWD Performance

Tool OD / Type :	4.75	in /	HH	
MWD Real-time%:	90.00	% /	90.00	%
MWD Recorded%:	90.00	% /	0.00	%
Min. Inc. :	31.00	deg /	15036.00	ft
Max. Inc. :	34.20	deg /	15131.00	ft
Final Az. :	118.60	deg		
Max Op. Press. :	14055.08	psig		

Bitrun Summary

Run Time Data

MWD Run :	0400
Rig Bit No:	0400
Hole Size :	6.75 in
Run Start :	21-Jul-01 01:00
Run End :	31-Jul-01 13:30
BRT Hrs :	252.50
Circ. Hrs :	213.00
Oper. Hrs :	252.50

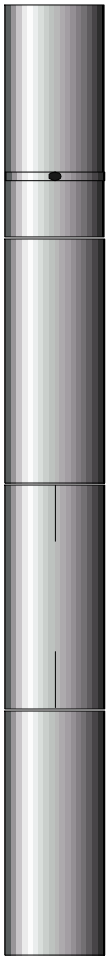
Drilling Data

Start Depth :	15195.00	ft
End Depth :	16719.00	ft
Footage :	1524.00	ft
Avg. Flow Rate :	215.00	gpm
Avg. RPM :	64.00	rpm
Avg. WOB :	8.00	klb
Avg. ROP :	8.00	fph
Avg. SPP :	3300.00	psig

Mud Data

Mud Type :	Oil Based			
Weight / Visc :	18.40	ppg /	90.00	spqt
Chlorides :	0.00	mg/l		
PV / YP :	74.00	cp /	28.00	lhf2
Solids/Sand :	41.5	% /		%
%Oil / O:W :	53.5	% /	91/9	
pH/Fluid Loss:	0.00	pH /	0.00	mptm
Max. Temp. :	318.00	degF		

MWD Schematics



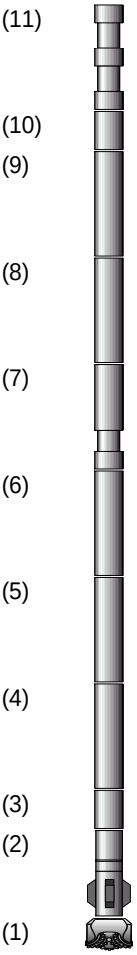
4. MARK VII
SN : 76

3. Telemetry Module
SN : 86654
0.00 ft Distance from Bit

2. Directional Module
SN : 90554
0.00 ft Distance from Bit

1. Gamma Module
SN : 156070
0.00 ft Distance from Bit

BHA Schematics



	Component	Length (ft)	O.D. (in)	I.D. (in)
11.	6x HWDP	184.78	4.000	2.560
10.	Cross Over Sub	2.67	5.188	2.250
09.	3x Drill collar	91.90	4.750	2.250
08.	2x Drill collar	60.00	4.750	2.375
07.	Drilling Jars	30.15	4.750	2.250
06.	Drill collar	29.41	4.750	2.375
05.	1 x Non-Mag Drill Collar	31.19	4.750	2.250
04.	SOLAR DGWD SlimHole	28.61	4.750	2.810
03.	Float Sub	2.33	4.750	2.250
02.	4-3/4" SperryDrill 4/5 6.3 stg	24.40	4.750	2.794
01.	PDC	1.00	6.750	2.560

Comments

100 % MWD run. POOH to switch BHA, MWD because of hours, and test BOP's.ª«35 impeller, 41 stator, 1.675 orifice.ª«

MWD Performance

Tool OD / Type :	4.75	in /	HH	
MWD Real-time%:	100.00	% /	100.00	%
MWD Recorded%:	100.00	% /	0.00	%
Min. Inc. :	34.30	deg /	15131.00	ft
Max. Inc. :	48.30	deg /	16661.00	ft
Final Az. :	119.10	deg		
Max Op. Press. :	15996.74	psig		

Bitrun Summary

Run Time Data

MWD Run :	0500
Rig Bit No:	0500
Hole Size :	6.75 in
Run Start :	01-Aug-01 17:30
Run End :	06-Aug-01 02:30
BRT Hrs :	105.00
Circ. Hrs :	74.00
Oper. Hrs :	105.00

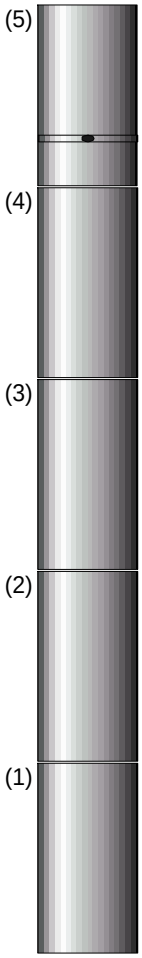
Drilling Data

Start Depth :	16719.00	ft
End Depth :	17173.00	ft
Footage :	454.00	ft
Avg. Flow Rate :	211.00	gpm
Avg. RPM :	55.00	rpm
Avg. WOB :	10.00	klb
Avg. ROP :	12.00	fph
Avg. SPP :	3200.00	psig

Mud Data

Mud Type :	Oil Based			
Weight / Visc :	18.50	ppg /	63.00	spqt
Chlorides :	0.00	mg/l		
PV / YP :	48.00	cp /	7.00	lhf2
Solids/Sand :	41.5	% /		%
%Oil / O:W :	53	% /	91/9	
pH/Fluid Loss:	0.00	pH /	0.00	mptm
Max. Temp. :	353.00	degF		

MWD Schematics



5. Mark VIII
   SN : 8176

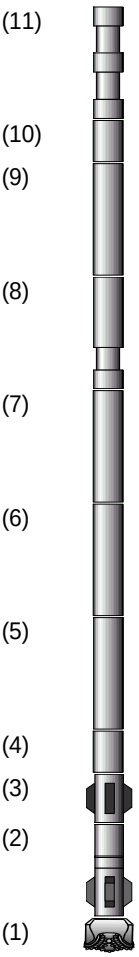
4. Telemetry Module
   SN : 146619
   0.00 ft Distance from Bit

3. Directional Module
   SN : 146618
   50.28 ft Distance from Bit

2. Gamma Module
   SN : 146171
   44.10 ft Distance from Bit

1. Battery Probe
   SN : 146746
   0.00 ft Distance from Bit

BHA Schematics



	Component	Length (ft)	O.D. (in)	I.D. (in)
11.	6x HWDP	184.78	4.000	2.560
10.	Cross Over Sub	1.87	5.188	2.688
09.	5x Drill collar	152.07	4.750	2.250
08.	Drilling Jars	30.15	4.750	2.250
07.	1x Drill collar	30.50	4.750	2.250
06.	1x Non-Mag Drill collar	31.12	4.750	2.250
05.	DGWD SlimHole	24.47	4.625	3.500
04.	Float Sub	2.41	4.750	2.250
03.	Integral Blade Stabilizer	5.68	4.750	1.938
02.	4-3/4"SperryDrillLobe4/5-6.3st	24.40	4.750	2.794
01.	PDC	1.00	6.750	2.560

Comments

MWD Failure. Orifice 1.6375, stator 41, impeller 35

MWD Performance

Tool OD / Type :	4.75	in /	HH	
MWD Real-time%:	70.00	% /	70.00	%
MWD Recorded%:	70.00	% /	0.00	%
Min. Inc. :	48.30	deg /	16662.00	ft
Max. Inc. :	49.10	deg /	16757.00	ft
Final Az. :	119.80	deg		
Max Op. Press. :	16434.81	psig		

Bitrun Summary

Run Time Data

MWD Run :	0600
Rig Bit No:	0600
Hole Size :	6.75 in
Run Start :	06-Aug-01 03:30
Run End :	13-Aug-01 22:00
BRT Hrs :	186.50
Circ. Hrs :	106.00
Oper. Hrs :	186.50

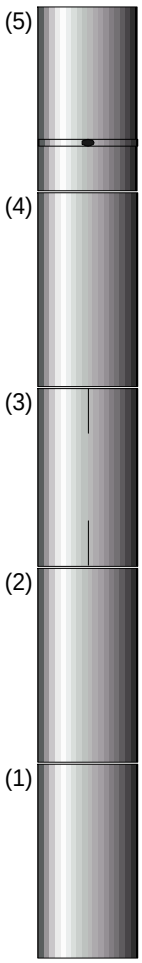
Drilling Data

Start Depth :	17173.00	ft
End Depth :	17777.00	ft
Footage :	604.00	ft
Avg. Flow Rate :	230.00	gpm
Avg. RPM :	55.00	rpm
Avg. WOB :	5.00	klb
Avg. ROP :	5.00	fph
Avg. SPP :	3200.00	psig

Mud Data

Mud Type :	Oil Based			
Weight / Visc :	18.60	ppg /	74.00	spqt
Chlorides :	0.00	mg/l		
PV / YP :	49.00	cp /	9.00	lhf2
Solids/Sand :	42	% /		%
%Oil / O:W :	52	% /	90/10	
pH/Fluid Loss:	0.00	pH /	0.00	mptm
Max. Temp. :	360.00	degF		

MWD Schematics



5. Mark VIII
SN : 8178

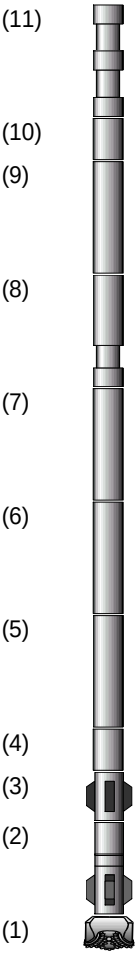
4. Telemetry Module
SN : 146620
0.00 ft Distance from Bit

3. Directional Module
SN : 146617
0.00 ft Distance from Bit

2. Gamma Module
SN : 146170
0.00 ft Distance from Bit

1. Battery Probe
SN : 146747
0.00 ft Distance from Bit

BHA Schematics



	Component	Length (ft)	O.D. (in)	I.D. (in)
11.	6x HWDP	184.78	4.000	2.560
10.	Cross Over Sub	1.87	5.188	2.688
09.	5x Drill collar	152.07	4.750	2.250
08.	Drilling Jars	30.15	4.750	2.250
07.	1x Drill collar	30.50	4.750	2.250
06.	1x Non-Mag Drill collar	31.12	4.750	2.250
05.	DGWD SlimHole	28.61	4.625	3.500
04.	Float Sub	2.41	4.750	2.250
03.	Integral Blade Stabilizer	4.69	4.750	2.188
02.	4-3/4"SperryDrillLobe4/5-6.3st	25.12	4.750	2.794
01.	PDC	1.00	6.750	2.560

Comments

MWD quit pulsing after 13 circulating hours.
Drilled to TD without realtime MWD.
41/35, 1.650 DT orifice.

MWD Performance

Tool OD / Type :	4.75	in /	HH	
MWD Real-time%:	25.00	% /	25.00	%
MWD Recorded%:	25.00	% /	0.00	%
Min. Inc. :	48.10	deg /	17141.00	ft
Max. Inc. :	48.30	deg /	17012.00	ft
Final Az. :	122.60	deg		
Max Op. Press. :	166842.00	psig		

Directional Survey Data

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100f)
14072.00	3.68	105.75	14067.00	109.35 N	23.75 W	-78.82	TIE-IN
14113.00	4.50	115.00	14107.90	108.31 N	21.03 W	-75.97	2.56
14145.00	4.40	120.50	14139.80	107.16 N	18.83 W	-73.49	1.37
14174.00	3.20	154.50	14168.74	105.86 N	17.52 W	-71.70	8.62
14206.00	5.90	195.90	14200.64	103.48 N	17.59 W	-70.47	12.77
14238.00	7.80	186.90	14232.41	99.74 N	18.30 W	-69.06	6.80
14269.00	8.50	177.00	14263.10	95.36 N	18.43 W	-66.82	5.05
14301.00	9.40	169.30	14294.71	90.43 N	17.82 W	-63.65	4.68
14333.00	9.80	159.70	14326.27	85.31 N	16.39 W	-59.69	5.15
14365.00	10.60	147.10	14357.76	80.28 N	13.85 W	-54.84	7.39
14397.00	11.20	143.70	14389.19	75.31 N	10.41 W	-49.27	2.75
14429.00	11.60	142.80	14420.56	70.24 N	6.63 W	-43.35	1.37
14461.00	12.30	137.20	14451.86	65.18 N	2.37 W	-37.04	4.23
14493.00	12.70	131.30	14483.11	60.35 N	2.59 E	-30.26	4.18
14525.00	13.40	124.40	14514.28	55.94 N	8.30 E	-23.08	5.33
14557.00	14.20	121.00	14545.36	51.82 N	14.72 E	-15.45	3.56
14588.00	15.70	117.10	14575.31	47.95 N	21.71 E	-7.47	5.82
14620.00	16.80	117.80	14606.03	43.82 N	29.66 E	1.44	3.49
14652.00	17.50	116.90	14636.61	39.49 N	38.04 E	10.84	2.34
14684.00	18.50	115.60	14667.04	35.12 N	46.91 E	20.67	3.37
14716.00	19.30	115.60	14697.32	30.64 N	56.26 E	30.96	2.50
14749.00	20.20	115.40	14728.37	25.84 N	66.32 E	42.03	2.73
14781.00	21.50	116.00	14758.28	20.90 N	76.58 E	53.34	4.12
14813.00	23.00	116.70	14787.89	15.52 N	87.44 E	65.38	4.76
14845.00	23.80	116.70	14817.26	9.81 N	98.79 E	78.02	2.50
14877.00	24.70	117.30	14846.44	3.84 N	110.50 E	91.11	2.92
14909.00	25.70	117.30	14875.39	2.41 S	122.61 E	104.67	3.13
14941.00	27.20	116.50	14904.04	8.86 S	135.32 E	118.86	4.82
14973.00	28.70	115.90	14932.31	15.48 S	148.78 E	133.76	4.77
15004.00	30.20	116.10	14959.30	22.16 S	162.48 E	148.91	4.85
15036.00	31.00	115.00	14986.85	29.18 S	177.17 E	165.07	3.05
15068.00	31.60	113.90	15014.19	36.06 S	192.31 E	181.53	2.59
15099.00	33.00	115.00	15040.39	42.92 S	207.39 E	197.93	4.90
15131.00	34.30	117.30	15067.03	50.74 S	223.30 E	215.55	5.69
15162.00	35.80	118.00	15092.41	59.00 S	239.06 E	233.29	5.01
15194.00	37.00	118.70	15118.16	68.02 S	255.78 E	252.23	3.97
15226.00	38.10	118.70	15143.53	77.39 S	272.88 E	271.69	3.44
15258.00	38.80	119.30	15168.59	87.03 S	290.28 E	291.55	2.48
15290.00	39.50	120.10	15193.41	97.04 S	307.83 E	311.73	2.70
15321.00	39.60	120.40	15217.31	106.99 S	324.88 E	331.45	0.70

Directional Survey Data

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100f)
15352.00	39.80	119.80	15241.16	116.92 S	342.02 E	351.23	1.39
15384.00	40.70	118.20	15265.59	126.94 S	360.10 E	371.87	4.28
15416.00	41.70	117.60	15289.67	136.80 S	378.73 E	392.88	3.36
15448.00	42.30	117.00	15313.45	146.62 S	397.75 E	414.20	2.26
15479.00	42.70	117.20	15336.30	156.16 S	416.40 E	435.05	1.36
15511.00	43.00	117.10	15359.76	166.09 S	435.76 E	456.72	0.96
15543.00	43.10	117.20	15383.15	176.06 S	455.20 E	478.47	0.38
15575.00	43.70	116.90	15406.40	186.06 S	474.78 E	500.35	1.98
15607.00	43.80	117.10	15429.51	196.10 S	494.50 E	522.38	0.53
15639.00	44.00	117.00	15452.57	206.20 S	514.26 E	544.47	0.66
15671.00	44.20	117.10	15475.55	216.32 S	534.09 E	566.63	0.66
15703.00	44.30	116.90	15498.47	226.46 S	553.99 E	588.86	0.54
15735.00	44.40	117.50	15521.35	236.69 S	573.88 E	611.13	1.35
15766.00	44.70	117.10	15543.45	246.66 S	593.21 E	632.79	1.33
15799.00	44.90	116.80	15566.86	257.20 S	613.94 E	655.93	0.88
15831.00	45.30	116.70	15589.45	267.40 S	634.18 E	678.48	1.27
15863.00	45.40	116.10	15611.94	277.52 S	654.57 E	701.12	1.37
15895.00	45.60	116.30	15634.37	287.60 S	675.05 E	723.80	0.77
15927.00	45.60	115.60	15656.76	297.60 S	695.61 E	746.51	1.56
15959.00	45.90	115.90	15679.09	307.56 S	716.25 E	769.28	1.15
15991.00	46.00	115.70	15701.33	317.57 S	736.96 E	792.12	0.55
16023.00	46.10	115.20	15723.54	327.47 S	757.76 E	814.98	1.17
16054.00	46.50	114.90	15744.96	336.96 S	778.06 E	837.20	1.47
16086.00	46.60	115.50	15766.97	346.85 S	799.08 E	860.24	1.40
16118.00	46.90	114.60	15788.90	356.72 S	820.20 E	883.35	2.25
16150.00	46.90	114.50	15810.76	366.43 S	841.45 E	906.49	0.23
16182.00	47.20	114.80	15832.56	376.20 S	862.74 E	929.69	1.16
16214.00	46.70	116.20	15854.41	386.26 S	883.85 E	952.90	3.56
16246.00	46.70	117.10	15876.35	396.71 S	904.66 E	976.07	2.05
16278.00	46.30	118.60	15898.38	407.55 S	925.18 E	999.20	3.62
16310.00	46.50	118.80	15920.45	418.68 S	945.51 E	1022.32	0.77
16342.00	46.60	119.10	15942.46	429.92 S	965.84 E	1045.51	0.75
16374.00	46.80	118.40	15964.40	441.13 S	986.26 E	1068.74	1.71
16437.00	46.00	119.10	16007.85	463.07 S	1026.25 E	1114.27	1.50
16501.00	46.40	118.70	16052.15	485.39 S	1066.69 E	1160.37	0.77
16533.00	46.60	118.70	16074.17	496.54 S	1087.05 E	1183.53	0.62
16565.00	46.80	118.60	16096.12	507.70 S	1107.49 E	1206.76	0.67
16597.00	47.20	119.20	16117.94	519.02 S	1127.98 E	1230.12	1.86
16629.00	47.70	118.90	16139.58	530.46 S	1148.59 E	1253.65	1.71
16661.00	48.30	119.10	16161.00	541.99 S	1169.39 E	1277.39	1.93

Directional Survey Data

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100f)
16693.00	49.00	118.30	16182.14	553.53 S	1190.46 E	1301.35	2.88
16757.00	49.10	118.80	16224.08	576.63 S	1232.92 E	1349.57	0.61
16821.00	48.80	119.10	16266.11	599.99 S	1275.15 E	1397.75	0.59
16885.00	48.60	119.10	16308.35	623.37 S	1317.16 E	1445.74	0.31
16949.00	48.30	119.80	16350.80	646.92 S	1358.87 E	1493.57	0.94
17012.00	48.30	121.20	16392.71	670.79 S	1399.40 E	1540.57	1.66
17077.00	48.20	121.90	16436.00	696.17 S	1440.72 E	1589.06	0.82
17141.00	48.10	122.60	16478.70	721.61 S	1481.04 E	1636.73	0.83
17777.00	48.10	122.60	16903.44	976.65 S	1879.84 E	2110.11	0.00

Directional Survey Data

CALCULATION BASED ON Minimum Curvature METHOD

SURVEY COORDINATES RELATIVE TO WELL SYSTEM REFERENCE POINT
TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT

VERTICAL SECTION RELATIVE TO WELL HEAD
VERTICAL SECTION IS COMPUTED ALONG A DIRECTION OF 122.53 DEGREES (GRID)
A TOTAL CORRECTION OF 3.98 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 17777.00 FEET
IS 2118.41 FEET ALONG 117.45 DEGREES (GRID)

TIE-IN SURVEY AT 14072' MD IS PROVIDED BY MULTI-SHOT.
SURVEYS FROM 14113' MD TO 17141' MD IS PROVIDED BY SPERRY-SUN MWD.
SURVEY AT 17141' MD IS PROJECTED TO TD AT 17777' MD.
SPERRY-SUN ENGINEERS, K. MCCOY AND T. BUFFORD.

Service Interrupt Report

MWD run number :	0500	Time/Date of Failure :	04-Aug-01 23:00
Rig Bit Number :	0500	Depth at time of Failure :	17015.00 ft
MWD Run start time/date :	01-Aug-01 17:30	Lost Rig Hours :	18.00
MWD Run end time/date :	06-Aug-01 02:30		

Rig Activity

Drilling ahead.

Description of Failure

Tool quit pulsing.

Action Taken

Cycled pumps, changed flow rates, changed pressure tranducer, etc... Drilled ahead 19.5 hrs without MWD.

Operation Impact

POOH for MWD. Lost 130' of data. Delayed data delivery 24 hrs. 20 hrs lost rig time.

Reason for Failure

Pulser failed poppet retraction test. BM shorted sub bus.

Service Interrupt Report

MWD run number :	0600	Time/Date of Failure :	07-Aug-01 05:30
Rig Bit Number :	0600	Depth at time of Failure :	17233.00 ft
MWD Run start time/date :	06-Aug-01 03:30	Lost Rig Hours :	0.00
MWD Run end time/date :	13-Aug-01 22:00		

Rig Activity

Drilling ahead.

Description of Failure

Tool quit pulsing.

Action Taken

Cycled pumps, changed flow rates, changed pressure tranducer, etc... Drilled ahead to TD without MWD.

Operation Impact

POOH for MWD. Lost 600' of data, delayed data delivery 96 hrs.

Reason for Failure

Found nut on top of poppet. Surface test revealed a broken poppet, and was unable to communicate with TM. Poppet failed poppet retraction test.

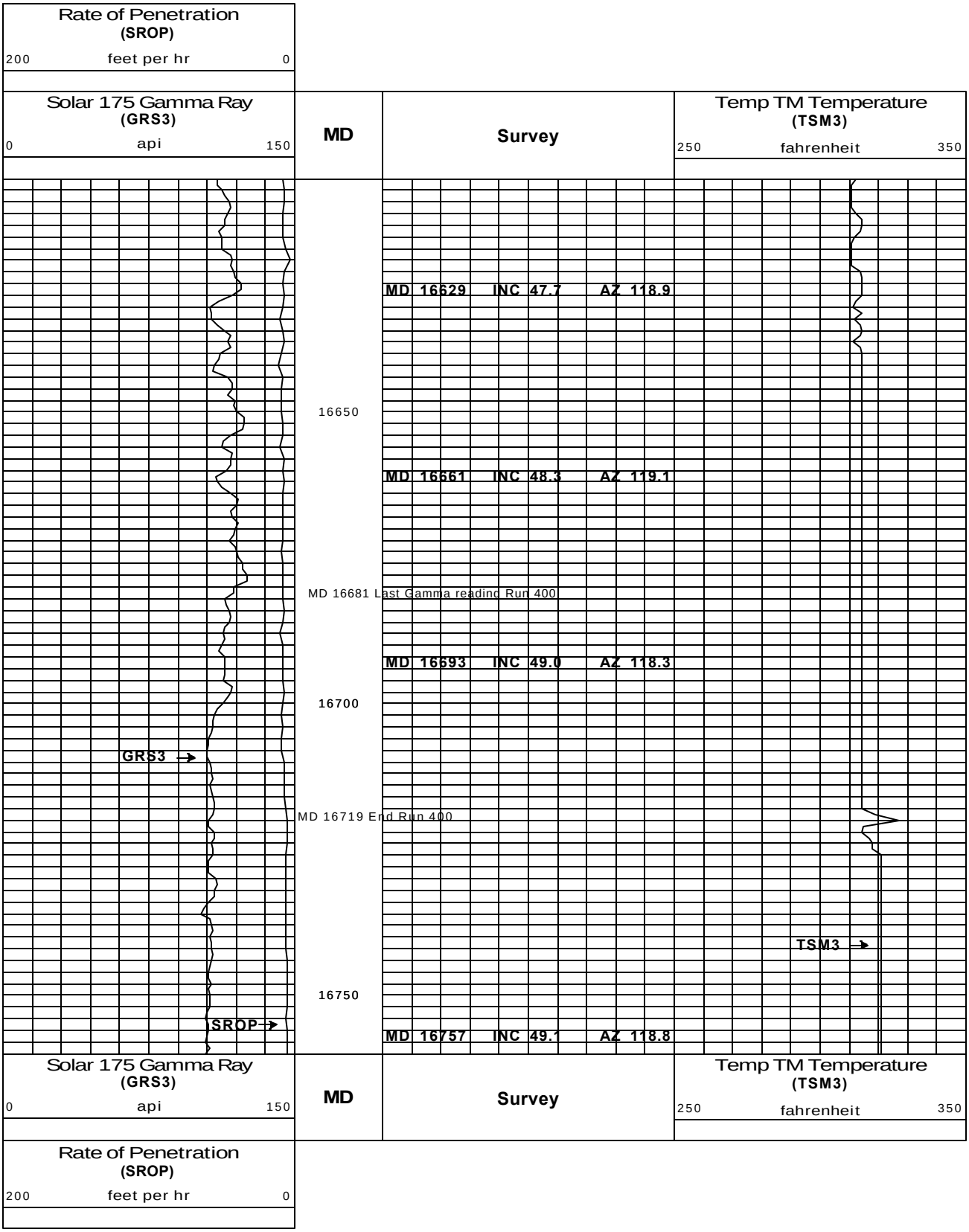
Sperry-Sun, A Halliburton Company

LWD Logs

- Gamma Ray MD log from 16610 to 16760. Last reading from Solar 175 Gamma at 16681. Depths below this point are from Solar 195 Gamma tool.

TS01-001-HT195: <Solar 195>

01 Aug 2001 – 14 Aug 2001



Mud Reports

OIL-BASED MUD REPORT No.94

Drilling Fluids

Date	07/28/2001	Depth/TVD	16343 ft / 15943 ft
Spud Date	04/26/2001	Mud Type	Versadril
Water Depth		Activity	Drilling

Operator : Louis Dreyfus
Report For : Royce Coats
Well Name : John Hancock Sr. A-1
Contractor : Helmerich & Payne #89
Report For : Rick Hawthorne

Field/Area : NE. Speaks
Description : A-532
Location : Lavaca County, Texas
Well No. : C3887

DRILLING ASSEMBLY		CASING	MUD VOLUME (bbl)	CIRCULATION DATA		
Bit Size 6.75 in PDC		Surface	Hole	Pump Make	G.D. PZ-11	G.D. PZ-11
Nozzles 4x12 / 1/32"		13.375in @2986ft (2986TVD)	934	Pump Size	6 X 11.in	6 X 11.in
Drill Pipe Size	Length	Intermediate	Active Pits	Pump Cap	3.837 gal/stk	3.837 gal/stk
5 in	8781 ft	9.625in @10751ft (10751TVD)	599	Pump stk/min	57@95%	
Drill Pipe Size	Length	Intermediate	Total Circulating Vol	Flow Rate	219 gal/min	
4 in	7075 ft	7.625in @14072ft (14072TVD)	1533	Bottoms Up	134 min	7636 stk
Drill Collar Size	Length	Production or Liner	In Storage	Total Circ Time	294 min	16758 stk
4.75 in	302 ft		975	Circulating Pressure	3550 psi	

MUD PROPERTIES

Sample From		PIT@03:00	
Flow Line Temp	°F	168	
Depth/TVD	ft	16343/15943	
Mud Weight	lb/gal	18@160°F	
Funnel Viscosity	s/qt	76	
Rheology Temp	°F	160	
R600/R300		139/79	
R200/R100		-/-	
R6/R3		-/-	
PV	cP	60	
YP	lb/100ft²	19	
10s/10m/30m Gel	lb/100ft²	5/17/24	
API Fluid Loss	cc/30 min	NA	
HTHP FL Temp	cc/30 min	2.8@400°F	
Cake API/HTHP	1/32"	-/3	
Unc Ret Solids	%Vol	40.5	
Correct Solids	%Vol	39.9	
Oil	%Vol	54	
Uncorr Water	%Vol	5.5	
Oil/Water Ratio		91/9	
Alkal (Pom)		2.8	
Cl Whole Mud	mg/l	13500	
Salt	%Wt	27.75	277500
Lime	lb/bbl	3.64	
E-Stability		1550	
Received Volume	bbl	2907	
Returned Volume	bbl	377	
Present Volume	bbl	2508	
Diff. Volume	bbl	-22	

PRODUCTS USED LAST 24 HRS

Products	Size	Amt
M-I BAR BULK	100 LB BG	175
VERSACOAT	1 GA BK	15
VERSATROL	50 LB BG	2
OIL DRI ABSORBANT	50 LB BG	2
MUD DIESEL	1 GA BK	780
SHRINK WRAP	1 EA	2
TRUCKING SERVICE	1 EA	80
ENGINEERING SERVICE	1 EA	1
QUICKLIME (KENOX)	50 LB BG	12

SOLIDS EQUIP	Size	Hrs
Derrick Shaker	14/14/14	0
Derrick Shaker	175/175/175	24
Derrick Shaker	175/175/175	24
D-Sander	212	0
D-Silter	8T4	0

MUD PROPERTY SPECIFICATIONS

Weight	Co. Orders
Viscosity	50-60
Filtrate	<4 cc HTHP

REMARKS AND TREATMENT

19 bbls Oil Added
11 bbls Water Added
13 bbls Products Added
43 bbls Mud Built
0 bbls Mud Received
0 bbls Mud Returned
2489 bbls Starting Volume
2508 bbls Present Volume
-24 bbls Mud Loss /24 hrs
-22 bbls Cumulative Mud Loss 8 bbls New Hole Volume

REMARKS

Drilled head rot. and slide to 16343'. Increased mud wt to 18.0 ppg due to high gas. Last survey @16278/15898'- 46.3 deg. BGRN gas - 30 to 110 units. Conn. gas 700 to 1570 units, and down time gas was 800 to 1075 units.

(corrected for side track well)
Oil Base Mud Cuttings
00 cu yds Daily Haul Off
112 cu yds Cumulative Haul Off

TIME DISTR Last 24 Hrs		MUD VOL ACCTG	(bbl)	SOLIDS ANALYSIS		MUD RHEOLOGY & HYDRAULICS	
Rig Up/Service		Oil Added	0	Salt Wt%	27.75	np/na Values	0.815/0.815
Drilling	24	Water Added	11	Salt Conc,lb/bbl	7.4	kp/ka (lb-s^n/100ft²)	0.522/0.522
Tripping		Mud Received	0	Adjusted Solid %	39.95	Bit Loss (psi / %)	407 / 11.5
Circulating		Dumped	0	Oil/Water Ratio	91/9	Bit HHP (hhp / HSI)	52 / 1.5
Chng Swvl Pkng		Shakers	18	Averge SG Solids	4.1	Bit Jet Vel (ft/s)	159
P/U Rot. Head		Evaporation	6	Low Gr %	2.6	Annular Vel DP (ft/min)	181.57
Slip Drill Line		Formation	0	Low Gr Wt, lb/bbl	23.26	Annular Vel DC (ft/min)	233.37
Dir Survey		Left in Hole	0	High Gr %	37.4	Crit Vel DP (ft/min)	293
Testing		Trip Loss	0	High Gr Wt lb/bbl	549.51	Crit Vel DC (ft/min)	365
Fishing		Other	0			ECD @ 16343 (lb/gal)	18.51

M-I ENGR / PHONE		RIG PHONE	WAREHOUSE PHONE	DAILY COST	CUMULATIVE COST
Corky Karcher	361 985-7424				
Cell Phone	830 708-5715	361 798-7111	361 358-0181	$ 4,128.66	$ 802,991.83

M-I Drilling Fluids

P.O. Box 42842
HOUSTON, TEXAS USA

361-886-3400

OIL MUD REPORT

REPORT NUMBER: 91

WELL NUMBER	State	County	Well	S/T
	TX		C3887	

Date	Depth
7/24/2001	15810 ft.
Spud Date	Present Activity
4/26/2001	TVD-15575 Drlg 8-15'/Hr

OPERATOR	CONTRACTOR	RIG NUMBER
Louis Dreyfus	Helmerich & Payne	89
OPERATOR REPRESENTATIVE	**CONTRACTOR REPRESENTATIVE**	**SECTION-TOWNSHIP-RANGE**
Royce Coats	Dale Molar	

WELL NAME AND NUMBER	FIELD OR BLOCK NUMBER	COUNTY, PARISH, OFFSHORE AREA	STATE / PROV
John Hancock Sr. A -1	NE Speaks	Lavaca	Texas

BIT DATA

No	Size	Type	Jets 32nd in				
	6.75 in	SEC. PDC	12	12	12	12	

DEVIATION

Angle	44.2 deg
Dir.	117.4
Depth	15660 ft

DRILLING ASSEMBLY

Drill Pipe	OD 5	ID 4.276	Length	6248	
Drill Pipe	OD 4	ID 3.34	Length	7075	
Drill Pipe	OD	ID	Length		
Drill Collar	OD 4	ID 2.56	Length	185	
Drill Collar	OD 4.75	ID 2.25	Length	302	

CASING DATA

Size	13.375	Top @	0	Set @	2986
Size	9.625	Top @	0	Set @	10751
Size	7.625	Top @	10428	Set @	14072
Size		Top @		Set @	
Size		Top @		Set @	

MUD VOLUME (bbls)

Hole	Pits
914	646

Total Circulating Volume	
1560	

In Storage	Weight
395	18 ppg
In Storage	Weight
500	18 ppg

Mud Type: VERSADRIL

CIRCULATION DATA

Pump 1 Make/Model	Garner Denver PZ - 11				
Size	6 x 11	% Eff	95	bbl/stk	0.0914
spm	61	bbl/min	5.58	gal/min	234
Pump 2 Make/Model	Garner Denver PZ - 11				
Size	6 x 11	% Eff	95	bbl/stk	0.0914
spm		bbl/min		gal/min	
Total bbl/min	5.58	Total gal/min	234		
Circulating Pressure	3,550 psi				
Ann.Vel. DP	194 ft/min	Ann.Vel. DC	249 ft/min		
Bottoms Up Time	123 min	Total Circ.Time	260 min		
Bottoms Up Stks	7,527	Total Circ.Stks	17,088		

MUD PROPERTIES

Sample From	PIT	
Time Sample Taken	3:00 am	
Flowline Temperature (deg F)	172	TVD
Depth (ft)	15810	15575
Mud Weight (ppg)	17.9	
Funnel Viscosity @ 163 deg F (sec/qt)	70	
Plastic Viscosity @ 160 deg F (cP)	59	
Yield Point (lbs/100 sq ft)	16	
Gel Strength (10 sec/10 min) (lbs/100 sq ft)	6 / 16	27 /
API Filtrate (ml/30 min)		
HTHP Filtrate @ 400 deg F (ml/30 min)	2.4	
Cake Thickness (API / HTHP) (32nd in)	/ 3	/
Solids Content (% by vol)	40	
Oil / Water Content (% by vol)	55 / 6	/
Solids Adjusted For Salt (% by vol)	39.3	
Alkalinity Mud (Pom)	1.8	
Lime Content (lb/bbl)	2.34	
Salt Content Water Phase (% by Wt)	23.84	
Oil / Water Ratio	90 / 10	/
Chlorides Whole Mud (mg/L)	11000	
Electrical Stability (volts)	1600	
Salt Content (PPM)	222,949	
New Hole (bbls)	8	
LCM (lb/bbl)		

MUD PROPERTY SPECIFICATIONS

Weight	17.9 ppg	Viscosity	60-70 sec/qt	Filtrate	< 4cc HTHP cc

RECOMMENDED TOUR TREATMENT

Oil Added:---------- 17 bbls
Water Added:---------- 8 bbls
Products Added:-------- 1 bbls
Mud Built:---------- 26 bbls
Mud Received:---------- 0 bbls
Mud Returned:---------- 0 bbls
Starting Volume:---2484 bbls
Present Volume :--2500 bbls
Mud Loss / 24 hrs:----- 12 bbls
Cumm. Mud Loss:--3495 bbls
Oilbase Mud Cuttings
Daily Haul Off: 0 cu yds Cumm. Haul Off: 352 cu yds

REMARKS

Drlg 8' to 15' / hr, Rolled storage tanks 4 hours

PRODUCT INVENTORY

7/24/2001
DAILY MUD COST: $2,707.22
CUMULATIVE COST: $71,207.96

	CLEAN UP	MUD DIESEL	ENGR. SERVICE	QUICKLIME(KENO)	VERSATHIN
Starting Inventory	47	3,675		325	5
Products Received		2,000			
Products Returned					
Used Last 24 Hours	1	383	1	5	5
Closing Inventory	46	5,292		320	
Cost Last 24 Hours	$66.80	$340.87	$650.00	$224.00	$1,266.30
Used (from IADC)					

BIT, RHEOLOGY, and HYDRAULICS

Mud Gradient, psi/ft	0.9308		
Hydrostatic Pressure, psi	14,716		
ECD, ppg			
Bit weight (WOB), lbs	10		
Bit RPM, rpm	70		
Back Ground Gas	50-95		
Connection Gas	300-425		
Gas Cut Mud	17.7		
Bottom Hole Temp	310		

METER READINGS

600	134	200	6
300	75	100	3

SOLIDS ANALYSIS

Low Gravity %	2.8
Low Gravity, ppb	25.1
Bentonite %	
Bentonite, ppb	
Drill Solids %	
Drill Solids, ppb	
Shale CEC, ppb	
D / B Ratio	
High Gravity %	36.8
High Gravity, ppb	540.4
Avg. SG	4.089

MUD CONSUMPTION

ADDITIONS	bbls
Oil / ABO	9
Fresh Water	12
Brine Water	
Mud Built	1
Mud Transfer	

LOSSES	bbls
Mud Lost	6
Mud Dumped	
Mud Transfer	
TOTAL	bbls
Gain / Loss	16

TIME DISTRIBUTION

RIG OPERATION	Hrs
Rig Up / Service	
Drilling	24.00
Circulating	
Tripping	
Surveys	
Logging	
Run Casing	
Testing	
Cementing	
Coring / Reaming	

TOUR SOLIDS CONTROL EQUIPMENT

DEVICE / MAKE	SIZE or SCREENS	Hrs
Derrick Shaker	3 x 14's	0
Derrick Shaker	3 x 175	24
Derrick Shaker	3 x 175	24
D-Sander		0
D-Silter		0
D-Gasser		24

ENGINEER	ENGINEER LOCATION	HOME PHONE	MOBILE PHONE	PAGER	WAREHOUSE LOCATION	WHSE PHONE
Joe Barnes	Corpus Christi	361-992-6470	361-442-3734	361-442-3734	Beeville	361-358-0181

M-I Drilling Fluids

P.O. Box 42842
HOUSTON, TEXAS USA

361-886-3400

OIL MUD REPORT

REPORT NUMBER: 89

Date	Depth
7/22/2001	15440 ft.
Spud Date	Present Activity
4/26/2001	(TVD 15310) Drlg

WELL NUMBER	State	County	Well	S/T
	TX		C3887	

OPERATOR	CONTRACTOR	RIG NUMBER
Louis Dreyfus	Helmerich & Payne	89
OPERATOR REPRESENTATIVE	**CONTRACTOR REPRESENTATIVE**	**SECTION-TOWNSHIP-RANGE**
Royce Coats	Dale Molar	

WELL NAME AND NUMBER	FIELD OR BLOCK NUMBER	COUNTY, PARISH, OFFSHORE AREA	STATE / PROV
John Hancock Sr. A -1	NE Speaks	Lavaca	Texas

BIT DATA

No	Size	Type	Jets: 32nd in				
	6.75 in	SEC. PDC	12	12	12	12	

DEVIATION

Angle	40 deg
Dir.	
Depth	15440 ft

DRILLING ASSEMBLY

Drill Pipe OD 5	in	ID 4.276	R	Length	7878
Drill Pipe OD 4		ID 3.34		Length	7075
Drill Pipe OD		ID		Length	
Drill Collar OD 4		ID 2.56		Length	185
Drill Collar OD 4.75		ID 2.25		Length	302

CASING DATA

Size 13.375	in	Top @ 0	ft	Set @	2986
Size 9.625		Top @ 0		Set @	10751
Size 7.625		Top @ 10428		Set @	14072
Size		Top @		Set @	
Size		Top @		Set @	

MUD VOLUME bbls

Hole	Pits
900	676

Total Circulating Volume: 1576

In Storage	Weight	
395	18	ppg
In Storage	Weight	
500	18	ppg

Mud Type: VERSADRIL

CIRCULATION DATA

Pump 1 Make/Model			Garner Denver PZ - 11		
Size	6 x 11	% Eff	95	bbl/stk	0.0914
spm	62	bbl/min	5.67	gal/min	238
Pump 2 Make/Model			Garner Denver PZ - 11		
Size	6 x 11	% Eff	95	bbl/stk	0.0914
spm		bbl/min		gal/min	
Total bbl/min	5.67			Total gal/min	238
Circulating Pressure	3,550	psi			
Ann.Vel. DP	197	ft/min	Ann.Vel. DC	253	ft/min
Bottoms Up Time	120	min	Total Circ.Time	278	min
Bottoms Up Stks	7,440		Total Circ.Stks	17,232	

MUD PROPERTIES

Sample From	PIT	
Time Sample Taken	3:00 am	
Flowline Temperature (deg F)	175	
Depth (ft)	15440	
Mud Weight (ppg)	17.9	
Funnel Viscosity @ 162 deg F (sec/qt)	68	
Plastic Viscosity @ 160 deg F (cP)	55	
Yield Point (lbs/100 sq ft)	13	
Gel Strength (10 sec/10 min) (lbs/100 sq ft)	5 / 16	25 /
API Filtrate (ml/30 min)		
HTHP Filtrate @ 400 deg F (ml/30 min)	3	
Cake Thickness (API / HTHP) (32nd in)	/ 3	/
Solids Content (% by vol)	41	
Oil / Water Content (% by vol)	53 / 6	/
Solids Adjusted For Salt (% by vol)	40.5	
Alkalinity Mud (Pom)	2.2	
Lime Content (lb/bbl)	2.86	
Salt Content Water Phase (% by Wt)	23.84	
Oil / Water Ratio	90 / 10	/
Chlorides Whole Mud (mg/L)	12000	
Electrical Stability (volts)	1500	
Salt Content (PPM)	238385	
New Hole (bbls)	6	
LCM (lb/bbl)		

MUD PROPERTY SPECIFICATIONS

Weight	17.9 ppg	Viscosity	60-70 sec/qt	Filtrate	< 4cc HTHP cc

RECOMMENDED TOUR TREATMENT

Oil Added: 12 bbls
Water Added: 2 bbls
Products Added: 3 bbls
Mud Built: 17 bbls
Mud Received: 0 bbls
Mud Returned: 0 bbls
Starting Volume: 2472 bbls
Present Volume : 2476 bbls
Mud Loss / 24 hrs: 14 bbls
Cumm. Mud Loss: 3486 bbls
Oilbase Mud Cuttings
Daily Haul Off: 16 cu yds Cumm. Haul Off: 352 cu yds

REMARKS

Drilling 7 to 10'/hr

PRODUCT INVENTORY

7/22/2001	MI BULK BAR	MUD DIESEL	ENGR. SERVICE	QUICKLIME(KENO)
DAILY MUD COST $1,796.46				
CUMULATIVE COST $66,013.59				
Starting Inventory	1,716	4,676		340
Products Received				
Products Returned				
Used Last 24 Hours	50	511	1	5
Closing Inventory	1,666	4,165		335
Cost Last 24 Hours	$362.00	$454.79	$650.00	$224.00
Used (from IADC)				

BIT, RHEOLOGY, and HYDRAULICS		SOLIDS ANALYSIS		MUD CONSUMPTION		TIME DISTRIBUTION		TOUR SOLIDS CONTROL EQUIPMENT		
Mud Gradient, psi/ft	0.9306	Low Gravity %	4.9	ADDITIONS	bbls	RIG OPERATION	Hrs	DEVICE / MAKE	SIZE of SCREENS	Hrs
Hydrostatic Pressure, psi	14,372	Low Gravity, ppb	44.2	Oil / ABO	12	Rig Up / Service				
ECD, ppg	18.37	Bentonite %		Fresh Water	2	Drilling	24.00	Derrick Shaker	3 x 14's	0
Bit weight (WOB), lbs	7	Bentonite, ppb		Brine Water		Circulating		Derrick Shaker	3 x 175	24
Bit RPM, rpm	110	Drill Solids %		Mud Built	3	Tripping		Derrick Shaker	3 x 175	24
		Drill Solids, ppb		Mud Transfer		Surveys		D-Sander		0
Back Ground Gas	130-800	Shale CEC, ppb				Logging		D-Silter		0
Connection Gas	25-55	D / B Ratio		LOSSES	bbls	Run Casing		D-Gasser		24
Bottom Hole Temp	300	High Gravity %	35.7	Mud Lost	14	Testing				
Water Meter	42739	High Gravity, ppb	524.3	Mud Dumped		Cementing				
METER READINGS		Avg. SG	4.008	Mud Transfer		Coring / Reaming				
600 123 200 6				TOTAL	bbls					
300 68 100 3				Gain / Loss	3					

ENGINEER	ENGINEER LOCATION	HOME PHONE	MOBILE PHONE	PAGER	WAREHOUSE LOCATION	WHSE PHONE
Joe Barnes	Corpus Christi	361-992-8470	361-442-3734	361-442-3734	Beeville	361-358-0181

M-I Drilling Fluids

P.O. Box 42842
HOUSTON, TEXAS USA

361-886-3400

OIL MUD REPORT

REPORT NUMBER: 88

WELL NUMBER	State	County	Well	S/T
	TX		C3887	

Date	Depth
7/21/2001	15285 ft.
Spud Date	**Present Activity**
4/26/2001	Drlg 15' / hr

OPERATOR	CONTRACTOR	RIG NUMBER
Louis Dreyfus	Helmerich & Payne	89
OPERATOR REPRESENTATIVE	**CONTRACTOR REPRESENTATIVE**	**SECTION-TOWNSHIP-RANGE**
Royce Coats	Dale Molar	

WELL NAME AND NUMBER	FIELD OR BLOCK NUMBER	COUNTY, PARISH, OFFSHORE AREA	STATE / PROV
John Hancock Sr. A -1	NE Speaks	Lavaca	Texas

BIT DATA

No	Size
	6.75 in

Type: SEC. PDC

Jets: 32nd in

12	12	12	12			

DEVIATION

Angle 37 deg
Dir.
Depth 15253 ft

DRILLING ASSEMBLY

Drill Pipe OD 5	ID 4.276	Length	7723
Drill Pipe OD 4	ID 3.34	Length	7075
Drill Pipe OD	ID	Length	
Drill Collar OD 4	ID 2.56	Length	185
Drill Collar OD 4.75	ID 2.25	Length	302

CASING DATA

Size 13.375	Top @	0	Set @	2986
Size 9.625	Top @	0	Set @	10751
Size 7.625	Top @	10428	Set @	14072
Size	Top @		Set @	
Size	Top @		Set @	

MUD VOLUME

Hole (bbls)	Pits (bbls)
894	668

Total Circulating Volume: 1562

In Storage	Weight
395	18 ppg
500	18 ppg

Mud Type: VERSADRIL

CIRCULATION DATA

Pump 1 Make/Model			Garner Denver PZ - 11		
Size 6 x 11		% Eff 95		bbl/stk 0.0914	
spm 61		bbl/min 5.58		gal/min 234	
Pump 2 Make/Model			Garner Denver PZ - 11		
Size 6 x 11		% Eff 95		bbl/stk 0.0914	
spm		bbl/min		gal/min	
Total bbl/min 5.58			Total gal/min 234		
Circulating Pressure 3,470 psi					
Ann.Vel. DP 194 ft/min			Ann.Vel. DC 249 ft/min		
Bottoms Up Time 121 min			Total Circ.Time 280 min		
Bottoms Up Stks 7,407			Total Circ.Stks 17,090		

MUD PROPERTIES

Sample From	PIT	
Time Sample Taken	3:30 am	
Flowline Temperature (deg F)	172	
Depth (ft)	15285	
Mud Weight (ppg)	17.9	
Funnel Viscosity @ 158 deg F (sec/qt)	70	
Plastic Viscosity @ 160 deg F (cP)	60	
Yield Point (lbs/100 sq ft)	15	
Gel Strength (10 sec/10 min) (lbs/100 sq ft)	6 / 18	/
API Filtrate (ml/30 min)		
HTHP Filtrate @ 400 deg F (ml/30 min)	2.6	
Cake Thickness (API / HTHP) (32nd in)	/ 3	/
Solids Content (% by vol)	40.5	
Oil / Water Content (% by vol)	54 / 5.5	/
Solids Adjusted For Salt (% by vol)	40	
Alkalinity Mud (Pom)	2.5	
Lime Content (lb/bbl)	3.12	
Salt Content Water Phase (% by Wt)	28.49	
Oil / Water Ratio	91 / 9	/
Chlorides Whole Mud (mg/L)	14000	
Electrical Stability (volts)	1530	
Salt Content (PPM)	284,878	
New Hole (bbls)	4	
LCM (lb/bbl)		

MUD PROPERTY SPECIFICATIONS

Weight 17.9 ppg	Viscosity 60-70 sec/qt	Filtrate < 4cc HTHP cc

RECOMMENDED TOUR TREATMENT

Oil Added:----------21 bbls
Water Added:----------12 bbls
Products Added:---------1 bbls
Mud Built:----------34 bbls
Mud Received:----------0 bbls
Mud Returned:----------0 bbls
Starting Volume:----2454 bbls
Present Volume :-- 2472 bbls
Mud Loss / 24 hrs:-----12 bbls
Cumm. Mud Loss:--3452 bbls
Oilbase Mud Cuttings
Daily Haul Off: 0 cu yds Cumm. Haul Off: 336 cu yds

REMARKS

TIH, Drilling, B/up thru seperator 330 max gas w/ 17.8 GCM, Back to shakers had 930 Max Gas w/ 17.7 GC Mud, Rolled Reserve tanks, Drilling at 10 to 20' / hr

PRODUCT INVENTORY

7/21/2001
DAILY MUD COST: $2,679.38
CUMULATIVE COST: $64,217.13

	VERSATROL	A. CHLORIDE (PW)	CLEAN UP	MUD DIESEL	ENGR. SERVICE	QUICKLIME(KENO)							
Starting Inventory	180	80	53	5,576		345							
Products Received													
Products Returned													
Used Last 24 Hours	3	10	3	900	1	5							
Closing Inventory	177	70	50	4,676		340							
Cost Last 24 Hours	$211.77	$434.60	$200.40	$801.00	$650.00	$224.00							
Used (from IADC)													

BIT, RHEOLOGY and HYDRAULICS

Mud Gradient, psi/ft	0.9308
Hydrostatic Pressure, psi	14,227
ECD, ppg	18.45
Bit weight (WOB), lbs	7
Bit RPM, rpm	
Back Ground Gas	45
Connection Gas	160
Bottom Hole Temp	295-305
Water Meter	42470

METER READINGS

600	135	200	6
300	75	100	3

SOLIDS ANALYSIS

Low Gravity %	3.7
Low Gravity, ppb	33.5
Bentonite %	
Bentonite, ppb	
Drill Solids %	
Drill Solids, ppb	
Shale CEC, ppb	
D / B Ratio	
High Gravity %	36.2
High Gravity, ppb	532.7
Avg. SG	4.053

MUD CONSUMPTION

ADDITIONS	bbls
Oil / ABO	21
Fresh Water	7
Brine Water	
Mud Built	1
Mud Transfer	

LOSSES	bbls
Mud Lost	12
Mud Dumped	
Mud Transfer	
TOTAL	bbls
Gain / Loss	17

TIME DISTRIBUTION

RIG OPERATION	Hrs
Rig Up / Service	0.50
Drilling	16.50
Circulating	
Tripping	5.00
Surveys	
Logging	
Run Casing	
Testing	2.00
Cementing	
Coring / Reaming	

TOUR SOLIDS CONTROL EQUIPMENT

DEVICE / MAKE	SIZE or SCREENS	Hrs
Derrick Shaker	3 x 14's	0
Derrick Shaker	3 x 175	24
Derrick Shaker	3 x 175	24
D-Sander		0
D-Silter		0
D-Gasser		24

ENGINEER	ENGINEER LOCATION	HOME PHONE	MOBILE PHONE	PAGER	WAREHOUSE LOCATION	WHSE PHONE
Joe Barnes	Corpus Christi	361-992-6470	361-442-3734	361-442-3734	Beeville	361-358-0181

OIL-BASED MUD REPORT No.84

M-I Drilling Fluids

Date	07/18/2001	Depth/TVD	14950 ft / 14928 ft
Spud Date	04/26/2001	Mud Type	Versadril
Water Depth		Activity	Drilling

Operator : Louis Dreyfus
Report For : Royce Coats
Well Name : John Hancock Sr. A-1
Contractor : Helmerich & Payne #89
Report For : Rick Hawthorne

Field/Area : NE. Speaks
Description : A-532
Location : Lavaca County, Texas
Well No. : C3887

DRILLING ASSEMBLY		CASING	MUD VOLUME (bbl)	CIRCULATION DATA		
Bit Size 6.75 in Sec. FM2831		Surface	Hole	Pump Make	G.D. PZ-11	G.D. PZ-11
Nozzles 4x12 / 1/32"		13.375in @2986ft (2986TVD)	881.4	Pump Size	6 X 11.in	6 X 11.in
Drill Pipe Size	Length	Intermediate	Active Pits	Pump Cap	3.837 gal/stk	3.837 gal/stk
5 in	7388 ft	9.625in @10751ft (10751TVD)	617.6	Pump stk/min		61@95%
Drill Pipe Size	Length	Intermediate	Total Circulating Vol	Flow Rate	234 gal/min	
4 in	7075 ft	7.625in @14072ft (14072TVD)	1499	Bottoms Up	120.4 min	7343 stk
Drill Collar Size	Length	Production or Liner	In Storage	Total Circ Time	269.1 min	16412 stk
4.75 in	302 ft		895	Circulating Pressure	3400 psi	

MUD PROPERTIES

Sample From		PIT@03:30	
Flow Line Temp	°F	173	
Depth/TVD	ft	14950/14928	
Mud Weight	lb/gal	17.9@162°F	
Funnel Viscosity	s/qt	64	
Rheology Temp	°F	160	
R600/R300		142/79	
R200/R100			
R6/R3		-/3	
PV	cP	63	
YP	lb/100ft²	16	
10s/10m/30m Gel	lb/100ft²	3/22/27	
API Fluid Loss	cc/30 min	NA	
HTHP FL Temp	cc/30 min	2.8@400°F	
Cake API/HTHP	1/32"	-/3	
Unc Ret Solids	%Vol	40	
Correct Solids	%Vol	39.44	
Oil	%Vol	54	
Uncorr Water	%Vol	6	
Oil/Water Ratio		90/10	
Alkal (Pom)		3.8	
Cl Whole Mud	mg/l	14000	
Salt	%Wt	26.75	267500
Lime	lb/bbl	4.94	
E-Stability		1360	
Received Volume	bbl	2907	
Returned Volume	bbl	377	
Present Volume	bbl	2394	
Diff. Volume	bbl	-136	

PRODUCTS USED LAST 24 HRS

Products	Size	Amt
VERSACOAT	1 GA BK	30
VERSATROL	50 LB BG	10
MUD DIESEL	1 GA BK	980
ENGINEERING SERVICE	1 EA	1
175 PMD PYRAMID SCREEI	1 EA	2
VERSAMUL	55 GA DM	1

SOLIDS EQUIP	Size	Hrs
Derrick Shaker	14/14/14	0
Derrick Shaker	175/175/175	24
Derrick Shaker	175/175/175	24
D-Sander	212	0
D-Silter	8T4	0

MUD PROPERTY SPECIFICATIONS

Weight	Co. Orders
Viscosity	50-60
Filtrate	<4 cc HTHP

REMARKS AND TREATMENT

23 bbls Oil Added
15 bbls Water Added
3 bbls Products Added
41 bbls Mud Built
0 bbls Mud Received
0 bbls Mud Returned
2380 bbls Starting Volume
2394 bbls Present Volume
-27 bbls Mud Loss /24 hrs
-3394 bbls Cumulative Mud Loss 6 bbls New Hole Volume

REMARKS

Drilled to 14950 ft. Last survey at 14909 was 25.7 deg. Bottom hole temperature 286 deg. F. Short tripped with no problems. No increase in Chlorides at bottoms up. BKGRN gas = 15 - 50 units. Trip gas = 50. Last connection gas = 60 units.

Oil Base Mud Cuttings
00 cu yds Daily Haul Off
304 cu yds Cumulative Haul Off

TIME DISTR Last 24 Hrs		MUD VOL ACCTG	(bbl)	SOLIDS ANALYSIS		MUD RHEOLOGY & HYDRAULICS	
Rig Up/Service	0.5	Oil Added	0	Salt Wt%	26.75	np/na Values	0.846/0.846
Drilling	22.5	Water Added	15	Salt Conc,lb/bbl	7.67	kp/ka (lb•s^n/100ft²)	0.431/0.431
Tripping	1	Mud Received	0	Adjusted Solid %	39.44	Bit Loss (psi / %)	462 / 13.6
Circulating		Dumped	0	Oil/Water Ratio	90/10	Bit HHP (hhp / HSI)	63 / 1.8
Chng Swvl Pkng		Shakers	16	Averge SG Solids	4.1	Bit Jet Vel (ft/s)	170
P/U Rot. Head		Evaporation	9	Low Gr %	2.7	Annular Vel DP (ft/min)	194
Slip Drill Line		Formation	0	Low Gr Wt, lb/bbl	24.49	Annular Vel DC (ft/min)	249.36
Dir Survey		Left in Hole	0	High Gr %	36.7	Crit Vel DP (ft/min)	282
Testing		Trip Loss	2	High Gr Wt lb/bbl	539.95	Crit Vel DC (ft/min)	356
Fishing		Other	0			ECD @ 14950 (lb/gal)	18.35

M-I ENGR / PHONE		RIG PHONE	WAREHOUSE PHONE	DAILY COST	CUMULATIVE COST
Corky Karcher	361 985-7424				
Cell Phone	830 708-5715	361 798-7111	361 358-0181	$ 5,378.77	$ 760,544.33

OIL-BASED MUD REPORT No.78

Date	7/12/2001	Depth/TVD	14202 ft / 14202 ft
Spud Date	4/26/2001	Mud Type	Versadril
Water Depth		Activity	Time Drilling

Operator : Louis Dreyfus
Report For : Dan Patton
Well Name : John Hancock Sr. A-1
Contractor : Helmerich & Payne #89
Report For : Rick Hawthorne

Field/Area : NE. Speaks
Description : A-532
Location : Lavaca County, Texas
Well No. : C3887

DRILLING ASSEMBLY		CASING	MUD VOLUME (bbl)	CIRCULATION DATA		
Bit Size 6.75 in Dowdco Diamond		Surface	Hole	Pump Make	G.D. PZ-11	G.D. PZ-11
Nozzles 1/32"		13.375in @2986ft (2986TVD)	854.2	Pump Size	6 X 11.in	6 X 11.in
Drill Pipe Size	Length	Intermediate	Active Pits	Pump Cap	3.837 gal/stk	3.837 gal/stk
5 in	6732 ft	9.625in @10751ft (10751TVD)	570.8	Pump stk/min		61@95%
Drill Pipe Size	Length	Intermedate	Total Circulating Vol	Flow Rate	234 gal/min	
4 in	7075 ft	7.625in @14072ft (14072TVD)	1425	Bottoms Up	117.7 min	7177 stk
Drill Collar Size	Length	Production or Liner	In Storage	Total Circ Time	255.8 min	15602 stk
4.75 in	210 ft		895	Circulating Pressure	3200 psi	

MUD PROPERTIES

Sample From		PIT@03:00	
Flow Line Temp	°F	172	
Depth/TVD	ft	14202/14202	
Mud Weight	lb/gal	17.9+@161°F	
Funnel Viscosity	s/qt	66	
Rheology Temp	°F	160	
R600/R300		108/60	
R200/R100		-/-	
R6/R3		-/3	
PV	cP	48	
YP	lb/100ft²	12	
10s/10m/30m Gel	lb/100ft²	4/18/24	
API Fluid Loss	cc/30 min	N/A	
HTHP FL Temp	cc/30 min	2.0@400°F	
Cake API/HTHP	1/32"	-/3	
Unc Ret Solids	%Vol	40.0	
Correct Solids	%Vol	39.4	
Oil	%Vol	54.0	
Uncorr Water	%Vol	6.0	
Oil/Water Ratio		90/10	
Alkal (Pom)		4.6	
Cl Whole Mud	mg/l	15000	
Salt	%Wt	28.12	281200
Lime	lb/bbl	5.98	
E-Stability		1160	
Received Volume	bbl	2907	
Returned Volume	bbl	377	
Present Volume	bbl	2320	
Diff. Volume	bbl	-210	

PRODUCTS USED LAST 24 HRS

Products	Size	Amt
M-I BAR BULK	100 LB BG	50
VERSACOAT	1 GA BK	15
OIL DRI ABSORBANT	50 LB BG	6
CLEAN-UP	5 GA CN	5
MUD DIESEL	1 GA BK	835
ENGINEERING SERVICE	1 EA	1
QUICKLIME (KENOX)	50 LB BG	65
SWA (MAGCO)	55 GA DM	1

SOLIDS EQUIP	Size	Hrs
Derrick Shaker	14/14/14	0
Derrick Shaker	175/175/175	23
Derrick Shaker	175/175/175	23
D-Sander	212	0
D-Silter	8T4	0

MUD PROPERTY SPECIFICATIONS

Weight	Co. Orders
Viscosity	50-60
Filtrate	<4 cc HTHP

REMARKS AND TREATMENT

20 bbls Oil Added
15 bbls Water Added
9 bbls Products Added
44 bbls Mud Built
0 bbls Mud Received
0 bbls Mud Returned
2303 bbls Starting Volume
2320 bbls Present Volume
-27 bbls Mud Loss /24 hrs
-3286 bbls Cumulative Mud Loss 1.5 bbls New Hole Volume

REMARKS

Building angle in 100% shale.

Oil Base Mud Cuttings
0 cu yds Daily Haul Off
272 cu yds Cumulative Haul Off

TIME DISTR Last 24 Hrs		MUD VOL ACCTG	(bbl)	SOLIDS ANALYSIS		MUD RHEOLOGY & HYDRAULICS	
Rig Up/Service	0.5	Oil Added	0	Salt Wt%	28.12	np/na Values	0.848/0.848
Drilling	22.0	Water Added	15	Salt Conc,lb/bbl	8.22	kp/ka (lb•s^n/100ft²)	0.323/0.323
Tripping		Mud Received	0	Adjusted Solid %	39.39	Bit Loss (psi / %)	361 / 11.3
Circulating	0.5	Dumped	0	Oil/Water Ratio	90/10	Bit HHP (hhp / HSI)	49 / 1.4
Chng Swvl Pkng	1.0	Shakers	18	Averge SG Solids	4.1	Bit Jet Vel (ft/s)	150
P/U Rot. Head		Evaporation	10	Low Gr %	2.3	Annular Vel DP (ft/min)	249.36
Slip Drill Line		Formation	0	Low Gr Wt, lb/bbl	20.83	Annular Vel DC (ft/min)	249.36
Dir Survey		Left in Hole	0	High Gr %	37.1	Crit Vel DP (ft/min)	280
Testing		Trip Loss	0	High Gr Wt lb/bbl	545.17	Crit Vel DC (ft/min)	280
Fishing		Other	0			ECD @ 14202 (lb/gal)	18.21

M-I ENGR / PHONE		RIG PHONE	WAREHOUSE PHONE	DAILY COST	CUMULATIVE COST
Mark Watson	361 358-4781				
Cell Phone	361 362-5940	361 798-7111	361 358-0181	$ 8,171.87	$ 727,774.27

Drilling Fluids

OIL-BASED MUD REPORT No.36

Date		Depth/TVD	
Spud Date		Mud Type	
Water Depth		Activity	

Operator : Louis Dreyfus
Report For : Royce Coats
Well Name : J. Hancock Sr A-1 ST
Contractor : Helmerich & Payne #89
Report For : Dale Moler

Field/Area : NE Speaks
Description : A-532
Location : Lavaca County, Texas
Well No. : C3957

DRILLING ASSEMBLY		CASING	MUD VOLUME (bbl)	CIRCULATION DATA		
Bit Size 6.75 in Security FM2831		Surface	Hole	Pump Make	G.D. PZ-11	G.D. PZ-11
Nozzles 4x12 / 1/32"		9.625in @10751ft (10751TVD)	987.9	Pump Size	6 X 11.in	6 X 11.in
Drill Pipe Size	Length	Intermediate	Active Pits	Pump Cap	3.837 gal/stk	3.837 gal/stk
5 in	10210 ft	7.625in @14072ft (14072TVD)	650.1	Pump stk/min		25@95%
Drill Pipe Size	Length	Intermediate	Total Circulating Vol	Flow Rate	96 gal/min	
4 in	7075 ft		1638	Bottoms Up	318.1 min	7954 stk
Drill Collar Size	Length	Production or Liner	In Storage	Total Circ Time	716.6 min	17916 stk
4.75 in	307 ft		880	Circulating Pressure	970 psi	

MUD PROPERTIES

Sample From		PIT@24:00	
Flow Line Temp	°F	153	
Depth/TVD	ft	17777/16904	
Mud Weight	lb/gal	19.0@144°F	
Funnel Viscosity	s/qt	97	
Rheology Temp	°F	160	
R600/R300		148/79	
R200/R100		-/-	
R6/R3		-/3	
PV	cP	69	
YP	lb/100ft²	10	
10s/10m/30m Gel	lb/100ft²	3/13/20	
API Fluid Loss	cc/30 min	NA	
HTHP FL Temp	cc/30 min	2.6@400°F	
Cake API/HTHP	1/32"	-/3	
Unc Ret Solids	%Vol	43	
Correct Solids	%Vol	42.6	
Oil	%Vol	52	
Uncorr Water	%Vol	5	
Oil/Water Ratio		91/9	
Alkal (Pom)		0.8	
Cl Whole Mud	mg/l	10500	
Salt	%Wt	24.73	247300
Lime	lb/bbl	1.04	
E-Stability		960	
Received Volume	bbl	2747	
Returned Volume	bbl	478	
Present Volume	bbl	2518	
Diff. Volume	bbl	+249	

PRODUCTS USED LAST 24 HRS

Products	Size	Amt
M-I BAR BULK	100 LB BG	500
ASPHASOL SUPREME	50 LB BG	15
VERSACOAT	1 GA BK	10
VERSATROL	50 LB BG	17
OIL DRI ABSORBANT	50 LB BG	12
CLEAN-UP	5 GA CN	10
MUD DIESEL	1 GA BK	1128
SAFE-CARB FINE	50 LB BG	18
SAFE-CARB MEDIUM	50 LB BG	36
SAFE-CARB COARSE	50 LB BG	60
MIX II FINE	25 LB BG	15
MIX II MED	25 LB BG	25
MIX II COARSE	25 LB BG	41
G-SEAL	50 LB BG	34
ENGINEERING SERVICE	1 EA	1

SOLIDS EQUIP	Size	Hrs
Derrick Shaker	14/14/14	24
Derrick Shaker	175/175/175	0
Derrick Shaker	175/175/175	0

MUD PROPERTY SPECIFICATIONS

Weight	Co. Orders
Viscosity	50-60
Filtrate	<4 cc HTHP

REMARKS AND TREATMENT

27 bbls Oil Added
4 bbls Water Added
50 bbls Products Added
81 bbls Mud Built
0 bbls Mud Received
0 bbls Mud Returned
2473 bbls Starting Volume
2518 bbls Present Volume
-36 bbls Mud Loss /24 hrs
1170 bbls Cumulative Mud Loss 0 bbls New Hole Volume

REMARKS

Circulating well monitoring gas and losses. Gradually increasing and maintaining 18.9/19.0 ppg. B/up #1. 3/4% inc. in retort water, Cl = 177K. #2. 1 % inc. in retort water, Cl = 238K
Built 120 bbl of lcm (31 PPB) for sweeps and volume. Mud sample is screened before testing due to lcm. LCM concentration in active is 22.2 ppb. ECD with present rheology and 35 stks is 19.3 ppg / 25 stks, see below (19.22).
Oil Base Mud Cuttings
16 cu yds Daily Haul Off
224 cu yds Cumulative Haul Off

TIME DISTR Last 24 Hrs		MUD VOL ACCTG	(bbl)	SOLIDS ANALYSIS		MUD RHEOLOGY & HYDRAULICS	
Rig Up/Service		Oil Added	0	Salt Wt%	24.73	np/na Values	0.906/0.906
Drilling		Water Added	4	Salt Conc,lb/bbl	5.75	kp/ka (lb•s^n/100ft²)	0.297/0.297
Tripping		Mud Received	0	Adjusted Solid %	42.59	Bit Loss (psi / %)	83 / 8.5
Circulating		Shakers	0	Oil/Water Ratio	91/9	Bit HHP (hhp / HSI)	5 / .1
Slip & Cut		Evaporation	7	Averge SG Solids	4.1	Bit Jet Vel (ft/s)	70
Chng Rot. Head		Formation	29	Low Gr %	1.4	Annular Vel DP (ft/min)	79.59
Rig Repair		Left in Hole	0	Low Gr Wt, lb/bbl	13.07	Annular Vel DC (ft/min)	102.3
Wireline Logs		Trip Loss	0	High Gr %	41.2	Crit Vel DP (ft/min)	244
Testing		Other	0	High Gr Wt lb/bbl	604.67	Crit Vel DC (ft/min)	318
Direction Work		Dumped	0			ECD @ 17777 (lb/gal)	19.22

Corky Karcher	361 985-7424				
Cell Phone	830 708-5715	361 798-7111	361 358-0181	$ 25,550.90	$ 230,321.08

Drilling Fluids

OIL-BASED MUD REPORT No.35

Date	08/12/2001	Depth/TVD	17777 ft / 16904 ft
Spud Date	07/09/2001	Mud Type	Versadril
Water Depth		Activity	Circulating Hole

Operator : Louis Dreyfus
Report For : Royce Coats
Well Name : J. Hancock Sr A-1 ST
Contractor : Helmerich & Payne #89
Report For : Dale Moler

Field/Area : NE Speaks
Description : A-532
Location : Lavaca County, Texas
Well No. : C3957

DRILLING ASSEMBLY		CASING	MUD VOLUME (bbl)	CIRCULATION DATA		
Bit Size 6.75 in Security FM2831		Surface	Hole	Pump Make	G.D. PZ-11	G.D. PZ-11
Nozzles 4x12 / 1/32"		9.625in @10751ft (10751TVD)	987.9	Pump Size	6 X 11.in	6 X 11.in
Drill Pipe Size	Length	Intermediate	Active Pits	Pump Cap	3.837 gal/stk	3.837 gal/stk
5 in	10210 ft	7.625in @14072ft (14072TVD)	605.1	Pump stk/min		44@95%
Drill Pipe Size	Length	Intermediate	Total Circulating Vol	Flow Rate		169 gal/min
4 in	7075 ft		1593	Bottoms Up	180.7 min	7952 stk
Drill Collar Size	Length	Production or Liner	In Storage	Total Circ Time	395.9 min	17419 stk
4.75 in	307 ft		880	Circulating Pressure	2340 psi	

MUD PROPERTIES

Sample From		PIT@24:00	
Flow Line Temp	°F	152	
Depth/TVD	ft	17777/16904	
Mud Weight	lb/gal	18.9@144°F	
Funnel Viscosity	s/qt	92	
Rheology Temp	°F	160	
R600/R300		144/77	
R200/R100		-/-	
R6/R3		-/3	
PV	cP	67	
YP	lb/100ft²	10	
10s/10m/30m Gel	lb/100ft²	4/17/23	
API Fluid Loss	cc/30 min	NA	
HTHP FL Temp	cc/30 min	2.2@400°F	
Cake API/HTHP	1/32"	-/3	
Unc Ret Solids	%Vol	43	
Correct Solids	%Vol	42.6	
Oil	%Vol	52	
Uncorr Water	%Vol	5	
Oil/Water Ratio		91/9	
Alkal (Pom)		1.0	
Cl Whole Mud	mg/l	11000	
Salt	%Wt	25.61	256100
Lime	lb/bbl	1.3	
E-Stability		1210	
Received Volume	bbl	2747	
Returned Volume	bbl	478	
Present Volume	bbl	2473	
Diff. Volume	bbl	+204	

PRODUCTS USED LAST 24 HRS

Products	Size	Amt
M-I BAR BULK	100 LB BG	320
VERSACOAT	1 GA BK	10
VERSATROL	50 LB BG	5
CLEAN-UP	5 GA CN	3
MUD DIESEL	1 GA BK	882
SAFE-CARB FINE	50 LB BG	90
MIX II FINE	25 LB BG	94
G-SEAL	50 LB BG	10
SHRINK WRAP	1 EA	3
TRUCKING SERVICE	1 EA	755
ENGINEERING SERVICE	1 EA	1
VERSAGEL HT	25 KG BG	3
QUICKLIME (KENOX)	50 LB BG	20
BEADS COARSE	50 LB BG	10

SOLIDS EQUIP	Size	Hrs
Derrick Shaker	14/14/14	24
Derrick Shaker	175/175/175	0
Derrick Shaker	175/175/175	0

MUD PROPERTY SPECIFICATIONS

Weight	Co. Orders
Viscosity	50-60
Filtrate	<4 cc HTHP

REMARKS AND TREATMENT

21 bbls Oil Added
7 bbls Water Added
33 bbls Products Added
61 bbls Mud Built
0 bbls Mud Received
0 bbls Mud Returned
2551 bbls Starting Volume
2473 bbls Present Volume
-139 bbls Mud Loss /24 hrs
1134 bbls Cumulative Mud Loss 0 bbls New Hole Volume

REMARKS

Gained 100 plus bbls from well while attempting to POOH. Circ. GCMud, flaring to 30 ft. Continued to loose mud. Pumped 40 ppb CarbF/MixF sweep. incorporating into system (14 mesh). Continually pumping 22.5 ppb sweeps while circ GCmud & maintaining 18.8 ppg mud. Inc wt to 18.9. Spot beads and attempt POOH. Well flowed. Circ and adding lcm to system. Transfered 110 bbls of reserve mud to active. Noted a 1% inc. in retort water on bottoms up.
Oil Base Mud Cuttings
16 cu yds Daily Haul Off
208 cu yds Cumulative Haul Off

TIME DISTR Last 24 Hrs | MUD VOL ACCTG (bbl) | SOLIDS ANALYSIS | MUD RHEOLOGY & HYDRAULICS

OIL-BASED MUD REPORT No.31

Date	8/8/2001	Depth/TVD	17415 ft / 16662 ft
Spud Date	7/9/2001	Mud Type	Versadril
Water Depth		Activity	Drilling

Operator : Louis Dreyfus
Report For : Royce Coats
Well Name : J. Hancock Sr A-1 ST
Contractor : Helmerich & Payne #89
Report For : Dale Moler

Field/Area : NE Speaks
Description : A-532
Location : Lavaca County, Texas
Well No. : C3957

DRILLING ASSEMBLY		CASING	MUD VOLUME (bbl)	CIRCULATION DATA		
Bit Size 6.75 in Security FM2831		Surface	Hole	Pump Make	G.D. PZ-11	G.D. PZ-11
Nozzles 4x12 / 1/32"		9.625in @10751ft (10751TVD)	974.2	Pump Size	6 X 11.in	6 X 11.in
Drill Pipe Size	Length	Intermediate	Active Pits	Pump Cap	3.837 gal/stk	3.837 gal/stk
5 in	9848 ft	7.625in @14072ft (14072TVD)	575.8	Pump stk/min		60@95%
Drill Pipe Size	Length	Intermediate	Total Circulating Vol	Flow Rate		230 gal/min
4 in	7075 ft		1550	Bottoms Up		131.5 min 7888 stk
Drill Collar Size	Length	Production or Liner	In Storage	Total Circ Time		283 min 16983 stk
4.75 in	307 ft		990	Circulating Pressure		3150 psi

MUD PROPERTIES

Sample From		PIT@03:00	
Flow Line Temp	°F	159	
Depth/TVD	ft	17415/16662	
Mud Weight	lb/gal	18.5+@149°F	
Funnel Viscosity	s/qt	70	
Rheology Temp	°F	160	
R600/R300		111/60	
R200/R100		-/-	
R6/R3		-/2	
PV	cP	51	
YP	lb/100ft²	9	
10s/10m/30m Gel	lb/100ft²	3/12/17	
API Fluid Loss	cc/30 min	N/A	
HTHP FL Temp	cc/30 min	2.4@400°F	
Cake API/HTHP	1/32"	-/3	
Unc Ret Solids	%Vol	42.0	
Correct Solids	%Vol	41.5	
Oil	%Vol	52.0	
Uncorr Water	%Vol	6.0	
Oil/Water Ratio		90/10	
Alkal (Pom)		2.5	
Cl Whole Mud	mg/l	12500	
Salt	%Wt	24.59	245900
Lime	lb/bbl	3.25	
E-Stability		1205	
Received Volume	bbl	2747	
Returned Volume	bbl	478	
Present Volume	bbl	2540	
Diff. Volume	bbl	+271	

PRODUCTS USED LAST 24 HRS

Products	Size	Amt
M-I BAR BULK	100 LB BG	250
CLEAN-UP	5 GA CN	12
MUD DIESEL	1 GA BK	780
ENGINEERING SERVICE	1 EA	1
QUICKLIME (KENOX)	50 LB BG	64

SOLIDS EQUIP	Size	Hrs
Derrick Shaker	14/14/14	0
Derrick Shaker	175/175/175	24
Derrick Shaker	175/175/175	24

MUD PROPERTY SPECIFICATIONS

Weight	Co. Orders
Viscosity	50-60
Filtrate	<4 cc HTHP

REMARKS AND TREATMENT

19 bbls Oil Added
8 bbls Water Added
22 bbls Products Added
49 bbls Mud Built
0 bbls Mud Received
0 bbls Mud Returned
2521 bbls Starting Volume
2540 bbls Present Volume
-30 bbls Mud Loss /24 hrs
-784 bbls Cumulative Mud Loss 9 bbls New Hole Volume

REMARKS

MWD & LWD quit working. Continue drilling. Bottoms up from break @ 17,323'-17,337' had 120 gas units. Circulate connection @ 17,393'; 2,250 gas units and 18.1 #/gal mud cut down flowline then 450 units after mud/gas separator with 6' flare.

Oil Base Mud Cuttings
0 cu yds Daily Haul Off
176 cu yds Cumulative Haul Off

TIME DISTR Last 24 Hrs		MUD VOL ACCTG	(bbl)	SOLIDS ANALYSIS		MUD RHEOLOGY & HYDRAULICS	
Rig Up/Service	0.5	Oil Added	0	Salt Wt%	24.59	np/na Values	0.888/0.888
Drilling	20.5	Water Added	8	Salt Conc,lb/bbl	6.85	kp/ka (lb•s^n/100ft²)	0.253/0.253
Tripping		Mud Received	0	Adjusted Solid %	41.51	Bit Loss (psi / %)	462 / 14.7
Circulating	3.0	Dumped	0	Oil/Water Ratio	90/10	Bit HHP (hhp / HSI)	62 / 1.7
P/U Trip Nipple		Shakers	14	Averge SG Solids	4.1	Bit Jet Vel (ft/s)	167
P/U Rot. Head		Evaporation	8	Low Gr %	2.1	Annular Vel DP (ft/min)	190.69
Running Casing		Formation	0	Low Gr Wt, lb/bbl	18.68	Annular Vel DC (ft/min)	245.1
Wireline Logs		Left in Hole	0	High Gr %	39.5	Crit Vel DP (ft/min)	201
Testing		Trip Loss	0	High Gr Wt lb/bbl	579.76	Crit Vel DC (ft/min)	259
Direction Work		Other	8			ECD @ 17415 (lb/gal)	18.88

M-I ENGR / PHONE		RIG PHONE	WAREHOUSE PHONE	DAILY COST	CUMULATIVE COST
Mark Watson	361 358-4781				
Cell Phone	361 362-5940	361 798-7111	361 358-0181	$ 7,236.16	$ 143,444.55

OIL-BASED MUD REPORT No.30

Date	8/7/2001	Depth/TVD	17210 ft / 16525 ft
Spud Date	7/9/2001	Mud Type	Versadril
Water Depth		Activity	Drilling

Operator : Louis Dreyfus
Report For : Royce Coats
Well Name : J. Hancock Sr A-1 ST
Contractor : Helmerich & Payne #89
Report For : Dale Moler

Field/Area : NE Speaks
Description : A-532
Location : Lavaca County, Texas
Well No. : C3957

DRILLING ASSEMBLY		CASING	MUD VOLUME (bbl)	CIRCULATION DATA		
Bit Size 6.75 in Security FM2831		Surface	Hole	Pump Make	G.D. PZ-11	G.D. PZ-11
Nozzles 4x12 / 1/32"		9.625in @10751ft (10751TVD)	966.5	Pump Size	6 X 11.in	6 X 11.in
Drill Pipe Size	Length	Intermediate	Active Pits	Pump Cap	3.837 gal/stk	3.837 gal/stk
5 in	9643 ft	7.625in @14072ft (14072TVD)	564.5	Pump stk/min		60@95%
Drill Pipe Size	Length	Intermediate	Total Circulating Vol	Flow Rate	230 gal/min	
4 in	7075 ft		1531	Bottoms Up	130.7 min	7843 stk
Drill Collar Size	Length	Production or Liner	In Storage	Total Circ Time	279.6 min	16774 stk
4.75 in	307 ft		990	Circulating Pressure	3450 psi	

MUD PROPERTIES

Sample From		PIT@03:00	
Flow Line Temp	°F	152	
Depth/TVD	ft	17210/16525	
Mud Weight	lb/gal	18.6@144°F	
Funnel Viscosity	s/qt	74	
Rheology Temp	°F	160	
R600/R300		107/58	
R200/R100		-/-	
R6/R3		-/2	
PV	cP	49	
YP	lb/100ft²	9	
10s/10m/30m Gel	lb/100ft²	3/12/17	
API Fluid Loss	cc/30 min	N/A	
HTHP FL Temp	cc/30 min	2.0@400°F	
Cake API/HTHP	1/32"	-/3	
Unc Ret Solids	%Vol	42.5	
Correct Solids	%Vol	42.0	
Oil	%Vol	52.0	
Uncorr Water	%Vol	5.5	
Oil/Water Ratio		90/10	
Alkal (Pom)		2.2	
Cl Whole Mud	mg/l	12500	
Salt	%Wt	26.24	262400
Lime	lb/bbl	2.86	
E-Stability		1100	
Received Volume	bbl	2747	
Returned Volume	bbl	478	
Present Volume	bbl	2521	
Diff. Volume	bbl	+252	

PRODUCTS USED LAST 24 HRS

Products	Size	Amt
ENGINEERING SERVICE	1 EA	1
175 PMD PYRAMID SCREEN	1 EA	3

SOLIDS EQUIP	Size	Hrs
Derrick Shaker	14/14/14	2
Derrick Shaker	175/175/175	10
Derrick Shaker	175/175/175	10

MUD PROPERTY SPECIFICATIONS

Weight	Co. Orders
Viscosity	50-60
Filtrate	<4 cc HTHP

REMARKS AND TREATMENT

0 bbls Oil Added
16 bbls Water Added
0 bbls Products Added
16 bbls Mud Built
0 bbls Mud Received
0 bbls Mud Returned
2520 bbls Starting Volume
2521 bbls Present Volume
-15 bbls Mud Loss /24 hrs
-754 bbls Cumulative Mud Loss 2 bbls New Hole Volume

REMARKS

Bottoms up from trip had maximum gas of 260 units after mud/gas separator with 18.1 #/gal mud cut and a 15' flare. Maximum connection gas of 395 units with a 18.0 #/gal mud cut; back ground gas of 25-50 units. Last survey @ 17,141' MD/ 16,479' TVD was 48.1 degrees.

Oil Base Mud Cuttings
16 cu yds Daily Haul Off
176 cu yds Cumulative Haul Off

TIME DISTR Last 24 Hrs		MUD VOL ACCTG	(bbl)	SOLIDS ANALYSIS		MUD RHEOLOGY & HYDRAULICS	
Rig Up/Service	0.5	Oil Added	0	Salt Wt%	26.24	np/na Values	0.883/0.883
Drilling	5.0	Water Added	16	Salt Conc,lb/bbl	6.85	kp/ka (lb•s^n/100ft²)	0.250/0.250
Tripping	16.0	Mud Received	0	Adjusted Solid %	42.	Bit Loss (psi / %)	464 / 13.5
Circulating	2.0	Dumped	0	Oil/Water Ratio	90/10	Bit HHP (hhp / HSI)	62 / 1.7
P/U Trip Nipple	0.5	Shakers	4	Averge SG Solids	4.1	Bit Jet Vel (ft/s)	167
P/U Rot. Head	0.5	Evaporation	0	Low Gr %	2.7	Annular Vel DP (ft/min)	190.69
Chk CrownOmati	1	Formation	0	Low Gr Wt, lb/bbl	24.18	Annular Vel DC (ft/min)	245.1
Dir. Work / Log	3.0	Left in Hole	0	High Gr %	39.3	Crit Vel DP (ft/min)	196
Chng Spinners	2.0	Trip Loss	11	High Gr Wt lb/bbl	578.12	Crit Vel DC (ft/min)	252
Chng Dir. Tools	2.0	Other	0			ECD @ 17210 (lb/gal)	18.96

M-I ENGR / PHONE		RIG PHONE	WAREHOUSE PHONE	DAILY COST	CUMULATIVE COST
Mark Watson	361 358-4781				
Cell Phone	361 362-5940	361 798-7111	361 358-0181	$ 1,389.88	$ 136,208.39

OIL-BASED MUD REPORT No.29

Date	8/6/2001	Depth/TVD	17170 ft / 16499 ft
Spud Date	7/9/2001	Mud Type	Versadril
Water Depth		Activity	Slug for Trip

Operator : Louis Dreyfus
Field/Area : NE Speaks
Report For : Dan Patton
Description : A-532
Well Name : J. Hancock Sr A-1 ST
Location : Lavaca County, Texas
Contractor : Helmerich & Payne #89
Well No. : C3957
Report For : Dale Moler

DRILLING ASSEMBLY		CASING	MUD VOLUME (bbl)
Bit Size 6.75 in Security FM2831		Surface	Hole
Nozzles 4x12 / 1/32"		9.625in @10751ft (10751TVD)	965
Drill Pipe Size	Length	Intermediate	Active Pits
5 in	9602 ft	7.625in @14072ft (14072TVD)	565
Drill Pipe Size	Length	Intermediate	Total Circulating Vol
4 in	7075 ft		1530
Drill Collar Size	Length	Production or Liner	In Storage
4.75 in	308 ft		990

CIRCULATION DATA		
Pump Make	G.D. PZ-11	G.D. PZ-11
Pump Size	6 X 11.in	6 X 11.in
Pump Cap	3.837 gal/stk	3.837 gal/stk
Pump stk/min		58@95%
Flow Rate	223 gal/min	
Bottoms Up	134.7 min	7811 stk
Total Circ Time	288.2 min	16713 stk
Circulating Pressure	3450 psi	

MUD PROPERTIES

Sample From		PIT@18:30	
Flow Line Temp	°F	161	
Depth/TVD	ft	17170/16499	
Mud Weight	lb/gal	18.5@152°F	
Funnel Viscosity	s/qt	64	
Rheology Temp	°F	160	
R600/R300		110/60	
R200/R100		-/-	
R6/R3		-/2	
PV	cP	50	
YP	lb/100ft²	10	
10s/10m/30m Gel	lb/100ft²	3/10/16	
API Fluid Loss	cc/30 min	N/A	
HTHP FL Temp	cc/30 min	2.0@400°F	
Cake API/HTHP	1/32"	-/3	
Unc Ret Solids	%Vol	42.0	
Correct Solids	%Vol	41.5	
Oil	%Vol	52.5	
Uncorr Water	%Vol	5.5	
Oil/Water Ratio		91/9	
Alkal (Pom)		1.6	
Cl Whole Mud	mg/l	12500	
Salt	%Wt	26.24	262400
Lime	lb/bbl	2.08	
E-Stability		1050	
Received Volume	bbl	2747	
Returned Volume	bbl	478	
Present Volume	bbl	2520	
Diff. Volume	bbl	+251	

PRODUCTS USED LAST 24 HRS

Products	Size	Amt
M-I BAR BULK	100 LB BG	152
VERSACOAT	1 GA BK	5
OIL DRI ABSORBANT	50 LB BG	4
CLEAN-UP	5 GA CN	1
MUD DIESEL	1 GA BK	1130
TRUCKING SERVICE	1 EA	902
ENGINEERING SERVICE	1 EA	1
QUICKLIME (KENOX)	50 LB BG	25

SOLIDS EQUIP	Size	Hrs
Derrick Shaker	14/14/14	0
Derrick Shaker	175/175/175	14.5
Derrick Shaker	175/175/175	14.5

MUD PROPERTY SPECIFICATIONS

Weight	Co. Orders
Viscosity	50-60
Filtrate	<4 cc HTHP

REMARKS AND TREATMENT

27 bbls Oil Added
13 bbls Water Added
12 bbls Products Added
52 bbls Mud Built
0 bbls Mud Received
0 bbls Mud Returned
2488 bbls Starting Volume
2520 bbls Present Volume
-20 bbls Mud Loss /24 hrs
-739 bbls Cumulative Mud Loss 5 bbls New Hole Volume

REMARKS

MWD quit working. Pumped 2 / 5 bbl diesel sweeps but tool wouldn't work. Drill to 17,170' then slug with 70 bbl 21.25 #/gal slug and TOH to change out MWD tool. Maximum connection gas was 800 units with 18.0 #/gal mud cut, maximum down time gas was 700 units with 18.1 #/gal mud cut, and average background gas of 60 units.

Oil Base Mud Cuttings
16 cu yds Daily Haul Off
160 cu yds Cumulative Haul Off

TIME DISTR Last 24 Hrs		MUD VOL ACCTG	(bbl)
Rig Up/Service	0.5	Oil Added	0
Drilling	14.5	Water Added	13
Tripping		Mud Received	0
Circulating		Dumped	0
P/U Trip Nipple		Shakers	13
P/U Rot. Head		Evaporation	7
Pump Repair	0.5	Formation	0
Direction Work		Left in Hole	0
Testing		Trip Loss	0
Wireline Logs		Other	0

SOLIDS ANALYSIS		MUD RHEOLOGY & HYDRAULICS	
Salt Wt%	26.24	np/na Values	0.874/0.874
Salt Conc,lb/bbl	6.85	kp/ka (lb*s^n/100ft²)	0.274/0.274
Adjusted Solid %	41.5	Bit Loss (psi / %)	434 / 12.6
Oil/Water Ratio	91/9	Bit HHP (hhp / HSI)	56 / 1.6
Averge SG Solids	4.1	Bit Jet Vel (ft/s)	162
Low Gr %	2.4	Annular Vel DP (ft/min)	184.88
Low Gr Wt, lb/bbl	21.45	Annular Vel DC (ft/min)	237.64
High Gr %	39.1	Crit Vel DP (ft/min)	206
High Gr Wt lb/bbl	575.17	Crit Vel DC (ft/min)	264
		ECD @ 17170 (lb/gal)	18.87

M-I ENGR / PHONE		RIG PHONE	WAREHOUSE PHONE	DAILY COST	CUMULATIVE COST
Mark Watson	361 358-4781				
Cell Phone	361 362-5940	361 798-7111	361 358-0181	$ 5,671.88	$ 134,818.51

OIL-BASED MUD REPORT No.28

Date	8/5/2001	Depth/TVD	17053 ft / 16420 ft
Spud Date	7/9/2001	Mud Type	Versadril
Water Depth		Activity	Drilling

Operator : Louis Dreyfus
Report For : Dan Patton
Well Name : J. Hancock Sr A-1 ST
Contractor : Helmerich & Payne #89
Report For : Rick Hawthorne

Field/Area : NE Speaks
Description : A-532
Location : Lavaca County, Texas
Well No. : C3957

DRILLING ASSEMBLY		CASING	MUD VOLUME (bbl)	CIRCULATION DATA		
Bit Size 6.75 in Security FM2831		Surface	Hole	Pump Make	G.D. PZ-11	G.D. PZ-11
Nozzles 4x12 / 1/32"		9.625in @10751ft (10751TVD)	960.6	Pump Size	6 X 11.in	6 X 11.in
Drill Pipe Size	Length	Intermediate	Active Pits	Pump Cap	3.837 gal/stk	3.837gal/stk
5 in	9485 ft	7.625in @14072ft (14072TVD)	537.4	Pump stk/min		55/@95%
Drill Pipe Size	Length	Intermediate	Total Circulating Vol	Flow Rate	211 gal/min	
4 in	7075 ft		1498	Bottoms Up	141.9 min	7803 stk
Drill Collar Size	Length	Production or Liner	In Storage	Total Circ Time	298.2 min	16400 stk
4.75 in	308 ft		990	Circulating Pressure	3100 psi	

MUD PROPERTIES

Sample From		PIT@03:00		FL@15:30	
Flow Line Temp	°F	161		165	
Depth/TVD	ft	17053/16420		16930/	
Mud Weight	lb/gal	18.5 @152°F		18.4@165°F	
Funnel Viscosity	s/qt	63		B/U From	
Rheology Temp	°F	160		Break	
R600/R300		103/55			
R200/R100		-/-			
R6/R3		-/2			
PV	cP	48			
YP	lb/100ft²	7			
10s/10m/30m Gel	lb/100ft²	3/10/15			
API Fluid Loss	cc/30 min	N/A			
HTHP FL Temp	cc/30 min	1.6@400°F			
Cake API/HTHP	1/32"	-/3			
Unc Ret Solids	%Vol	42.0		41.0	
Correct Solids	%Vol	41.5		40.47	
Oil	%Vol	53.0		54.0	
Uncorr Water	%Vol	5.0		5.0	
Oil/Water Ratio		91/9		92/8	
Alkal (Pom)		1.1		0.8	
Cl Whole Mud	mg/l	12500		13000	
Salt	%Wt	28.12	281200	28.92	289200
Lime	lb/bbl	1.43		1.04	
E-Stability		1100		710	
Received Volume	bbl	2747			
Returned Volume	bbl	478			
Present Volume	bbl	2488			
Diff. Volume	bbl	+219			

PRODUCTS USED LAST 24 HRS

Products	Size	Amt
M-I BAR BULK	100 LB BG	350
CLEAN-UP	5 GA CN	2
MUD DIESEL	1 GA BK	295
ENGINEERING SERV	1 EA	1
QUICKLIME (KENOX	50 LB BG	15

SOLIDS EQUIP	Size	Hr
Derrick Shaker	14/14/14	1
Derrick Shaker	175/175/175	26
Derrick Shaker	175/175/175	26

MUD PROPERTY SPECIFICATIONS

Weight	Co. Orders
Viscosity	50-60
Filtrate	<4 cc HTHP

REMARKS AND TREATMENT

7 bbls Oil Added
16 bbls Water Added
25 bbls Products Added
48 bbls Mud Built
239 bbls Mud Received
228 bbls Mud Returned
2505 bbls Starting Volume
2488 bbls Present Volume
-76 bbls Mud Loss /24 hrs
-719 bbls Cumulative Mud Loss 8 bbls New Hole Volume

REMARKS

Made short trip to liner @ 16,885'. Bottoms up had 300 gas units after mud/gas separator with a 20' flare. Swapped 500 bbls from system with 500 bbls new mud; ROP increased. Bottoms up from drilling break @ 16,925' had 150 gas units after mud/gas separator with no flare. Maximum connection gas was 700 units with 18.2 #/gal mud cut. Maximum down time gas was 575 units with 18.2 #/gal mud cut. Background gas @ 60 units. Last survey @ 16,949' was 48.3 degrees.
Oil Base Mud Cuttings
32 cu yds Daily Haul Off
144 cu yds Cumulative Haul Off

TIME DISTR Last 24 Hrs		MUD VOL ACCTG (bbl)		SOLIDS ANALYSIS		MUD RHEOLOGY & HYDRAULICS	
Rig Up/Service	0.5	Oil Added	0	Salt Wt%	28.12	np/na Values	0.905/0.905
Drilling	22.5	Water Added	16	Salt Conc,lb/bbl	6.85	kp/ka (lb•s^n/100ft²)	0.208/0.208
Tripping	2.0	Mud Received	11	Adjusted Solid %	41.49	Bit Loss (psi / %)	389 / 12.5
Circulating	4.0	Dumped	0	Oil/Water Ratio	91/9	Bit HHP (hhp / HSI)	48 / 1.3
P/U Trip Nipple	0.5	Shakers	20	Averge SG Solids	4.1	Bit Jet Vel (ft/s)	153
P/U Rot. Head	0.5	Evaporation	16	Low Gr %	1.9	Annular Vel DP (ft/min)	174.93
Dir Survey		Formation	0	Low Gr Wt, lb/bbl	17.37	Annular Vel DC (ft/min)	224.85
Direction Work		Left in Hole	0	High Gr %	39.6	Crit Vel DP (ft/min)	180
Testing		Trip Loss	18	High Gr Wt lb/bbl	581.63	Crit Vel DC (ft/min)	234
Wireline Logs		Other	22			ECD @ 17053 (lb/gal)	18.8

M-I ENGR / PHONE		RIG PHONE	WAREHOUSE PHONE	DAILY COST	CUMULATIVE COST
Mark Watson	361 358-4781				
Cell Phone	361 362-5940	361 798-7111	361 358-0181	$ 4,520.70	$ 129,146.63

OIL-BASED MUD REPORT No.27

Date	8/4/2001	Depth/TVD	16870 ft / 16298 ft
Spud Date	7/9/2001	Mud Type	Versadril
Water Depth		Activity	Drilling

Operator : Louis Dreyfus
Report For : Dan Patton
Well Name : J. Hancock Sr A-1 ST
Contractor : Helmerich & Payne #89
Report For : Rick Hawthorne

Field/Area : NE Speaks
Description : A-532
Location : Lavaca County, Texas
Well No. : C3957

DRILLING ASSEMBLY		CASING	MUD VOLUME (bbl)	CIRCULATION DATA		
Bit Size 6.75 in Security FM2831		Surface	Hole	Pump Make	G.D. PZ-11	G.D. PZ-11
Nozzles 4x12 / 1/32"		9.625in @10751ft (10751TVD)	953.7	Pump Size	6 X 11.in	6 X 11.in
Drill Pipe Size	Length	Intermediate	Active Pits	Pump Cap	3.837 gal/stk	3.837 gal/stk
5 in	9302 ft	7.625in @14072ft (14072TVD)	582.3	Pump stk/min		53@95%
Drill Pipe Size	Length	Intermediate	Total Circulating Vol	Flow Rate		203 gal/min
4 in	7075 ft		1536	Bottoms Up	146.7 min	7775 stk
Drill Collar Size	Length	Production or Liner	In Storage	Total Circ Time	317.8 min	16843 stk
4.75 in	308 ft		969	Circulating Pressure	3400 psi	

MUD PROPERTIES

Sample From		PIT@03:00	
Flow Line Temp	°F	166	
Depth/TVD	ft	16870/16298	
Mud Weight	lb/gal	18.5@158°F	
Funnel Viscosity	s/qt	108	
Rheology Temp	°F	160	
R600/R300		168/95	
R200/R100		-/-	
R6/R3		-/3	
PV	cP	73	
YP	lb/100ft²	22	
10s/10m/30m Gel	lb/100ft²	5/20/29	
API Fluid Loss	cc/30 min	N/A	
HTHP FL Temp	cc/30 min	1.6@400°F	
Cake API/HTHP	1/32"	-/3	
Unc Ret Solids	%Vol	42.0	
Correct Solids	%Vol	41.46	
Oil	%Vol	53.5	
Uncorr Water	%Vol	4.5	
Oil/Water Ratio		92/8	
Alkal (Pom)		2.7	
Cl Whole Mud	mg/l	13000	
Salt	%Wt	31.13	311300
Lime	lb/bbl	3.51	
E-Stability		1610	
Received Volume	bbl	2508	
Returned Volume	bbl	250	
Present Volume	bbl	2505	
Diff. Volume	bbl	+253	

PRODUCTS USED LAST 24 HRS

Products	Size	Amt
VERSACOAT	1 GA BK	10
VERSATROL	50 LB BG	7
CLEAN-UP	5 GA CN	3
MUD DIESEL	1 GA BK	440
SAFE-CARB FINE	50 LB BG	5
MIX II FINE	25 LB BG	5
G-SEAL	50 LB BG	5
ENGINEERING SERVICE	1 EA	1
QUICKLIME (KENOX)	50 LB BG	5

SOLIDS EQUIP	Size	Hrs
Derrick Shaker	14/14/14	0
Derrick Shaker	175/175/175	17.5
Derrick Shaker	175/175/175	17.5

MUD PROPERTY SPECIFICATIONS

Weight	Co. Orders
Viscosity	50-60
Filtrate	<4 cc HTHP

REMARKS AND TREATMENT

10 bbls Oil Added
8 bbls Water Added
2 bbls Products Added
20 bbls Mud Built
244 bbls Mud Received
250 bbls Mud Returned
2508 bbls Starting Volume
2505 bbls Present Volume
-17 bbls Mud Loss /24 hrs
-643 bbls Cumulative Mud Loss 4 bbls New Hole Volume

REMARKS

Full day of drilling. Received 244 bbls new mud and returned 250 bbls mud from storage.

Oil Base Mud Cuttings
0 cu yds Daily Haul Off
112 cu yds Cumulative Haul Off

TIME DISTR Last 24 Hrs		MUD VOL ACCTG	(bbl)	SOLIDS ANALYSIS		MUD RHEOLOGY & HYDRAULICS	
Rig Up/Service	0.5	Oil Added	0	Salt Wt%	31.13	np/na Values	0.822/0.822
Drilling	17.0	Water Added	8	Salt Conc,lb/bbl	7.12	kp/ka (lb•s^n/100ft²)	0.600/0.600
Tripping		Mud Received	-6	Adjusted Solid %	41.46	Bit Loss (psi / %)	360 / 10.6
Circulating		Dumped	0	Oil/Water Ratio	92/8	Bit HHP (hhp / HSI)	43 / 1.2
Reaming		Shakers	4	Averge SG Solids	4.1	Bit Jet Vel (ft/s)	147
Chng. Rot. Head	0.5	Evaporation	8	Low Gr %	2.2	Annular Vel DP (ft/min)	168.3
Dir Survey		Formation	0	Low Gr Wt, lb/bbl	19.94	Annular Vel DC (ft/min)	216.32
Direction Work		Left in Hole	0	High Gr %	39.3	Crit Vel DP (ft/min)	331
Testing		Trip Loss	0	High Gr Wt lb/bbl	576.97	Crit Vel DC (ft/min)	414
Wireline Logs		Other	5			ECD @ 16870 (lb/gal)	19.09

M-I ENGR / PHONE		RIG PHONE	WAREHOUSE PHONE	DAILY COST	CUMULATIVE COST
Mark Watson	361 358-4781				
Cell Phone	361 362-5940	361 798-7111	361 358-0181	$ 3,412.28	$ 124,625.70

OIL-BASED MUD REPORT No.26

Date	8/3/2001	Depth/TVD	16781 ft / 16239 ft
Spud Date	7/9/2001	Mud Type	Versadril
Water Depth		Activity	Drilling

Operator : Louis Dreyfus
Report For : Dan Patton
Well Name : J. Hancock Sr A-1 ST
Contractor : Helmerich & Payne #89
Report For : Rick Hawthorne

Field/Area : NE Speaks
Description : A-532
Location : Lavaca County, Texas
Well No. : C3957

DRILLING ASSEMBLY		CASING	MUD VOLUME (bbl)	CIRCULATION DATA		
Bit Size 6.75 in Security FM2831		Surface	Hole	Pump Make	G.D. PZ-11	G.D. PZ-11
Nozzles 4x12 / 1/32"		9.625in @10751ft (10751TVD)	950.3	Pump Size	6 X 11.in	6 X 11.in
Drill Pipe Size	Length	Intermediate	Active Pits	Pump Cap	3.837 gal/stk	3.837 gal/stk
5 in	9213 ft	7.625in @14072ft (14072TVD)	582.7	Pump stk/min		53@95%
Drill Pipe Size	Length	Intermediate	Total Circulating Vol	Flow Rate	203 gal/min	
4 in	7075 ft		1533	Bottoms Up	146.3 min	7756 stk
Drill Collar Size	Length	Production or Liner	In Storage	Total Circ Time	317.2 min	16810 stk
4.75 in	308 ft		975	Circulating Pressure	3500 psi	

MUD PROPERTIES

Sample From		PIT@03:00	
Flow Line Temp	°F	163	
Depth/TVD	ft	16781/16239	
Mud Weight	lb/gal	18.5@155°F	
Funnel Viscosity	s/qt	103	
Rheology Temp	°F	160	
R600/R300		162/91	
R200/R100		-/-	
R6/R3		-/3	
PV	cP	71	
YP	lb/100ft²	20	
10s/10m/30m Gel	lb/100ft²	4/18/26	
API Fluid Loss	cc/30 min	N/A	
HTHP FL Temp	cc/30 min	1.6@400°F	
Cake API/HTHP	1/32"	-/3	
Unc Ret Solids	%Vol	42.0	
Correct Solids	%Vol	41.46	
Oil	%Vol	53.5	
Uncorr Water	%Vol	4.5	
Oil/Water Ratio		92/8	
Alkal (Pom)		2.3	
Cl Whole Mud	mg/l	13000	
Salt	%Wt	31.13	311300
Lime	lb/bbl	2.99	
E-Stability		1645	
Received Volume	bbl	2264	
Returned Volume	bbl	0	
Present Volume	bbl	2508	
Diff. Volume	bbl	+244	

PRODUCTS USED LAST 24 HRS

Products	Size	Amt
VERSATROL	50 LB BG	7
OIL DRI ABSORBANT	50 LB BG	6
CLEAN-UP	5 GA CN	2
MUD DIESEL	1 GA BK	446
SAFE-CARB FINE	50 LB BG	5
MIX II FINE	25 LB BG	6
G-SEAL	50 LB BG	5
ENGINEERING SERVICE	1 EA	1

SOLIDS EQUIP	Size	Hrs
Derrick Shaker	14/14/14	8.5
Derrick Shaker	175/175/175	17.5
Derrick Shaker	175/175/175	17.5

MUD PROPERTY SPECIFICATIONS

Weight	Co. Orders
Viscosity	50-60
Filtrate	<4 cc HTHP

REMARKS AND TREATMENT

11 bbls Oil Added
0 bbls Water Added
1 bbls Products Added
12 bbls Mud Built
0 bbls Mud Received
0 bbls Mud Returned
2541 bbls Starting Volume
2508 bbls Present Volume
-45 bbls Mud Loss /24 hrs
-626 bbls Cumulative Mud Loss 3 bbls New Hole Volume

REMARKS

B/U f/ trip had 2,300 gas units after mud/gas separator with 18.1 #/gal mud cut and a 12' flare. Ream 16,400'-16,450'. Drilling with 30-70 units background gas. Mixed 50 bbl 21 #/bbl LCM pill in slug pit; pumping 5 bbls/hr.

Oil Base Mud Cuttings
0 cu yds Daily Haul Off
112 cu yds Cumulative Haul Off

TIME DISTR Last 24 Hrs		MUD VOL ACCTG	(bbl)	SOLIDS ANALYSIS		MUD RHEOLOGY & HYDRAULICS	
Rig Up/Service	0.5	Oil Added	0	Salt Wt%	31.13	np/na Values	0.832/0.832
Drilling	14.5	Water Added	0	Salt Conc,lb/bbl	7.12	kp/ka (lb*s^n/100ft²)	0.542/0.542
Tripping	8.5	Mud Received	0	Adjusted Solid %	41.46	Bit Loss (psi / %)	360 / 10.3
Circulating	2.0	Dumped	0	Oil/Water Ratio	92/8	Bit HHP (hhp / HSI)	43 / 1.2
Reaming	1.0	Shakers	6	Averge SG Solids	4.1	Bit Jet Vel (ft/s)	147
P/U Rot. Head	0.5	Evaporation	0	Low Gr %	2.2	Annular Vel DP (ft/min)	168.3
Dir Survey		Formation	0	Low Gr Wt, lb/bbl	19.94	Annular Vel DC (ft/min)	216.32
Direction Work		Left in Hole	0	High Gr %	39.3	Crit Vel DP (ft/min)	316
Testing		Trip Loss	39	High Gr Wt lb/bbl	576.97	Crit Vel DC (ft/min)	396
Wireline Logs		Other	0			ECD @ 16781 (lb/gal)	19.05

M-I ENGR / PHONE		RIG PHONE	WAREHOUSE PHONE	DAILY COST	CUMULATIVE COST
Mark Watson	361 358-4781				
Cell Phone	361 362-5940	361 798-7111	361 358-0181	$ 2,953.45	$ 121,213.41

Drilling Fluids

OIL-BASED MUD REPORT No.25

Date	08/02/2001	Depth/TVD	16719 ft / 16200 ft
Spud Date	07/09/2001	Mud Type	Versadril
Water Depth		Activity	TIH

Operator : Louis Dreyfus
Report For : Dan Patton
Well Name : John HancockSr.A-1ST
Contractor : Helmerick & Payne #89
Report For : Rick Hawthorne

Field/Area : NE. Speaks
Description : A-532
Location : Lavaca County, Texas
Well No. : C3957

DRILLING ASSEMBLY		CASING	MUD VOLUME (bbl)	CIRCULATION DATA		
Bit Size 6.75 in Sec FM2831		Surface	Hole	Pump Make	G.D. PZ-11	G.D. PZ-11
Nozzles 4x12 / 1/32"		9.625in @10751ft (10751TVD)	1047.9	Pump Size	6 X 11.in	6 X 11.in
Drill Pipe Size	Length	Intermediate	Active Pits	Pump Cap	gal/stk	gal/stk
5 in	ft	7.625in @14072ft (14072TVD)	518.1	Pump stk/min		
Drill Pipe Size	Length	Intermediate	Total Circulating Vol	Flow Rate	gal/min	
4 in	7075 ft		518.1	Bottoms Up		
Drill Collar Size	Length	Production or Liner	In Storage	Total Circ Time		
4.75 in	309 ft		975	Circulating Pressure		

MUD PROPERTIES

Sample From		PIT@24:00	
Flow Line Temp	°F	NA	
Depth/TVD	ft	16719/16200	
Mud Weight	lb/gal	18.5@102°F	
Funnel Viscosity	s/qt	104	
Rheology Temp	°F	160	
R600/R300		149/85	
R200/R100		-/-	
R6/R3		-/3	
PV	cP	64	
YP	lb/100ft²	21	
10s/10m/30m Gel	lb/100ft²	4/20/31	
API Fluid Loss	cc/30 min	NA	
HTHP FL Temp	cc/30 min	2.8@400°F	
Cake API/HTHP	1/32"	-/3	
Unc Ret Solids	%Vol	43	
Correct Solids	%Vol	42.5	
Oil	%Vol	52	
Uncorr Water	%Vol	5	
Oil/Water Ratio		91/9	
Alkal (Pom)		2.5	
Cl Whole Mud	mg/l	13000	
Salt	%Wt	28.92	289200
Lime	lb/bbl	3.25	
E-Stability		1680	
Received Volume	bbl	2264	
Returned Volume	bbl	0	
Present Volume	bbl	2541	
Diff. Volume	bbl	+277	

PRODUCTS USED LAST 24 HRS

Products	Size	Amt
CLEAN-UP	5 GA CN	4
MUD DIESEL	1 GA BK	189
ENGINEERING SERVICE	1 EA	1

SOLIDS EQUIP	Size	Hrs
Derrick Shaker	14/14/14	0
Derrick Shaker	175/175/175	0
Derrick Shaker	175/175/175	0

MUD PROPERTY SPECIFICATIONS

Weight	Co. Orders
Viscosity	50-60
Filtrate	<4 cc HTHP

REMARKS AND TREATMENT

5 bbls Oil Added
0 bbls Water Added
0 bbls Products Added
5 bbls Mud Built
0 bbls Mud Received
0 bbls Mud Returned
2546 bbls Starting Volume
2541 bbls Present Volume
-10 bbls Mud Loss /24 hrs
-581 bbls Cumulative Mud Loss 0 bbls New Hole Volume

REMARKS

Continued repairs to and testing BOPs. TIH. Added diesel to suction pit.

Oil Base Mud Cuttings
00 cu yds Daily Haul Off
112 cu yds Cumulative Haul Off

TIME DISTR Last 24 Hrs		MUD VOL ACCTG	(bbl)	SOLIDS ANALYSIS		MUD RHEOLOGY & HYDRAULICS	
Rig Up/Service		Oil Added	0	Salt Wt%	28.92	np/na Values	
Drilling		Water Added	0	Salt Conc,lb/bbl	7.12	kp/ka (lb•s^n/100ft²)	
Tripping		Mud Received	0	Adjusted Solid %	42.47	Bit Loss (psi / %)	
BOP Testing	24	Centrifuge	0	Oil/Water Ratio	91/9	Bit HHP (hhp / HSI)	
Condition Hole		Formation	0	Averge SG Solids	4.	Bit Jet Vel (ft/s)	
Circ. out Gas		Left in Hole	0	Low Gr %	4.	Annular Vel DP (ft/min)	
Slip and Cut		Other	10	Low Gr Wt, lb/bbl	36.8	Annular Vel DC (ft/min)	
Condition Mud		Dumped	0	High Gr %	38.4	Crit Vel DP (ft/min)	
Chg Swvl Pkng		Shakers	0	High Gr Wt lb/bbl	564.59	Crit Vel DC (ft/min)	
		Evaporation	0				

M-I ENGR / PHONE		RIG PHONE	WAREHOUSE PHONE	DAILY COST	CUMULATIVE COST
Corky Karcher	361 985-7424				
Cell	830 708-5715	361 798-7111	361 358-0181	$ 1,147.32	$ 118,259.96

Drilling Fluids

OIL-BASED MUD REPORT No.24

Date	08/01/2001	Depth/TVD	16719 ft / 16200 ft
Spud Date	07/09/2001	Mud Type	Versadril
Water Depth		Activity	Test BOPs

Operator : Louis Dreyfus
Report For : Dan Patton
Well Name : John HancockSr.A-1ST
Contractor : Helmerick & Payne #89
Report For : Rick Hawthorne

Field/Area : NE. Speaks
Description : A-532
Location : Lavaca County, Texas
Well No. : C3957

DRILLING ASSEMBLY		CASING	MUD VOLUME (bbl)	CIRCULATION DATA		
Bit Size 6.75 in Sec FM2831		Surface	Hole	Pump Make	G.D. PZ-11	G.D. PZ-11
Nozzles 4x12 / 1/32"		9.625in @10751ft (10751TVD)	1047.9	Pump Size	6 X 11.in	6 X 11.in
Drill Pipe Size	Length	Intermediate	Active Pits	Pump Cap	gal/stk	gal/stk
5 in	ft	7.625in @14072ft (14072TVD)	523.1	Pump stk/min		
Drill Pipe Size	Length	Intermediate	Total Circulating Vol	Flow Rate	gal/min	
4 in	7075 ft		523.1	Bottoms Up		
Drill Collar Size	Length	Production or Liner	In Storage	Total Circ Time		
4.75 in	309 ft		975	Circulating Pressure		

MUD PROPERTIES

Sample From		PIT@24:00	
Flow Line Temp	°F	NA	
Depth/TVD	ft	16719/16200	
Mud Weight	lb/gal	18.6@120°F	
Funnel Viscosity	s/qt	95	
Rheology Temp	°F	162	
R600/R300		169/96	
R200/R100		-/-	
R6/R3		-/3	
PV	cP	73	
YP	lb/100ft²	23	
10s/10m/30m Gel	lb/100ft²	6/19/30	
API Fluid Loss	cc/30 min	NA	
HTHP FL Temp	cc/30 min	3.0@400°F	
Cake API/HTHP	1/32"	-/3	
Unc Ret Solids	%Vol	43	
Correct Solids	%Vol	42.5	
Oil	%Vol	52	
Uncorr Water	%Vol	5	
Oil/Water Ratio		91/9	
Alkal (Pom)		2.5	
Cl Whole Mud	mg/l	13000	
Salt	%Wt	28.92	289200
Lime	lb/bbl	3.25	
E-Stability		1610	
Received Volume	bbl	2264	
Returned Volume	bbl	0	
Present Volume	bbl	2546	
Diff. Volume	bbl	+282	

PRODUCTS USED LAST 24 HRS

Products	Size	Amt
M-I BAR BULK	100 LB BG	112
VERSACOAT	1 GA BK	5
VERSATROL	50 LB BG	2
CLEAN-UP	5 GA CN	7
MUD DIESEL	1 GA BK	221
SAFE-CARB FINE	50 LB BG	2
MIX II FINE	25 LB BG	2
G-SEAL	50 LB BG	2
TRUCKING SERVICE	1 EA	887
ENGINEERING SERVICE	1 EA	1
QUICKLIME (KENOX)	50 LB BG	5

SOLIDS EQUIP	Size	Hrs
Derrick Shaker	14/14/14	0
Derrick Shaker	175/175/175	0
Derrick Shaker	175/175/175	0

MUD PROPERTY SPECIFICATIONS

Weight	Co. Orders
Viscosity	50-60
Filtrate	<4 cc HTHP

REMARKS AND TREATMENT

5 bbls Oil Added
3 bbls Water Added
9 bbls Products Added
17 bbls Mud Built
0 bbls Mud Received
0 bbls Mud Returned
2561 bbls Starting Volume
2546 bbls Present Volume
-32 bbls Mud Loss /24 hrs
-571 bbls Cumulative Mud Loss ' bbls New Hole Volume

REMARKS

Pump slug, POOH for new bit, BHA and test BOPs.

Oil Base Mud Cuttings
00 cu yds Daily Haul Off
112 cu yds Cumulative Haul Off

TIME DISTR Last 24 Hrs		MUD VOL ACCTG	(bbl)	SOLIDS ANALYSIS		MUD RHEOLOGY & HYDRAULICS	
Rig Up/Service		Oil Added	0	Salt Wt%	28.92	np/na Values	
Drilling		Water Added	3	Salt Conc,lb/bbl	7.12	kp/ka (lb•s^n/100ft²)	
Tripping	7	Mud Received	0	Adjusted Solid %	42.47	Bit Loss (psi / %)	
BOP Testing	17	Centrifuge	0	Oil/Water Ratio	91/9	Bit HHP (hhp / HSI)	
Condition Hole		Formation	0	Averge SG Solids	4.1	Bit Jet Vel (ft/s)	
Circ. out Gas		Left in Hole	0	Low Gr %	3.3	Annular Vel DP (ft/min)	
Slip and Cut		Other	21	Low Gr Wt, lb/bbl	29.97	Annular Vel DC (ft/min)	
Condition Mud		Dumped	0	High Gr %	39.2	Crit Vel DP (ft/min)	
Chg Swvl Pkng		Shakers	3	High Gr Wt lb/bbl	575.62	Crit Vel DC (ft/min)	
		Evaporation	8				

M-I ENGR / PHONE		RIG PHONE	WAREHOUSE PHONE	DAILY COST	CUMULATIVE COST
Corky Karcher	361 985-7424				
Cell	830 708-5715	361 798-7111	361 358-0181	$ 4,493.28	$ 117,112.64

Drilling Fluids

OIL-BASED MUD REPORT No.23

Date	07/31/2001	Depth/TVD	16719 ft / 16200 ft
Spud Date	07/09/2001	Mud Type	Versadril
Water Depth		Activity	Drilling

Operator : Louis Dreyfus
Report For : Dan Patton
Well Name : John HancockSr.A-1ST
Contractor : Helmerick & Payne #89
Report For : Rick Hawthorne

Field/Area : NE. Speaks
Description : A-532
Location : Lavaca County, Texas
Well No. : C3957

DRILLING ASSEMBLY		CASING	MUD VOLUME (bbl)
Bit Size 6.75 in Sec FM2831		Surface	Hole
Nozzles 4x12 / 1/32"		9.625in @10751ft (10751TVD)	948.2
Drill Pipe Size	Length	Intermediate	Active Pits
5 in	9157 ft	7.625in @14072ft (14072TVD)	637.8
Drill Pipe Size	Length	Intermediate	Total Circulating Vol
4 in	7075 ft		1586
Drill Collar Size	Length	Production or Liner	In Storage
4.75 in	302 ft		975

CIRCULATION DATA		
Pump Make	G.D. PZ-11	G.D. PZ-11
Pump Size	6 X 11.in	6 X 11.in
Pump Cap	3.837 gal/stk	3.837 gal/stk
Pump stk/min		55@95%
Flow Rate	211 gal/min	
Bottoms Up	140.5 min	7730 stk
Total Circ Time	315.7 min	17363 stk
Circulating Pressure	3650 psi	

MUD PROPERTIES

Sample From		PIT@03:00	
Flow Line Temp	°F	170	
Depth/TVD	ft	16719/16200	
Mud Weight	lb/gal	18.5@160°F	
Funnel Viscosity	s/qt	95	
Rheology Temp	°F	160	
R600/R300		169/96	
R200/R100		-/-	
R6/R3		-/4	
PV	cP	73	
YP	lb/100ft²	23	
10s/10m/30m Gel	lb/100ft²	6/21/31	
API Fluid Loss	cc/30 min	NA	
HTHP FL Temp	cc/30 min	2.8@400°F	
Cake API/HTHP	1/32"	-/3	
Unc Ret Solids	%Vol	43	
Correct Solids	%Vol	42.8	
Oil	%Vol	52	
Uncorr Water	%Vol	5	
Oil/Water Ratio		91/9	
Alkal (Pom)		2.6	
Cl Whole Mud	mg/l	13000	
Salt	%Wt	28.92	289200
Lime	lb/bbl	3.38	
E-Stability		1670	
Received Volume	bbl	2264	
Returned Volume	bbl	0	
Present Volume	bbl	2561	
Diff. Volume	bbl	+297	

PRODUCTS USED LAST 24 HRS

Products	Size	Amt
M-I BAR BULK	100 LB BG	575
ASPHASOL SUPREME	50 LB BG	10
VERSACOAT	1 GA BK	5
VERSATROL	50 LB BG	8
CLEAN-UP	5 GA CN	2
MUD DIESEL	1 GA BK	931
SAFE-CARB FINE	50 LB BG	8
MIX II FINE	25 LB BG	6
MIX II MED	25 LB BG	2
G-SEAL	50 LB BG	8
ENGINEERING SERVICE	1 EA	1
175 PMD PYRAMID SCREEI	1 EA	3
QUICKLIME (KENOX)	50 LB BG	7

SOLIDS EQUIP	Size	Hrs
Derrick Shaker	14/14/14	1
Derrick Shaker	175/175/175	24
Derrick Shaker	175/175/175	24

MUD PROPERTY SPECIFICATIONS

Weight	Co. Orders
Viscosity	50-60
Filtrate	<4 cc HTHP

REMARKS AND TREATMENT

22 bbls Oil Added
3 bbls Water Added
42 bbls Products Added
67 bbls Mud Built
0 bbls Mud Received
0 bbls Mud Returned
2560 bbls Starting Volume
2561 bbls Present Volume
-67 bbls Mud Loss /24 hrs
-539 bbls Cumulative Mud Loss 5 bbls New Hole Volume

REMARKS

Drilled to 16605' and short tripped. Pulled tight at 16404'. B/up was 1200 units thru flow line and 190 units thru Buster with a 12' flare. No increase in chlorides at b/up. Drilled ahead pumping 5 bbl sweeps every hours. Conn Gas 330-625 u. w/mud cut 18.1 ppg Bkgnd gas 25-55 u. Last survey at 16661'/48.3 deg. Cost includes a Vacuum Truck Credit.

Oil Base Mud Cuttings
16 cu yds Daily Haul Off
112 cu yds Cumulative Haul Off
Note:Mud Acctg Vol, Other losses are trip losses.

TIME DISTR Last 24 Hrs		MUD VOL ACCTG	(bbl)
Rig Up/Service	0.5	Oil Added	0
Drilling	19.5	Water Added	3
Tripping	3	Mud Received	0
Reaming		Centrifuge	0
Condition Hole		Formation	0
Circ. out Gas	1	Left in Hole	0
Slip and Cut		Other	22
Condition Mud		Dumped	0
Chg Swvl Pkng		Shakers	26
P/U Rot. Head		Evaporation	18

SOLIDS ANALYSIS		MUD RHEOLOGY & HYDRAULICS	
Salt Wt%	28.92	np/na Values	0.816/0.816
Salt Conc,lb/bbl	7.12	kp/ka (lb•s^n/100ft²)	0.632/0.632
Adjusted Solid %	42.47	Bit Loss (psi / %)	389 / 10.6
Oil/Water Ratio	91/9	Bit HHP (hhp / HSI)	48 / 1.3
Averge SG Solids	4.	Bit Jet Vel (ft/s)	153
Low Gr %	4.	Annular Vel DP (ft/min)	174.93
Low Gr Wt, lb/bbl	36.8	Annular Vel DC (ft/min)	224.85
High Gr %	38.4	Crit Vel DP (ft/min)	337
High Gr Wt lb/bbl	564.59	Crit Vel DC (ft/min)	420
		ECD @ 16719 (lb/gal)	19.12

M-I ENGR / PHONE		RIG PHONE	WAREHOUSE PHONE	DAILY COST	CUMULATIVE COST
Corky Karcher	361 985-7424				
Cell	830 708-5715	361 798-7111	361 358-0181	$ 10,562.93	$ 112,619.36

Floor D.V.

Drilling Fluids

OIL-BASED MUD REPORT No.22

Date	07/30/2001	Depth/TVD	16594 ft / 16116 ft
Spud Date	07/09/2001	Mud Type	Versadril
Water Depth		Activity	Drilling

Operator : Louis Dreyfus
Report For : Royce Coats
Well Name : John HancockSr.A-1ST
Contractor : Helmerick & Payne #89
Report For : Rick Hawthorne

Field/Area : NE. Speaks
Description : A-532
Location : Lavaca County, Texas
Well No. : C3957

DRILLING ASSEMBLY		CASING	MUD VOLUME (bbl)	CIRCULATION DATA		
Bit Size 6.75 in Sec FM2831		Surface	Hole	Pump Make	G.D. PZ-11	G.D. PZ-11
Nozzles 4x12 / 1/32"		9.625in @10751ft (10751TVD)	943.5	Pump Size	6 X 11.in	6 X 11.in
Drill Pipe Size	Length	Intermediate	Active Pits	Pump Cap	3.837 gal/stk	3.837 gal/stk
5 in	9032 ft	7.625in @14072ft (14072TVD)	641.5	Pump stk/min		56@95%
Drill Pipe Size	Length	Intermediate	Total Circulating Vol	Flow Rate		215 gal/min
4 in	7075 ft		1585	Bottoms Up		137.4 min 7696 stk
Drill Collar Size	Length	Production or Liner	In Storage	Total Circ Time		309.6 min 17339 stk
4.75 in	302 ft		975	Circulating Pressure		3550 psi

MUD PROPERTIES

Sample From		PIT@03:00	
Flow Line Temp	°F	170	
Depth/TVD	ft	16594/16116	
Mud Weight	lb/gal	18.4@162°F	
Funnel Viscosity	s/qt	90	
Rheology Temp	°F	160	
R600/R300		176/102	
R200/R100		-/-	
R6/R3		-/4	
PV	cP	74	<----LCM in
YP	lb/100ft²	28	<------ Mud
10s/10m/30m Gel	lb/100ft²	5/19/29	
API Fluid Loss	cc/30 min	NA	
HTHP FL Temp	cc/30 min	2.6@400°F	
Cake API/HTHP	1/32"	-/3	
Unc Ret Solids	%Vol	41.5	
Correct Solids	%Vol	40.60	
Oil	%Vol	53.5	
Uncorr Water	%Vol	5	
Oil/Water Ratio		91/9	
Alkal (Pom)		3.0	
Cl Whole Mud	mg/l	10500	
Salt	%Wt	24.73	247300
Lime	lb/bbl	3.9	
E-Stability		1700	
Received Volume	bbl	2264	
Returned Volume	bbl	0	
Present Volume	bbl	2560	
Diff. Volume	bbl	+296	

PRODUCTS USED LAST 24 HRS

Products	Size	Amt
M-I BAR BULK	100 LB BG	526
VERSACOAT	1 GA BK	30
VERSATROL	50 LB BG	5
CLEAN-UP	5 GA CN	3
MUD DIESEL	1 GA BK	490
VACUUM TRUCK HAULIN	1 EA	452
SAFE-CARB FINE	50 LB BG	13
SAFE-CARB MEDIUM	50 LB BG	6
MIX II FINE	25 LB BG	8
MIX II MED	25 LB BG	2
G-SEAL	50 LB BG	7
TRUCKING SERVICE	1 EA	452
ENGINEERING SERVICE	1 EA	1

SOLIDS EQUIP	Size	Hrs
Derrick Shaker	14/14/14	0
Derrick Shaker	175/175/175	24
Derrick Shaker	175/175/175	24

MUD PROPERTY SPECIFICATIONS

Weight	Co. Orders
Viscosity	50-60
Filtrate	<4 cc HTHP

REMARKS AND TREATMENT

12 bbls Oil Added
8 bbls Water Added
39 bbls Products Added
59 bbls Mud Built
0 bbls Mud Received
0 bbls Mud Returned
2522 bbls Starting Volume
2560 bbls Present Volume
-21 bbls Mud Loss /24 hrs
-472 bbls Cumulative Mud Loss 4.5 bbls New Hole Volume

REMARKS

Drilled ahead slowly increasing mud weight to 18.4+ ppg. Connection gas 360 to 375 units with a 7 to 10 ft. flare. D/T gas, 400 units w/6' flare. BKGRN gas, 35 to 350 units. Maintaining LCM sweeps at 5 bbls on the hour. Last survey: 16533/16074' = 46.6 deg. Last connection gas at 16559', 365 units gas w/no flare.

Oil Base Mud Cuttings
00 cu yds Daily Haul Off
96 cu yds Cumulative Haul Off

TIME DISTR Last 24 Hrs		MUD VOL ACCTG	(bbl)	SOLIDS ANALYSIS		MUD RHEOLOGY & HYDRAULICS	
Rig Up/Service	0.5	Oil Added	0	Salt Wt%	24.73	np/na Values	0.787/0.787
Drilling	18	Water Added	8	Salt Conc,lb/bbl	5.75	kp/ka (lb•s^n/100ft²)	0.804/0.804
Tripping		Mud Received	0	Adjusted Solid %	41.09	Bit Loss (psi / %)	401 / 11.3
Reaming		Centrifuge	0	Oil/Water Ratio	91/9	Bit HHP (hhp / HSI)	50 / 1.4
Condition Hole		Formation	0	Averge SG Solids	4.1	Bit Jet Vel (ft/s)	156
Circulating	5.5	Left in Hole	0	Low Gr %	1.7	Annular Vel DP (ft/min)	178.25
Slip and Cut		Other	0	Low Gr Wt, lb/bbl	15.5	Annular Vel DC (ft/min)	229.11
Condition Mud		Dumped	0	High Gr %	39.4	Crit Vel DP (ft/min)	368
Chg Swvl Pkng		Shakers	15	High Gr Wt lb/bbl	578.7	Crit Vel DC (ft/min)	453
P/U Rot. Head		Evaporation	6			ECD @ 16594 (lb/gal)	19.1

M-I ENGR / PHONE	RIG PHONE	WAREHOUSE PHONE	DAILY COST	CUMULATIVE COST
Corky Karcher 361 985-7424				
Cell 830 708-5715	361 798-7111	361 358-0181	$ 9,714.99	$ 102,056.43

Digital Data

- INSITE adi backup with Data directory on MO disk

Miscellaneous