GEOPRESSURED-GEOTHERMAL WELL REPORT

VOLUME I - DRILLING & COMPLETION

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Technadril-Fenix & Scisson
T-F&S/DOE Gladys McCall No. 1 Well
Cameron Parish, Louisiana

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Nevada Operations Office, under
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VOLUME I
DRILLING & COMPLETION

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1.0 EXECUTIVE SUMMARY

In July, 1980 Technadril-Fenix & Scisson (T-F&S) was competitively selected by the U.S. Department of Energy (DOE) to drill, complete and test four design wells for geopressured geothermal reservoir resource assessment in the Texas and Louisiana Gulf Coast areas. Because of DOE budget limitations, the program has been limited to one well, T-F&S/DOE Gladys McCall No. 1, located 2.3 miles south of State Highway 82 near the town of Grand Chenier in Cameron Parish, Louisiana. This report covers Gladys McCall site activities through the completion of the test well and salt water disposal well.

T-F&S began site work on the Gladys McCall prospect in November, 1980 and started the drilling program in May, 1981. The test well was drilled to a total depth of 16,510 feet, then plugged back to 15,831 feet. Three 4" diameter diamond cores were taken for analysis. An existing well on site, the Getty-Buttes Gladys McCall No. 1, was reentered and completed to a depth of 3,514 feet as a salt water disposal well.

The geologic interpretation of the Gladys McCall site indicated target sands for testing at 15,080 feet through 15,831 feet. Reservoir fluid temperature at this depth is estimated to be approximately 313°F and pressure is estimated to be $\pm 12,800$ psi. The preliminary reservoir volume estimate is 3.6 billion barrels of brine.

The design wells program includes environmental monitoring of the Gladys McCall site by Louisiana State University. Field stations are set up to monitor surface and ground water quality, subsidence, land loss and shoreline erosion, and seismicity. As of December 31, 1981 the study shows no significant impact on the environment by site operations.

2.0 INTRODUCTION

2.1 BACKGROUND

In 1975, the U.S. Energy Research and Development Administration (now a part of the U.S. Department of Energy) initiated a research, development, and demonstration program to stimulate commercial development of the geopressed resources underlying the Gulf Coast region of the United States. Currently, the Department of Energy's (DOE) geopressed geothermal program is investigating Wells of Opportunity and Design Wells in the Gulf Coast areas of Texas and Louisiana. On July 31, 1980 Technadril - Fenix & Scisson, a joint venture, was competitively selected to drill, complete and test four design wells for geopressed-geothermal reservoir resource assessments in the Gulf Coast Area. On October 1, 1980, work began under Contract No. DE-AC08-80ET27217.

2.2 PROGRAM OBJECTIVES

T-F&S' principal objectives in this geopressed-geothermal reservoir resource assessment program are to obtain data related to the following:

- 2.2.1 Reservoir parameters and characteristics, including permeability, porosity, areal extent, net thickness of productive sands, methane content, and formation compressibilities.
- 2.2.2 Ability of a geopressed well to flow at the high rates, i.e., 40,000 bbls/day, necessary to achieve the resource recovery required for economic commercial operations.
- 2.2.3 Reservoir production drive mechanisms and physical and chemical changes that may occur with various production rates and conditions.
- 2.2.4 Aquifer fluid properties, including chemical composition, dissolved and suspended solids, hydrocarbon content, in situ temperature, and pressure.
- 2.2.5 Techniques and strategies for completion and production of geopressed wells for methane, thermal, and hydraulic energy production, including examination of producibility using computer simulators employing parameters determined by well testing.
- 2.2.6 Disposal well parameters, such as optimum injection rate and pressures (transient and psuedo steady state), chemical compatibility of reservoir fluids, temperature solubility

relationships, and the economic considerations of injection, including evaluation of filtering and inhibition techniques in the process stream.

- 2.2.7 The long-term environmental effects of an extensive commercial application of geopressured-geothermal energy, i.e., subsidence, induced seismicity, and fluid disposal.

2.3 WELL LOCATION

The T-F&S/DOE Gladys McCall No. 1 Test Well and the salt water disposal well are located on a site 2.3 miles south of St. Hwy. 82 near the town of Grand Chenier in Cameron Parish, Louisiana in Section 27, T15S, R5W (see Figure 2-1).

2.4 REPORT SCOPE

The purpose of the Well Report is to present a technical history of the work accomplished on the Gladys McCall project. This first volume includes all activities from the prospect area geological evaluation through the completion of the production and disposal wells. Volume II will contain an account of all activities beginning with the initial short term flow test through long term testing and data interpretation, and the final cleanup of the location and site disposition.

FIGURE 2-1

T-F&S/DOE Gladys McCall No. 1 Site Location Map

3.0 DRILLING OPERATIONS SUMMARY

3.1 T-F&S/DOE GLADYS McCALL NO. 1 TEST WELL

The test well was spudded on May 27, 1981, and drilling operations were completed on November 2, 1981. This test well, which is shown schematically in Figure 3-1, was drilled to a total depth of 16,510 feet, after a directionally drilled sidetrack at 15,295 feet.

30 inch outside diameter, 1-inch wall thickness, grade B casing was driven to refusal at 222 feet. A 26 inch bit was used to drill out of the drive pipe to a depth of 870 feet; 20 inch grade K-55, 133#/foot buttress thread conductor casing was lowered to 869 feet in the hole and cemented to the surface.

The 20 inch casing shoe was drilled out with a 17-1/2 inch bit and a 17-1/2 inch hole was drilled from 870 feet to 4500 feet. A string of 13-3/8 inch buttress thread surface casing, consisting of 81 joints of 68#/foot grade K-55 on the top of the string and 29 joints of 72#/foot grade L-80 on the bottom, was run in the hole to 4490 feet and cemented from that depth to the surface.

The 13-3/8 inch float equipment (collar and shoe) was drilled with a 12-1/4 inch bit and a 12-1/4 inch hole was drilled to 14,500 feet. A string of 9-5/8 inch 53.50#/foot grade P-110 buttress thread intermediate casing was run in the hole to 14,426 feet and cemented in place from 14,426 feet to the surface. At this time 57 days of drilling rig time had been used with no significant problems encountered.

An 8-3/8 inch hole was drilled from below the 9-5/8 inch casing to 15,166 feet. At this depth a 7-7/8 inch diamond core bit and a 60 foot core barrel were picked up; a 12 foot core was cut, 10 feet of which was recovered. The core assembly was rerun and core #2 was cut from 15,178 feet to 15,197 feet where the core barrel jammed; 19 feet of core were cut and 13-1/2 feet of core were recovered. The 7-7/8 inch core hole was reamed with an 8-3/8 inch bit and the drilling continued to a depth of 15,348 feet. Substantial time was consumed in reaming the cored interval on subsequent bit trips in the hole, and excessive torque was required in turning the drilling assembly through that section of the hole. At 15,348 feet another run was made with the core barrel; a 28 foot core was cut to 15,376 feet, and 26-1/2 feet were recovered. Coring was difficult due to high torquing and a tendency of the core barrel to stick in the hole.

The 7-7/8 inch core hole was reamed with an 8-3/8 inch bit, and drilling continued to 15,659 feet with excessive torque and sticking of the drill pipe. At 15,659 feet the drill pipe twisted into two parts due to the high torque, and one spiral drill collar, a bit sub, a shock sub, and an 8-3/8 inch diamond bit were left in the hole. Five days of fishing failed to recover the lost tools;

the hole was plugged back with cement to a depth of 14,750 feet in an effort to eliminate the deviated and troublesome section of the hole. Three plugs were attempted before obtaining acceptable results.

The side tracked hole kicked off of the original hole at 15,310 feet and a new 8-3/8 inch hole was drilled to 15,385 feet, where the drilling assembly stuck in the hole. Eight days were consumed retrieving the assembly. Drilling continued to 16,510 feet total depth without further serious problems.

A 7 inch casing string which was run as a liner stuck in the hole at 15,958 feet. It was cemented in place at that depth, tied back to the surface with 7 inch production casing, and cemented in the 9-5/8 inch intermediate casing to a subsurface depth of $\pm 6,000$ feet. The plugged back total depth (PBDT) of the test well is 15,831 feet.

A large workover rig was mobilized on January 10, 1982 to place the 5 inch production tubing. The mud that filled the hole upon completion of drilling activities was displaced with corrosion inhibited calcium chloride water heated to 150°F with a resulting density of 10.3 pounds per gallon.

The tubing installation was completed with a seal assembly on the bottom of the string stringing into a polished bore receptacle in the 7 inch casing at 13,921 feet. An Otis flow coupling and landing nipple were positioned in the tubing at a depth of 5,026'. The tubing was suspended in the tubing hanger and pack off at the surface and was bottomed at 13,933 feet. Internal and external pressure tests imposed on the tubing indicated complete integrity of the packer seals, tubing joint make up, and the tubing hanger.

3.2 T-F&S GLADYS McCALL SWDW NO. 1 (SALT WATER DISPOSAL WELL)

The first volume of the Geopressured-Geothermal Drilling and Testing Plan, Drilling and Completion, presented detailed plans for drilling a new 5,860 foot salt water disposal well. However, it has been intended from the outset that this new disposal well would be drilled only if an existing well (formerly Getty/Buttes Gladys McCall No. 1) could not be recompleted to function successfully as the disposal well.

This existing well was drilled originally to a depth of 15,598 feet by Getty-Buttes as a hydrocarbon exploratory prospect in 1965. Gruy Federal made an unsuccessful attempt to recomplete and test this well as a geopressured-geothermal test well during the November-December 1978 period under the current DOE resource evaluation program. The PBDT of this well following the unsuccessful recompletion attempt was reported by Gruy Federal to be 3,460 feet.

This well (now renamed T-F&S/DOE Gladys McCall SWDW No. 1) was re-entered and completed successfully as a salt water disposal well by T-F&S during the November 20-December 4, 1981 period. The 10 3/4 inch casing in the well was cleaned out to a depth of 3,514 feet, and pressure tested successfully at 1,500 psig. The recompleted disposal well is shown schematically in Figure 3-2.

FIGURE 3-1

T-F&S/DOE Gladys McCall No. 1 Completion

FIGURE 3-2

T-F&S/DOE Gladys McCall SWDW No. 1 Completion

4.0 GENERAL SITE ACTIVITIES

4.1 SITE PREPARATION

4.1.1 INTRODUCTION

The well site of the DOE Gladys McCall No. 1 well is located 2.3 miles south of Louisiana State Highway 82, (See Figure 2-1) and is connected to that highway by a dirt build-up road initially constructed in 1965. This build-up was repaired and reworked again in 1978 when re-entry to the initial well was attempted. At that time a 3 ply board run was laid over the built-up area from Highway No. 82 to the well pad. When T-F&S began site preparation in January, 1981, the remains of this board run and the well pad were in place, though somewhat deteriorated due to eighteen months of exposure to the elements and tidal action. The built-up road bed was still in good condition, well packed, unbroken and excellent for use in laying the new board run access road. Two bridges over canals in the roadway were constructed in 1968 of heavy creosoted timbers, and were in excellent condition.

There were 4 separate spaces on the existing board run roadway where fire had destroyed the boards in place. These areas (approximately 250 yards) were relaid with boards prior to beginning construction of the new board run.

4.1.2 BOARD RUN ROAD

The board run road was repaired to make it suitable for access to the well site by laying a 2 1/2 ply board run directly over the existing or repaired board run. The first 1 1/2 plys were constructed with good used 3"x8" scant board run lumber, each board nailed in place with four 60P nails. All wings and turn-ins were laid 3 ply solid directly over the existing "in place" boards.

4.1.3 SITE ENTRY

The entry way and access to the board run road from state Highway 82 is 60'x60'x60'x26', and was laid with boards 3 ply solid. These boards were badly deteriorated, so the entire turn in area was covered with 12 inches of oyster shell which were compacted to 8".

4.1.4 OFFICE SITE

In order to provide an office site near the entry way, it was necessary to arrange by written agreement with Mrs.

Sturlease (at no additional cost) for the temporary use of an additional 100'x300' area along the access road. This area was covered solid with 3 ply 3"x8" scant board run lumber; the first two plys were good used lumber with a top ply of new lumber. Each board was nailed with four 60P nails. This area was developed to provide a location for the administrative office trailer of the Project Manager, a parking area for vehicles and a lay down storage area. To control access to the well site in accordance with the leases in force, a security officer's shack was placed at the entrance to this area. A shuttle vehicle was provided to convey some of the working personnel, and all permissible visitors, to the working site.

4.1.5 WELL PAD AREA

To condition the existing well pad area for operation, the ring levee was repaired using fill material from inside the ring levee. The water from the well pad and reserve pits was tested and shown to be uncontaminated. All material removed from the reserve pits was placed inside the ring levee's east side where sufficient space was available. The well pad was then cleaned of all debris and the two existing cellars filled with dirt. Because of the size of the rig contracted to drill the production well and the associated equipment (dormitory trailer, galley and mess facilities, crew recreational trailer, mud loggers' trailer and consultants' trailer), as well as the need to lengthen the derrick lay down area, it was necessary to increase the well pad from 33,360 square feet to 78,604 square feet. The south end of the pad was squared off and the east-west width of the pad was increased by about 35 feet. It was necessary to lay down 6" of fill dirt in the pad area at the south end prior to boarding that area. Three layers of boards were laid solid in the increased pad area, and the fill dirt used brought the newly laid area up to the overall pad level. All dirt work was done inside the existing ring levee.

One hundred four 70' non-treated pilings were driven to provide support for the drilling rig sub-structure and 103 forty foot pilings were driven to support the generators, pumps and mud tanks; then a new 3-ply solid pad was laid over the existing well pad, using 3"x8" scant board run lumber. The bottom two plys were good used lumber, and the top layer was new 3"x8" scant board run lumber. Each board was nailed with four 60P nails. A rig support strong back for the drilling rig 76 X 48' was laid solid and made up the fourth ply of the new location pad.

On May 17, after the well pad was completely conditioned, a fire destroyed approximately 1/4 of the pad. The fire was extinguished by the Grand Chenier Volunteer Fire Department, and after the site was examined by a representative of the FBI, The Louisiana Fire Marshall and the Cameron Parish Sheriff's office, Odell Vinson Oil Field Contractor moved crews in and rebuilt the burned out area at a cost of \$43,000.00. This loss was within the deductible amount of insurance carried by T-F&S. The well pad was completely rebuilt and ready for the rig to move in on May 19, 1981.

A water well was drilled to provide rig water at the site and good fresh water was found at 183 feet. The well is located on the extreme north east corner of the well pad. See Figure 4-1 for complete drill site layout and Figure 4-2 for Access Road and Location Map.

4.2 TRAILERS

The trailers at the drill site were provided by the various firms involved. This included the Technadril - Fenix & Scisson drilling engineer's trailer, the tool pusher's trailer, the mud logger's trailer, the mud engineer's trailer, and trailers used by personnel involved in research for the project.

4.3 COMMUNICATIONS

A direct Houston telephone line was installed in the Technadril - Fenix & Scisson Project Manager's office trailer. During drilling operations, additional telephones were installed in the drilling engineer's trailer, the tool pusher's trailer, and in the dog house on the rig floor, with connecting intercoms to all these facilities.

4.4 WATER SUPPLY

Water supply for rig water was drawn from the water well described above and potable water was provided by temporary installed plastic water tanks trucked in from an approved off-site well.

4.5 SANITATION

A 500 gallon sheet steel, tar-coated septic tank and PVC pipe for the distribution lines were installed on the north side of the office site and connected to the T-F&S Project Manager's trailers. Two of the same type tanks were installed at the well pad for connection with the drilling engineer's trailer and rig crew trailers.

FIGURE 4-1

Drill Site Layout

FIGURE 4-2

Access Road and Location Map

4.6 POWER

A power line was installed from the Jefferson Davis REA to the Technadril - Fenix & Scisson Project Manager's trailer adjacent to State Highway 82. Site location power was provided by the rig generators during the drilling operation.

5.0 OCCUPATIONAL HEALTH AND SAFETY

5.1 GENERAL

All drilling operations and other site activities were conducted in accordance with standards of the Occupational Safety and Health Act of 1970 (OSHA) with amendments as of March 1, 1979.

All participating organizations were responsible for the health and safety of their own personnel and for conducting all activities in accordance with procedures that assured:

- 5.1.1 A safe and healthful environment for the employees.
- 5.1.2 Control and minimization of hazards to the public and to personnel of other participants.
- 5.1.3 Minimization of accidental damage or loss of equipment, materials, and property.

5.2 SITE ACCESS

Because of the potentially hazardous nature of geopressured-geothermal well drilling and testing operations, the T-F&S Project Manager controlled access to the test site and arranged all visits of nonproject personnel. A sign-in book and security were provided on a 24 hour basis.

5.3 FIRE PROTECTION

Hand operated fire extinguishers for the drilling rig and other surface equipment were provided. Extinguishers were available for control of Class A, B, and C fires.

5.4 INDUSTRIAL HYGIENE

Potable water and chemical or standard toilets were provided at all areas where personnel were stationed on a full-time basis. The chemical toilets were serviced on a regular basis. Solid wastes were disposed of appropriately.

5.5 SAFETY HAZARDS

5.5.1 Hydrogen Sulfide

Normal precautions were taken by placing H₂S detectors in the drilling fluid pit areas and monitoring same with the mud logging unit. H₂S monitor with 4 each sensor heads were installed.

5.5.2 BLOWOUTS

Procedures to control blowouts were formulated in the drilling plan as follows:

Should a severe "well kick" develop, the Hydril will be closed and the choke line opened. Circulation will continue while slowly increasing the weight of the drilling fluid. After sufficient weight material (barite) has been added, the Hydril will be opened. Circulation will continue for a length of time necessary to completely stabilize the mud at the new weight. The pump will be shut down and the well observed. If the drilling fluid is stable, normal operations will be continued.

During the course of the well killing procedure with the Hydril closed, the drill pipe will periodically be moved to lessen the chance of the drill pipe becoming stuck in the hole. Should the Hydril fail, the upper preventer will be closed and circulation continued with the drill pipe in place.

5.6 MEDICAL CARE

All rig and administrative staff were trained in first aid and H₂S first aid procedures, and regular safety meetings were held in the trailer house near the rig. A designated first aid room was set aside for treating all injuries. An industrial 36 unit first aid kit and sufficient back-up first aid supplies were provided.

Arrangements were made with a nearby helicopter service company to be at the rig within 15 minutes of receiving our call, should there be a serious injury to anyone on the site. The seriously injured person would then be flown to St. Lukes Memorial Hospital in Lake Charles.

5.7 REPORTING ACCIDENTS/INCIDENTS

5.7.1 GUIDELINES

The following guidelines were used to report all accidents or incidents on the site:

Report promptly to the DOE Nevada Operations Office Duty Officer all accidents and/or incidents arising during field operations set forth in this plan. The Duty Officer is available at all times (24 hours per day, 7 days per week) at phone number (702) 734-3343. Provide sufficient detail

in the telephone report to the Duty Officer to reasonably describe the cause(s), the current status and planned remedial actions.

5.7.2 REPORTING CATEGORIES

All fatalities.

All accidents involving serious injury to personnel.

Any accident or occurrence which could arouse significant public interest or have significant environmental impact.

5.7.3 ACTUAL INCIDENTS REPORTED

On May 17, 1981 a fire, apparently set with a flammable liquid, destroyed approximately one fourth of the drilling pad. The fire was extinguished by the Cameron Parish Fire Department. Damage was \$43,000.

On July 17, 1981 a Halliburton employee injured his lower right arm when he slipped while carrying stands across Koomey unit pipes.

On October 24, 1981 a Merit employee fractured his right leg when a pipe rack he was moving with a forklift slipped and hit his leg.

6.0 GEOLOGY

6.1 REGIONAL GEOLOGICAL SETTING

During the Cenozoic Era, the continental margin of southwestern Louisiana has progressively built Gulfward through processes of sedimentation. The upper slope and outer shelf are normally characterized by instability with a tendency to form gigantic slumps. Simultaneous sedimentation results in contemporaneous growth faults with abnormally thick deposits of deeper water facies on the basin side, contrasted to shallower water or deltaic deposits on the shoreward side. As a shelf edge moves intermittently basinward, continental facies of massive sands of relatively even thickness and low dip are superposed on the earlier faulted and tilted shales and sands of variable thickness.

In southern Louisiana, these sediments of geosynclinal thickness have been superposed on the deeply buried thick Louann salt bed, which has responded to differential sedimentation by lateral migration into salt ridges, massifs, and ultimately, in some cases, into piercement domes. Early formation of localized basins and ridges by salt migration influenced the geographical location of thicker and thinner sedimentary accumulations, which in turn reinforced the continued migration of the salt. Thus, sedimentary depocenters and embayments bounded by contemporaneous growth faults have developed in areas where salt evacuation has been pronounced.

The shelf edge extended east-west through Beauregard and Allen Parishes, 70 miles north of the prospect, during deposition of the early Eocene Wilcox Formation. Today it is 145 miles to the south, off the present coastline. The prospect area was occupied by unstable slope and outer shelf conditions with associated growth faults during the deposition of the upper portion of the lower Miocene Napoleonville formation. The target sands are outer shelf deposits of uppermost Lower Miocene characterized by the microfossil *Crestellaria A*; the underlying shales are deeper water upper slope deposits characterized by the microfossil *Siphonina davisii*.

6.2 GEOLOGY OF THE GLADYS McCALL PROSPECT AREA

6.2.1 WIRELINE LOGS AND CORES OF T-F&S/DOE GLADYS McCALL NO. 1

Five logging runs were made during the drilling of the well, with the suites of logs run as follows:

Run #1	4,500' - 873'
	Dual induction/sonic/gamma ray

Run #2	14,502' - 4,486'
	Dual induction/sonic
	Compensated neutron/formation density/gamma ray
	High resolution dipmeter
Run #3	15,080' - 14,414'
	Dual induction/gamma ray
Run #4	15,620' - 14,750'
	Dual induction
Run #5	16,510' - 14,210'
	Dual induction/sonic
	Dual induction/compensated neutron/formation
	density/gamma ray
	High resolution dipmeter
	Volan

Note that Run 5 overlaps Run 4.

See Table 6-1 for diamond core analysis and Table 6-2 for sidewall core analysis.

See also Appendix A - Logging Program.

6.2.2 SUBSURFACE GEOLOGY

The following geologic interpretation was made based solely on well logs. Three seismic lines are available from this area, and a synthetic seismogram is being computed for the T-F&S/DOE Gladys McCall No. 1 well (Gladys McCall well). This interpretation will be revised upon completion of the seismic study.

The Gladys McCall well geopressured-geothermal reservoir is structurally controlled by three major growth faults. The prospect lies in one of several fault blocks which are successively down dropped to the coast. One of the faults cuts the Gladys McCall well at 16,350 feet and forms the northern boundary of the reservoir. The dip in the well is south to southeast, but within the target sand the rollover into the fault becomes pronounced. Throughout much of the target sand section the dip is north at angles of 10-30°. The major faults are shown on the structure map in Figure 6-1.

The stratigraphic section of the Gladys McCall well consists of alternating massive sands and shales, with the shales becoming increasingly thick below 11,000 feet. The target

TABLE 6-1

Porosity and Permeability Analyses of Gladys McCall No. 1
Diamond Cores by Core Laboratories

SMP NO	DEPTH	PERM MD HORZ (KA)	POR %	OIL% PORE	WTR% PORE	PROD PROD	GAS% BULK	DESCRIPTION

CORE NO.1 CUT 12' REC 10' 15167' TO 15179'

15167.0-77.0
15177.0-79.0SHALE
LOST CORE

CORE NO.2 CUT 19' REC 13' 15179' TO 15198'

15179.0-82.7

SHALE

1	15182.7-84.0	64.	18.8	0.0	83.8	WTR	3.1	SD FG CLN NO FLU
	15184.0-84.8							SD VF-FG SLTY UCALC
2	15184.8-86.0	220.	18.0	0.0	83.8	WTR	2.9	SD FG CLN NO FLU
3	15186.0-87.0	185.	20.1	0.0	61.9	WTR	7.7	SD FG CLN NO FLU
	15187.0-87.5							SD FG SLTY UCALC
4	15187.5-89.0	93.	18.2	0.0	64.3	WTR	6.5	SD FG CLN NO FLU
5	15189.0-91.0	545.	20.8	0.0	83.3	WTR	3.5	SD FG CLN NO FLU
	15191.0-92.0							SD FG CLN
	15192.0-98.0							LOST CORE

CORE NO.3 15348' TO 15375' CUT 27' REC 26.5'

6	15348.0-50.0	145.	12.2	0.0	88.9	WTR	1.4	SD FG CLN NO FLU
7	15350.0-52.0	61.	12.7	0.0	85.5	WTR	1.8	SD FG CLN NO FLU
8	15352.0-54.0	150.	14.7	0.0	86.5	WTR	2.0	SD FG CLN NO FLU
9	15354.0-56.0	65.	12.2	0.0	97.4	WTR	0.3	SD FG CLN NO FLU
10	15356.0-58.0	21.	15.6	0.0	91.9	WTR	1.3	SD FG CLN NO FLU
11	15358.0-60.0	90.	10.4	0.0	68.9	WTR	3.2	SD FG CLN NO FLU
12	15360.0-62.0	115.	16.8	0.0	95.6	WTR	0.7	SD FG CLN NO FLU
13	15362.0-64.0	90.	15.1	0.0	77.3	WTR	3.4	SD FG CLN NO FLU
14	15364.0-66.0	60.	15.1	0.0	83.2	WTR	2.3	SD FG CLN NO FLU
15	15366.0-68.0	135.	16.1	0.0	73.6	WTR	4.2	SD FG CLN NO FLU
16	15368.0-70.0	80.	13.6	0.0	82.2	WTR	2.4	SD FG CLN NO FLU
17	15370.0-72.0	7.40	15.2	0.0	78.6	WTR	3.3	SD FG CLN DNS NO FLU
18	15372.0-74.0	55.	13.6	0.0	81.5	WTR	2.5	SD FG CLN NO FLU
	15374.0-74.5							SD FG CLN NO FLU
	15374.5-75.0							LOST CORE

DEPTH INTERVAL: 15182.0 TO 15374.0

FEET OF CORE ANALYZED : 33.0 FEET OF CORE INCLUDED IN AVERAGES: 28.0

-- SAMPLES FALLING WITHIN THE FOLLOWING RANGES WERE AVERAGED --

PERMEABILITY HORIZONTAL RANGE (MD.)	:	7.4 TO 545.	(UNCORRECTED FOR SLIPPAGE)
FLUID POROSITY RANGE (%)	:	10.4 TO 100.0	
OIL SATURATION RANGE (%)	:	0.0 TO 0.0	
WATER SATURATION RANGE (%)	:	61.9 TO 97.4	

SHALE SAMPLES EXCLUDED FROM AVERAGES.

TABLE 6-1

(continued)

AVERAGES FOR DEPTH INTERVAL: 15182.0 TO 15374.0

AVERAGE PERMEABILITY (MILLIDARCIES)		PRODUCTIVE CAPACITY (MILLIDARCY-FEET)	
ARITHMETIC PERMEABILITY	: 126.	ARITHMETIC CAPACITY	: 3531.
GEOMETRIC PERMEABILITY	: 94.	GEOMETRIC CAPACITY	: 2629.
HARMONIC PERMEABILITY	: 74.	HARMONIC CAPACITY	: 2060.
AVERAGE POROSITY (PERCENT)	: 15.4	AVERAGE TOTAL WATER SATURATION (PERCENT OF PORE SPACE)	: 83.9
AVERAGE RESIDUAL OIL SATURATION (PERCENT OF PORE SPACE)	: 0.0	AVERAGE CONNATE WATER SATURATION ** (PERCENT OF PORE SPACE)	: 83.9

** ESTIMATED FROM TOTAL
WATER SATURATION.

TABLE 6-2

Porosity and Permeability Analyses of Gladys McCall No. 1
Sidewall Cores by Core Laboratories

REC IN	DEPTH FEET	PERM MD(*)	POR %	OIL% PORE	WTR% PORE	PROB PROD	OIL% BULK	GAS% BULK	GAS DET	CRIT WTR%	DESCRIPTION
0.6	14570.0	16.	19.3	4.9	72.2	OIL	1.0	4.4	0	62	SD VFG SHY LAM VSLTY STKS GLD FLU
0.0	14605.0										EMPTY BOTTLE
0.8	14625.0	160.	25.9	10.3	69.0	OIL	2.7	5.4	0	46	SD VFG CLN VSLTY GLD FLU(37API)
0.5	14645.0	94.	23.8	2.7	77.8	WTR	0.6	4.6	0	50	SD VFG VSSHY VSLTY FT FLU
0.5	14660.0	4.2	14.9	0.0	89.9	(6)	0.0	1.5	0	62	SD VFG VSHY VCALLC NO FLU
0.0	14685.0										MUDCAKE
0.8	14715.0	275.	27.3	10.3	73.6	OIL	2.8	4.4	0	42	SD VFG CLN SLTY GLD FLU(35API)
0.0	14730.0										EMPTY BOTTLE
0.8	14745.0	285.	27.9	9.6	73.7	OIL	2.7	4.6	0	42	SD VFG CLN SLTY GLD FLU(35API)
0.8	14790.0	240.	27.1	14.3	68.0	OIL	3.9	4.8	0	43	SD VFG CLN SLTY GLD FLU(33API)
0.5	14935.0	205.	26.5	16.7	63.3	OIL	4.4	5.3	0	45	SD VFG CLN SLTY GLD FLU
0.5	14950.0	22.	22.5	2.2	80.0	WTR	0.5	4.0	0	43	SD VFG SSHY VSLTY FT FLU
0.5	15285.0	37.	22.8	2.1	82.5	WTR	0.5	3.5	0	59	SD VFG SSHY VSLTY FT FLU
0.5	15350.0	190.	26.1	4.9	79.7	WTR	1.3	4.0	0	45	SD VFG CLN SLTY FT GLD FLU
0.5	15360.0	28.	22.4	2.5	86.0	WTR	0.6	2.6	0	61	SD VFG SSHY VSLTY FT FLU
0.5	15400.0	38.	22.9	4.9	87.3	WTR	1.1	1.8	0	58	SD VFG SSHY VSLTY FT GLD FLU
0.5	15420.0	84.	25.2	1.7	85.5	WTR	0.4	3.2	0	53	SD VFG VSSHY VSLTY FT FLU
0.8	15460.0	40.	23.6	3.3	86.5	WTR	0.8	2.3	0	59	SD VFG SSHY VSLTY FT GLD FLU
0.5	15470.0	31.	23.3	2.2	81.5	WTR	0.5	3.8	0	61	SD VFG SSHY VSLTY FT FLU
0.8	15500.0								0		SHALE
0.5	15520.0	20.	22.8	1.5	87.4	WTR	0.3	2.5	0	64	SD VFG SSHY VSLTY FT FLU
0.0	15540.0										EMPTY BOTTLE
0.5	15550.0	78.	25.3	3.0	82.6	WTR	0.8	3.7	0	54	SD VFG VSSHY VSLTY FT FLU
0.3	15610.0					(3)			0		SD VFG SSHY VSLTY FT FLU
0.0	15620.0										EMPTY BOTTLE
0.3	15660.0					(3)			0		SD VFG SSHY VSLTY FT FLU
0.0	15680.0										EMPTY BOTTLE
0.0	15720.0										EMPTY BOTTLE
0.0	15760.0										EMPTY BOTTLE
0.5	15810.0	35.	23.7	1.7	86.7	WTR	0.4	2.7	0	61	SD VFG SSHY VSLTY FT FLU
0.0	15835.0										EMPTY BOTTLE
0.8	15890.0								0		SHALE CALC
0.3	16020.0								0		SHALE CALC

TABLE 6-2
(continued)

REC IN	DEPTH FEET	PERM MD(*)	POR %	OIL% PORE	WTR% PORE	PROB PROD	OIL% BULK	GAS% BULK	GAS DET	CRIT WTR%	DESCRIPTION
0.0	16040.0										EMPTY BOTTLE
0.5	16160.0	48.	24.1	0.0	85.7	WTR	0.0	3.4	0	57	SD VFG SSHY LAM SLTY NO FLU
0.3	16166.0					(3)			0		SD VFG SSHY VSLTY NO FLU
0.0	16185.0										EMPTY BOTTLE
0.5	16215.0	96.	24.5	1.2	91.0	WTR	0.3	1.9	0	50	SD VFG VSSHY CALC FT FLU
0.5	16230.0	415.	27.2	0.0	89.3	WTR	0.0	2.9	0	39	SD VFG CLN SSLTY NO FLU
0.0	16240.0										EMPTY BOTTLE
0.0	16245.0										EMPTY BOTTLE
0.5	16250.0	18.	21.7	0.0	84.6	WTR	0.0	3.3	0	44	SD VFG SSHY VSLTY NO FLU
0.8	16315.0	6.5	17.2	0.0	91.9	(6)	0.0	1.4	0	64	SD VFG SHY LAM VCALC NO FLU
0.0	16350.0										EMPTY BOTTLE
1.0	16455.0								0		SHALE CALC

PLEASE NOTE: GRAVITY OF OIL RETORTED FROM MUDCAKE
@ 14685' = 37 API

(3) INSUFFICIENT SAMPLE
(6) LOW PERMEABILITY

(*) PERMEABILITY VALUES FOR PERCUSSION TYPE SIDEWALL
CORES DETERMINED EMPIRICALLY.

NOTE: CRIT WTR% IS AN ESTIMATE OF THE MAXIMUM WATER EACH SAMPLE COULD CONTAIN IN THE FORMATION IF IT IS HYDROCARBON PRODUCTIVE. IT IS SOLELY DEPENDENT UPON THE PERMEABILITY AND POROSITY AND HAS NO RELATIONSHIP TO THE WATER % PORE MEASURED IN THE SAMPLE. IN PRODUCTIVE ZONES THE WATER SATURATION CALCULATED FROM THE INDUCTION LOG TRUE RESISTIVITY SHOULD BE LESS THAN THE CRITICAL WATER.

FIGURE 6-1

Structure Map Contoured on Top of "A" Sand T-F&S/DOE Gladys McCall No. 1 Prospect Area

sand is of lower Miocene, post-Anahuac age. It lies between two key microfossils: *Cristellaria* A, which is first noted several thousand feet above the top of the target sand; and *Siphonina davis*, which occurs immediately below the base of the target sand section. *Cristellaria* is a shallow water microfossil of Ecologic Zone 3, whereas *Siphonina* occurs in deep water sediments in Ecologic Zone 4. No sands of significant thickness occur below *Siphonina*. The target sand sediments were deposited on the outer shelf or upper slope in lower Miocene time.

Two cross-sections, one north-south (AA') and one east-west (BB'), show the structure of the Gladys McCall area in Figures 6-2 and 6-3, respectively. One major fault cuts the Sun Sturlese well (located approximately 1 mile north of the well site) at approximately 15,500 feet, and cuts out most of the target sand. The deep water microfossil *Siphonina davis* was found at 15,720 feet in the Sun Sturlese well. The second fault cuts the Gladys McCall well at 16,350 feet, and cuts out about half the stratigraphic section of the target sand. Correlation of the section in the Gladys McCall well with the Union of Cal Miller well to the south shows pronounced thickening toward the Gladys McCall. The individual sands correlate extremely well, down to the top sand of the "C" interval. Below this is shale in the Gladys McCall well. The *Siphonina davis* microfossil, found at 17,540 feet in the Miller well, was picked at 16,440 feet in the Gladys McCall; therefore, these two points definitely correlate and indicate that a great thickness of the section is missing in the Gladys McCall well. The dipmeter log shows an increasingly strong northerly dip throughout the target sand section in the Gladys McCall; at 16,350 feet, the dip abruptly changes to a southeast dip. The north dip would again agree with a rollover into the fault, with the abrupt change in dip direction marking the fault crossing the wellbore. Thus, the target sands are very close to a major growth fault which forms the northern boundary of the reservoir.

The third major fault in the area lies some 1-2 miles south of the Gladys McCall site. This fault is interpreted based on the absence of *Siphonina davis* in the Pan Am SL 4079. If the sands were just pinching out, then the *Siphonina davis* bug should be present in the well; but down to a depth of 18,391' this microfossil was not found. There is also a lack of correlation of individual sands below the "B" interval between the Union of Cal and Pan Am wells. This indi-

FIGURE 6-2

Cross Section AA' (North - South)

FIGURE 6-3

Cross Section BB' (West - East)

cates that there is a fault between the Miller and Pan Am wells, which thickens the "C" interval substantially in the Pan Am well. This fault may, or may not, extend far enough up in the section to form a barrier to the target reservoir.

The geology is less clearly defined in an east-west direction. The two faults north of the Gladys McCall site converge to the west cutting the Cherryville #1A Miller well at approximately 16,100 feet, and cutting out most of the target sand. One additional fault is postulated to the east, between the Union Texas and Pan Am SL 4080 wells. This fault may, or may not, converge with the faults north and south of the well site and form the eastern boundary of the reservoir. Due to the lack of deep well control east and west of the well site, the length of the fault block can only be estimated at this time; according to the current structural interpretation it is on the order of 7-8 miles, making a total reservoir area of 10-12 square miles.

See also Appendix B - Paleodata

6.2.3 GEOHERMAL GRADIENT AND TEMPERATURE

Uncorrected bottom-hole temperatures of the five deep wells in the Gladys McCall area and the Gladys McCall well have been plotted in Figure 6-4. The solid black line in this figure is the average Gulf coast geothermal gradient of 1.5°F per 100 feet. At the top of the geopressure (around 14,500 feet), these uncorrected temperatures are 50°F cooler than average. This indicates a geothermal gradient in the hydrostatic zone less than the average gradient; this has been estimated at 1.11°F/100 feet. However, within the geopressured zone the gradient is higher than the average (2.07°/100 feet) and at the target depth of 16,000-17,000 feet, the temperatures are only 30°F cooler than the average. If the entire AAPG correction factor is applied to these temperatures, they would increase at these depths by about 20°-30°F, and would then be equal to or perhaps slightly below the average temperature. It is not clear at this time whether the entire correction factor should be applied.

The uncorrected temperatures from the Gladys McCall well in the zone of interest are 270°F at 15,080 feet, 284°F at 15,600 feet, and 286°F at 16,510 feet. If these last two temperatures are correct relatively, that would indicate a very low gradient within the prospective sands, and a much higher one in the surrounding shales. The AAPG correction factors for these temperatures are 30°F, 29°F, respectively

FIGURE 6-4

Uncorrected Subsurface Temperatures from Five Deep Area Wells and
TF&S/DOE Gladys McCall No. 1

Thus the maximum temperature that could be expected in the target sand is 313°F.

6.2.4 GEOPRESSURE DISTRIBUTION

The subsurface in the Gladys McCall area is characterized by hydrostatic pressures to depths of 14,200-14,400 feet. A rough estimate of bottom-hole pressure from shale resistivities is 12,500 psi, or an equivalent mud weight of 15.2 lb./gal. This figure is probably low. A more reasonable estimate of bottom-hole pressure is 13,000 psi. If the bottom-hole pressure is 13,000 psi, the expected static wellhead pressure would be about 5,600 psi.

6.2.5 SAND CHARACTER

There are approximately 1,150 net feet of sand in the Gladys McCall well from 14,412-16,320 feet. This is about 70% as much sand as is present in the Union of Cal Miller, even though only about half the stratigraphic section is present in the Gladys McCall well. This is another indication of the thickening of the section towards the Gladys McCall well. The section is thickest at the Gladys McCall site and thins to the east, west, and south. Although the sands are very distinct and correlative in a well one mile away, further south they break up and begin to shale out.

Three diamond cores were taken in the upper part of the target sand, at the following depths: Core No. 1 - 15,167-15,177 feet, Core No. 2 - 15,179-15,192 feet, Core No. 3 - 15,348-15,374.5 feet. In addition, 28 sidewall cores were taken over the entire production interval. The results of the porosity and permeability analysis for the diamond cores are given in Table 6-1, and for sidewall cores in Table 6-2. See also Appendices C and D for a core log and a special core analysis study. There is a major discrepancy between the diamond core porosities and the sidewall core porosities for the same depth, notably 15,350 feet and 15,360 feet. The diamond core porosities are 12.9% and 10%, respectively, while the sidewall core porosities are 26% and 22%. The diamond core porosities are most likely nearer the true values. The high values of the sidewall cores are probably due to the exposure of the formation to the drilling mud for a long period of time and the percussion effect when the bullet hit the formation. The neutron-density log shows an average porosity of 15%, and the sonic log 10%; these agree with the diamond core porosities.

The cuttings from 15,600-15,900 feet showed a large amount of very fine grained white material, which the mud logger called anhydrite. As this did not seem completely reasonable, samples from 15,650-15,680 feet were sent to Accumin Analysis for XRD analysis. The results of these analyses are given in Table 3. No anhydrite was noted; the white material was most likely fine grained quartz and/or kaolinite. Some white chips were also present in the cuttings, and an SEM analysis of these chips showed that these were of three types. Some were shell fragments and some were kaolinite, but the majority were rock chips of microcrystalline quartz with inclusions of feldspar and calcite.

Core laboratories performed XRD analyses on plugs from the diamond cores, and the average analysis is also shown in Table 6-3.

Permeabilities for 6 the 11 zones in the target sand sequence were estimated from diamond and sidewall core data. Permeabilities for the remaining 5 zones were not estimated, since no data for those zones were available. An estimate of permeability to water was made from the measured air permeability, and the Kh and %Kh calculated for the 6 zones. These data are given in Table 6-4. The six zones were estimated to have some 20,000 md-ft available which could be sufficient to produce 40,000 B/D of brine. Two-thirds of Kh was contained in the two thickest sands, zones 2 and 8.

Intercomp made a more rigorous calculation of permeability through a computer program using the open hole log data. Their calculated K, Kh and %Kh for the 11 zones are also given in Table 6-4. Permeabilities to water range from 2 to 30 md, with a total available Kh of 18,600 md-ft. This should still be sufficient to produce 40,000 B/D of brine. Zones 2 and 8 contain approximately 50% of the total Kh, with zones 9 and 10 making up another 30%. The remaining zones are of lesser importance.

6.2.6 FLUID SALINITY

The salinity of the brine had been estimated from other wells in the area at 100,000 ppm NaCl. Salinities have since been calculated from the electric logs by five methods: conventional SP, Rwa, Dunlap's Kf, conductivity, and Bassionni's Shale resistivity. Salinities were calculated for 11 sands from 14,412-15,854 feet. This ignores the lower sand, because it is below the 7 inch casing and is

TABLE 6-3

X-RAY DIFFRACTION ANALYSES OF GLADYS McCALL NO. 1 CORE

<u>Mineral</u>	<u>Percentages</u>		
	<u>Accumin Analysis</u>		<u>Core Laboratories</u>
Quartz	79	68	91
Feldspar	3	2	6
Calcite	1	1	0
Barite	7	20	NR
Kaolinite	7	6	2-3
Illite	3	3	
Chlorite	trace	trace	trace

TABLE 6-4

Permeability And Hydraulic Capacity Data-Gladys McCall No. 1

Sand Zone No.	Interval	Net Thickness	Preliminary Estimate, Ka	Preliminary Estimate, Kw	Preliminary Kwh	Preliminary % Kwh	Intercomp Kw	Intercomp Kwh	Intercomp % Kwh
1	14,412-14,465	54'	-	-	-	-	7.30	394.2	2.12
2	14,550-14,772	223'	178	34	7,582	37.33	17.81	3,971.0	21.35
3	14,782-14,800	19'	-	-	-	-	24.96	474.0	2.55
4	14,920-14,969	50'	113	24	1,200	5.91	29.25	1,462.0	7.86
5	15,031-15,066	36'	-	-	-	-	2.11	76.0	0.41
6	15,098-15,108	11'	-	-	-	-	7.85	86.0	0.46
7	15,120-15,137	18'	-	-	-	-	12.96	233.0	1.25
8	15,158-15,490	333'	109	23	7,659	37.71	16.02	5,335.0	28.68
9	15,508-15,636	129'	49	12.5	1,612.5	7.94	27.49	3,546.0	19.06
10	15,642-15,783	142'	44	11	1,562	7.69	15.63	2,219.0	11.93
11	15,784-15,860	77'	35	9	693	3.41	10.46	805.0	4.33
TOTAL		<u>1,092'</u>			<u>20,308.5</u>	<u>99.99</u>		<u>18,601.0</u>	<u>100.00</u>

thus unavailable for testing. For each sand, minimum and maximum resistivity values were used, so that there are two calculations. These results are tabulated in Table 6-5. The conventional SP method gives the lowest values, 25,000-65,000 ppm NaCl. The highest values are those obtained by Dunlap's Kf method, ranging from 100,000 to 140,000 ppm NaCl. These values are probably closest to the true salinity, although until the well is perforated and tested these can only be regarded as estimates. Intercomp has also calculated salinity from the log data through an in-house computer program. These results are also shown in Table 6-5. The Intercomp values are substantially lower than the estimates made by Dunlap's method. However, if the dual water theory is taken into account, the producible water would be significantly more saline than the calculated values, and may possibly approach the Dunlap values.

A brine of 125,000 ppm salinity, at 13,000 psi and 285°F should contain about 32 SCF/B methane at saturation. Until the parameters can be more closely approximated; however this is only an estimate.

6.2.7 PETROLEUM PRODUCTION

Of the 5 deep wells in the Gladys McCall area, 3 have been produced. All of these wells, however, produced from formations above the prospective sand. In producing the test well, there should be no interference with any oil or gas producing wells in the area.

6.2.8 RESERVOIR SIZE

The limits of the target sand reservoir in the T-F&S/DOE Gladys McCall No. 1 well are unknown at this time. However, the reservoir can be expected to have an area of at least 10 square miles. The sands are thickest as they approach the growth fault which cuts the well, and thin to the east, west, and south. Assuming an average of 500 feet of net sand, the reservoir would have a volume of .95 cubic miles. Assuming an area of 10 square miles, an average porosity of 15%, an average thickness of 500 feet, and a B_w of 1.03, the number of stock tank barrels of brine in place is estimated at 3.6 billion barrels. The amount of brine that can be recovered is not known at this time, but may be on the order of 5-10%.

TABLE 6-5

CALCULATED SALINITIES - GLADYS McCALL NO. 1

Sand Zone No.	Interval, ft.	SP	Rwa	Kf	Conductivity	Shale	Intercomp
1	14,412-14,465	65,000	90,000	143,000	65,000	78,000	60,600
		60,000	140,000	135,000	100,000	72,000	
2	14,500-14,772	60,000	300,000	135,000	300,000	72,000	86,600
		65,000	130,000	143,000	130,000	78,000	
3	14,782-14,800	55,000	75,000	132,000	55,000	70,000	65,200
		55,000	105,000	132,000	80,000	70,000	
4	14,920-14,969	45,000	120,000	125,000	120,000	58,000	84,800
		45,000	90,000	125,000	90,000	58,000	
5	15,301-15,066	25,000	300,000	108,000	300,000	48,000	113,200
		25,000	115,000	108,000	105,000	48,000	
6	15,098-15,108	35,000	250,000	113,000	80,000	52,000	69,600
		35,000	-	113,000	39,000	52,000	
7	15,120,15,137	45,000	80,000	125,000	40,000	58,000	75,800
		45,000	300,000	125,000	300,000	58,000	
8	15,158-15,490	55,000	300,000	132,000	300,000	70,000	71,600
		55,000	85,000	132,000	80,000	70,000	
9	15,508-15,636	65,000	115,000	143,000	48,000	78,000	88,000
		65,000	120,000	143,000	62,000	78,000	
10	15,642-15,783	55,000	90,000	132,000	78,000	70,000	91,500
		45,000	92,000	125,000	80,000	58,000	
11	15,784-15,860	55,000	80,000	132,000	78,000	70,000	82,100
		45,000	300,000	125,000	300,000	58,000	

7.0 T-F&S/DOE GLADYS MCCALL NO. 1 TEST WELL DRILLING AND COMPLETION7.1 INTRODUCTION

Work on the T-F&S/DOE Gladys McCall No. 1 well began May 27, 1981. Drilling was completed November 2, 1981, and completion operations began January 10, 1982 with final completion January 24, 1982. Following is a day-by-day description of operations. See Appendices E through K for additional information on drilling operations.

7.2 DRILLING

- 7.2.1 5/27/81 Picked up hammer. Attempted to drive 30" conductor pipe. Cellar cemented. Rigged down hammer. Drilled 26" hole in cellar and attempted to open hole to 30".
- 7.2.2 5/28/81 Picked up 36" hole opener and 26" bit. Drilled 3' of cement and 5' of formation. Drove 30" casing to 222' (191' below ground level) 38' of free fall. Drove casing to 140 bpf. 1,080,000 lb bearing load. Cut 30" drive pipe.
- 7.2.3 5/29/81 Timco drove 30" drive pipe crooked. Cut, aligned and re-welded top joint. Drilled 26" hole to 160 feet. Survey $1\frac{1}{4}^{\circ}$ at 91 feet (inside drive pipe).
- 7.2.4 5/30/81 Drilled 26" hole to 870 feet. Surveys: 1° at 320 feet, $3/4^{\circ}$ at 630 feet and $1/2^{\circ}$ at 870 feet. Spotted 100 bbl. viscosity pill on bottom with HOWCO pump truck. Pulled out of the hole to start running 20 inch casing.
- 7.2.5 5/31/81 Ran 22 joints 20 inch, K-55, 133 ppf buttress with latch in float collar and guide shoe to 869 feet. Picked up drill pipe and latched into float collar. Rigged up Baker-Line pack-off. Circulated and cemented casing to surface. Pulled out of the hole and waited on cement to set.
- 7.2.6 6/01/81 Waited on cement to set. Tested 20" casing with 1,000 psi for 30 minutes. Cut 20 inch casing.
- 7.2.7 6/02/81 Installed A-section well head. Cemented top of 30" casing. Nippled up bell nipple. Picked up 17 1/2" bit and bottom hole assembly. Drilled cement, float equipment and 19 feet of formation, circulated at casing shoe. No mud loss.
- 7.2.8 6/03/81 Drilled to 1,063'. Pulled out of the hole and picked up stabilizers at 60, 90 and 120 feet above the bit. Survey $1/2^{\circ}$ at 1,063. Ran in hole and started drilling and bit torqued up. Pulled out of the hole and laid

down stabilizers. Ran in hole and started drilling and lost returns. Pulled into 20 inch casing. Mixed 50 bbl. viscosity pill. Spotted pill on bottom and pulled back into 20 inch casing. Drilling ahead with 700 psi pump pressure. Lost 25 bbl./hour. Mixed additional mud volume and drilled to 1,465 feet.

- 7.2.9   Drilled from 1,465 feet to 3,089 feet. Surveys: 2° at
6/04/81   1,514 feet, 3/4° at 2,039 feet and 3/4° at 2,578 feet.

- 7.2.10   Drilled from 3,089 feet to 4,534'. Surveys: 3/4° at
6/05/81   3,095 feet, 1/2° at 3,583 feet and 1/2° at 4,010 feet.
Circulated and conditioned mud. Pulled out of the hole
making steel line measurement correction 63 feet. T.D.
4,471 feet.

- 7.2.11   Ran in hole and drilled from 4,471 feet to 4,500 feet.
6/06/81   Circulated hole clean, displaced gel pill and pulled out
of the hole. Survey 0° at 4,500 feet. Ran caliper log
from 4,500 feet to 668 feet. Ran IES-GR log from 4,500
feet to 873 feet. Ran in hole and circulated and
conditioned mud, spotted viscosity pill on bottom and
pulled out of the hole. Rigged up to run 13 3/8 inch
casing.

- 7.2.12   Ran 29 joints of 13 3/8" 72 ppf L-80 buttress casing, 81
6/07/81   joints of 68 ppf K-55 buttress casing with float shoe,
float collar and 21 centralizers. Circulated and
cemented casing to surface. Nippled down bell nipple.
Waited on cement to set.

- 7.2.13   Waited on cement to set. Ran 1 inch tubing in 20 inch X
6/08/81   13 3/8 inch annulus to 855 feet. Cemented annulus to
surface. Laid down 1 inch tubing. Positioned slips,
cut 13 3/8 inch casing and installed 13 3/8 inch casing
spool.

- 7.2.14   Tested 11" X 13 5/8" spool to 975 psi. Nippled up
6/09/81   blowout preventer and changed out Hydril element.

- 7.2.15   Finished nipping up blowout preventer. Repaired and
6/10/81   tested blowout preventer stack and choke manifold.

- 7.2.16   Finished testing blowout preventer stack. Went in hole
6/11/81   with 12 1/4" bit to top of float collar at 4,441 feet,
drilled float collar and cement to 4,466 feet. Tested
casing to 500 psi. Drilled soft cement from 4,466 feet
to casing shoe. Drilled shoe at 4,488 feet, cement
stringers to 4,500 feet and 10 feet of formation.

Tested shoe - no test. Spotted gel pill - no test. Went in hole and set RTTS tool at 4,340 feet. Tested casing shoe to equivalent of 14.3 to 14.6 ppg mud weight. Started out of the hole.

- 7.2.17
6/12/82 Measured out of hole with RTTS tool. Went in hole with 12 1/4" bit No. 3, took weight at 4,417 feet. Washed and reamed from 4,417 feet to 4,510 feet. Drilled from 4,510 feet to 4,715 feet. Pulled out of hole to pick up stabilizers at 60 feet - 90 feet - 150 feet above bit. Drilled from 4,683 feet to 5,020 feet. Survey at 5,000 feet - 1/2°.
- 7.2.18
6/13/82 Drilled from 5,020 feet to 6,460 feet. Surveys: 5,500 feet-1°, 6,075 feet-1°.
- 7.2.19
6/14/82 Drilled from 6,460 feet to 7,076 feet. Surveys: 6,516 feet - 3/4°, 7,037 feet-3/4°. Installed new electric drawworks motor.
- 7.2.20
6/15/82 Drilled from 7,076 feet to 7,817 feet. Survey at 7,499 feet - 1/4°. Pulled out of hole to change bits.
- 7.2.21
6/16/82 Slip and cut drill line. Measured in hole - (16 feet correction). Drilled from 7,801 feet to 8,350 feet. Laid down 2 joints of washed out drill pipe.
- 7.2.22
6/17/82 Drilled from 8,350 feet to 8,754 feet. Dropped survey instrument and pulled out of hole. Survey at 8,754 feet - 1/4°.
- 7.2.23
6/18/82 Changed out shock sub, made up bit number 6 and went in hole. Drilled 12 1/4 inch hole from 8,754 feet to 9,275 feet. Survey at 9,275 feet - 3/4°. Pulled out of hole.
- 7.2.24
6/19/82 Changed bit and went in hole. Drilled 12 1/4 inch hole from 9,275 feet to 9,891 feet. Survey at 9,710 - 1/4°.
- 7.2.25
6/20/82 Drilled from 9,891 feet to 10,400 feet.
- 7.2.26
6/21/82 Drilled from 10,400 feet to 10,462 feet. Made 15 stand short trip. Drilled from 10,462 feet to 10,805 feet. Pulled out of hole to inspect drill collars. Tight hole at 5,280 feet. Started inspecting drill collars.
- 7.2.27
6/22/82 Finished inspecting drill collars. Layed down 11-8 inch collars and the bit sub with galled shoulders. Tested blowout preventer assembly and cut drill line. Went in hole and washed 30 feet to bottom. Drilled from 10,805 feet to 10,866 feet. Survey at 10,775 feet - 1/2°.

- 7.2.28 Drilled from 10,866 feet to 11,264 feet.
6/23/81
- 7.2.29 Drilled from 11,264 feet to 11,337 feet. Made 15 stand
6/24/81 short trip. Drilled from 11,337 feet to 11,528 feet.
- 7.2.30 Drilled from 11,528 feet to 11,812 feet.
6/25/81
- 7.2.31 Drilled from 11,812 feet to 11,987 feet. Steel line
6/26/81 measured out of hole for new bit.
- 7.2.32 Finished trip in hole, 6 feet correction. Drilled 12
6/27/81 1/4" hole from 11,981 to 12,089 feet. Drilling break
from 12,005 feet to 12,050 feet. Mud cut from 9.2 ppg
to 8.9 ppg. Maximum gas 630 units. Drilled from 12,089
feet to 12,203 feet.
- 7.2.33 Drilled from 12,203 feet to 12,550 feet.
6/28/81
- 7.2.34 Drilled from 12,550 feet to 12,580 feet. Made a 16
6/29/81 stand wiper trip. Drilled from 12,580 feet to 12,827
feet.
- 7.2.35 Drilled from 12,827 feet to 13,022 feet.
6/30/81
- 7.2.36 Drilled from 13,022 feet to 13,120 feet. Dropped
7/01/81 directional survey. Pulled out of the hole to inspect
collars. Rigged up and tested blowout preventers.
- 7.2.37 Tripped in hole to 4,450 feet. Slipped and cut drill
7/02/81 line. Finished tripping in the hole and circulated one
joint off bottom.
- 7.2.38 Drilled from 13,188 feet to 13,370 feet.
7/03/81
- 7.2.39 Drilled from 13,370 feet to 13,547 feet. Drilling
7/04/81 breaks from 13,490 feet to 13,505 feet and from 13,520
feet to 13,527 feet.
- 7.2.40 Drilled from 13,547 feet to 13,607 feet. Short trip.
7/05/81 Drilled from 13,607 feet to 13,697 feet.
- 7.2.41 Drilled 12 1/4 inch hole from 13,697 feet to 13,843
7/06/81 feet. Dropped directional survey. Pulled out of the
hole and rigged up to test blowout preventers. Deviation
of 1 1/2° at 13,827 feet.
- 7.2.42 Repaired leaks and retested blowout preventers. Hydril
7/07/81 tested to 3,500 psi. Tested bottom rams, top rams,
blind rams, choke manifold, super choke, choke lines and
valves, kill line and valves, kelly, kelly cock, stand

pipe, and mud manifold to 5,000 psi. No test on T.I.W. valve. trip in with bit #11 to 12,165 feet. Lost 76 barrels of mud. Circulated until full returns were established. Finished tripping in the hole slowly. Drilled 12 1/4" hole from 13,843 feet to 13,900 feet.

- 7.2.43   Drilled from 13,900 feet to 14,140 feet.
7/08/81
- 7.2.44   Drilled from 14,140 feet to 14,411 feet.
7/09/81
- 7.2.45   Drilled from 14,411 feet to 14,500 feet. Circulated, made 20 stand short trip-hole tight at 14,460 feet, washed 56 feet to bottom. Circulate and condition hole for logging run. Rig up Schlumberger and run ISF Sonic logs, bottom 14,500 feet. Drillers bottom 14,511 feet.
7/10/81
- 7.2.46   Ran ISF Sonic log from 14,483 feet to 4,486 feet. Ran in hole with FDC, CNL-GR. Unable to work through bridge at 13,740 feet. Pulled out of the hole and ran dipmeter survey from 14,486 feet to 10,000 feet (worked through bridges at 13,740 feet and 13,850 feet). Reran FDC-CNL-GR tools, shorted out. Cut 400 feet off of Schlumberger cable and install head.
7/11/81
- 7.2.47   Ran 200 feet with FDC CNL GR, GR shorted out, pulled out of the hole to change GR. Reran in the hole with new logging assembly. CNL shorted out at 14,486 feet. Pulled out of the hole to change CNL tool. Reran log from 14,486 feet to 4,200 feet. Rig up to run temperature survey.
7/12/81
- 7.2.48   Ran temperature survey and tool shorted at 9,000 feet. Reran survey from surface to 14,486 feet. Made trip in hole with 12 1/4 inch bit to 13 3/8 inch shoe. Circulate and change out drilling line and string 12 line. Ran 14 stands drill pipe in hole, bit at 5,369 feet, no mud returns. Broke circulation and reduced pump rate from 100 spm to 8 spm. Mud weight circulating out 12.7 ppg with viscosity of 60 second.
7/13/81
- 7.2.49   Ran in hole to 8,693 feet. Circulate with 13.1 ppg 68 second viscosity mud. Ran in hole to 10,528. Circulate out with mud weight 13.2 ppg and 78 second viscosity. Ran in hole to 12,632 feet. Circulate with 12.6 ppg mud and 53 sec. viscosity. Ran in hole to 14,500 feet. Circulate and condition mud to run 9 5/8 inch casing. Bottoms up mud weighed 12.3 ppg with 75 sec. viscosity.
7/14/81
- 7.2.50   Rig up lay down machine and circulate. Lay down 53
7/15/81

stands drill pipe and bottom hole assembly. Install false rotary table, remove drill pipe rams and install 9 5/8 inch casing rams in top of blowout preventer. Test bonnet seals to 3,500 psi. Rig up to run 9 5/8 inch 53.5# P-110 buttress thread casing, ran 101 joints. Build up mud volume.

- 7.2.51   Finish running 9-5/8 inch 53.5# P-110 buttress thread casing (ran a total of 365 range 3 joints). Rigged up Halliburton cement head. Circulate and worked pipe with full returns. Pipe stuck at 14,487 feet.
7/16/81

- 7.2.52   Circulated and condition hole. Cemented 9 5/8 inch casing with 2,400 sacks of Texas light weight cement with 1,900 sacks of Class A plus 40% silica flour and 0.2% HR 5. Slurry density of 16.2#/gal. Displaced cement with Halliburton pumps and bumped plug with 3,000 psi. Had 450 barrels of cement returns at the surface. Rigged down blowout preventers, well started flowing cement in annulus. Rigged up preventers and shut well in. Rigged up Schlumberger and ran temperature survey.
7/17/81

- 7.2.53   Finished running temperature survey. Ran sinker bar down 9 5/8 inch and 13 3/8 inch annulus. Cement top at 90 feet. Backed off cementing head and layed down one (1) joint of casing. Picked up and made up one joint of 9 5/8 inch, pulled on 9 5/8 inch casing with 820,000#, slacked off all casing weight. Collar remained in slip bowl area. Stand by for delivery of casing spool. Picked up 13 5/8 inch 5,000 X20 inch 2,000 casing spool and cut collar off 9 5/8 inch casing. Laid down one joint 9 5/8 inch casing and removed casing spools from bottom of preventer stack.
7/18/81

- 7.2.54   Nippled down 13 5/8 inch 5,000 X 20 inch 3,000 spool. Wait on P seals. Nippled up casing spool. Nippled down 13 5/8 inch 5,000 X 20 inch 3,000 spool. Waited on P seals. Nippled up casing spool. Attempted to make up joint of 9 5/8 inch casing to the casing string. Picked up and hung spools on bottom of blowout preventer. Made up joint of 9 5/8 inch casing in new collars by hand, rigged up hydraulic tongs and made up joint of casing on casing string, installed casing head.
7/19/81

- 7.2.55   Torqued up bolts in casing spool. Set type AW casing slips with 710,000# weight (slips set too deep in head and could not energize seals). Pulled slips and set CA slips in bowl with 150,000#. Slipped and cut 110 feet of drilling line, pulled 900,000# with rig and set 9 5/8 inch casing with 700,000# on slips. Cut off 9 5/8 inch
7/20/81

casing. Nipped up casing head and tested packing to 3,100 psi. Removed false rotary table and nipped up blowout preventer.

9 5/8" casing set and cemented at 14,487 feet.

- 7.2.56 Nipped up and tested blowout preventors.
7/21/81
- 7.2.57 Picked up bottom-hole assembly without stabilizers on
7/22/81 drill pipe and measured in hole with 8 1/2" bit. Tagged cement at 14,314 feet. Displaced 12.5 ppg mud with 14.5 ppg mud.
- 7.2.58 Drilled cement and float collar. Tested casing to 3,000
7/23/81 psi. Drilled casing shoe and washed 84 feet to bottom at 14,510 feet. Ran leak off test equivalent to 17.7 ppg mud. Drilled from 14,510 to 14,541 with excessive torque. Gas cut mud. Increased weight from 14.5 ppg to 14.8 ppg. Excess torque was experienced after drilling a thin sand from 14,510' to 14,520'.
- 7.2.59 Increased mud weight to 15.0 ppg. Drilled from 14,541
7/24/81 to 14,714. Increased mud weight to 15.8 ppg. Well flowed at 14,714 feet and increased mud weight to 16.8 ppg.
- 7.2.60 Killed well and increased mud weight to 17.0 ppg.
7/25/81 Drilled from 14,714 feet to 14,796 feet.
- 7.2.61 Drilled from 14,796 feet to 14,836 feet. Short trip and
7/26/81 pulled out of hole. Survey 1° at 14,834 feet. Picked up drilling jars. Bit #12 drilled 326' in 31 1/2 hours or 10.3 fph. The bit graded T-8, B-8 and 1/2" under gauge.
- 7.2.62 Went in hole with 8 1/2" Journal bearing mill-tooth bit
7/27/81 and stabilizers at 60'-90'-150' above bit. Reamed from 14,659 feet to bottom. Excessive torque and sticking with stabilizer at 14,730 feet to 14,740 feet. As a result of the kick, the first coring point was abandoned and with only 314' to drill to the second coring interval from 15,150' to 15,210', it was not prudent to use a diamond bit.
- 7.2.63 Drilled from 14,836 feet to 15,032 feet.
7/28/81

- 7.2.64
7/29/81 Drilled from 15,032 feet to 15,080 feet. Pulled out of hole. Survey $1\frac{1}{2}^{\circ}$ at 15,080 feet. Left one cone in hole. Tested BOP's. Bit #13 drilled 244' in 33 hours or 7.4 fph. The bit was graded T-8, B-8 with one cone left in the hole.
- 7.2.65
7/30/81 Went in hole with reverse circulating jet basket, washed and reamed from 14,987 feet to 15,080 feet. Cut 2 foot core and recovered lost cone. Waited on Schlumberger logging truck.
- 7.2.66
7/31/81 Ran IES log from 15,080 feet to 14,400 feet. Went in hole with bit and drilled from 15,080 feet to 15,166 feet. The log was run to verify correlation for the next coring interval at 15,140+. Bit #14 drilled the 155' in 20 hours or 7.8 fph. The bit graded T-4, B-6.
- 7.2.67
8/01/81 Pulled out of hole. Picked up 7 7/8" diamond core bit and core barrel assembly. Cut core from 15,166 feet to 15,178 feet. Core barrel jammed. Pulled out of hole.
- 7.2.68
8/02/81 Recovered net 10 feet of 12 foot core. Went in hole with coring assembly. Cut core No. 2 from 15,178 feet to 15,197 feet. Core barrel jammed. Pulled out of hole. From the appearance of the core, the coring assembly was cutting a spiral core.
- 7.2.69
8/03/81 Recovered 13 1/2 feet of core. Went in hole with security S-84-F rerun bit and reamed core hole from 15,166 feet to 15,197 feet. Drilled from 15,197 feet to 15,256 feet.
- 7.2.70
8/04/81 Drilled from 15,256 feet to 15,266 feet. Pulled out of hole. One cone loose. Went in hole with new bit. Washed and reamed from 14,760 feet to 14,900 feet.
- 7.2.71
8/05/81 Finished washing and reaming to bottom at 15,266 feet with near bit stabilizer. Drilled from 15,266 feet to 15,289 feet with excessive torque. Pulled out of hole.
- 7.2.72
8/06/81 Went in hole to tight spot at 15,288 feet. Washed and reamed from 15,203 feet to 15,289 feet (bottom). Drilled from 15,289 feet to 15,317 feet with excessive torque.
- 7.2.73
8/07/81 Pulled out of hole. Went in hole with 8 1/2" diamond bit. Reamed to bottom with diamond bit, without weight.

Excess torque. With only 220' of new hole drilled in four days as a result of under gauge and pinched, bit problems, it was decided to run the diamond bit even though the third core point was 31' down the hole. weight.

- 7.2.74
8/08/81 Drilled from 15,317 feet to 15,348 feet. Dropped survey, pulled into casing to recover survey instrument. Recovered top half of TOTCO instrument. Pulled out of hole. Survey 2° at 15,317 feet. Picked up coring equipment. Went in hole. The diamond bit followed the under gauge bit without any problems. It was recommended by the Drilling Department that an 8 3/8" core bit be used on future coring as the pinched bit problem offset the advantage of reduced differential sticking. The interval was cored with a 7 7/8" assembly.
- 7.2.75
8/09/81 Cored from 15,348 feet to 15,356 feet. Excess torque. Pipe stuck. Jarred one time and freed pipe. Reamed 5 feet to bottom. Cored from 15,356 feet to 15,375 feet.
- 7.2.76
8/10/81 Cored from 15,375 feet to 15,376 feet. Chained out of hole. Recovered 26 1/2 feet of core. Went in hole with 7" bladed mill and 8 3/8" watermelon mill. Reamed core hole from 15,255 feet to 15,328 feet. Stuck. Jarred free. Excess torque. As a result of pinched bit problems enlarging the cored interval from 7 7/8" to 8 3/8" with a bit, it was decided to use a combination blade and watermelon mills to open the hole. The mills were extremely slow in opening the hole from 7 7/8" to 8 3/8".
- 7.2.77
8/11/81 Reamed core hole from 15,328 feet to 15,349 feet with excess torque. Started to pull out of the hole. Ran into crown. No severe damage. Two inches from the bottom of the watermelon mill, the mill was 1/4" undergage. Tested blow out preventers. Went in hole with 8 1/8" bladed mill and 8 3/8" watermelon mill.
- 7.2.78
8/12/81 Reamed core hole from 15,270 feet to 15,349 feet. Steel line measure out of hole. Corrected total depth to 15,370 feet. Lost one mill blade in hole. Picked up jet basket and new Daily jars. Ran in the hole with new bottom hole assembly.
- 7.2.79
8/13/81 Went in hole to 15,339 feet. Washed and reamed from 15,339 feet to 15,364 feet. Pulled out of the hole. Recovered mill blade and piece of tong die. Went in hole with 8 3/8" bit with near bit stabilizer. Reamed from 15,339 feet to 15,364 feet.

- 7.2.80 Reamed from 15,364 feet to 15,370 feet. Drilled from
8/14/81 15,370 feet to 15,375 feet. Pulled out of hole. Survey
2° at 15,360 feet. Picked up diamond bit. Went in
hole. Reamed from 15,312 feet to 15,375 feet. Drilled
from 15,375 feet to 15,394 feet. A mill tooth bit was
used to enlarge the last 61' of core hole. The bit was
slightly under gauge when pulled, supporting previous
experience with under gauge and pinching of bits used as
hole openers.
- 7.2.81 Drilled from 15,394 feet to 15,472 feet.
8/15/81
- 7.2.82 Drilled from 15,472 feet to 15,508 feet. 5-8% Iron
8/16/81 filings in cuttings. Pulled out of hole. Inspected
bottom hole assembly.
- 7.2.83 Ran McCullough casing inspection log and electronic
8/17/81 caliper from 14,490 feet to 14,404 feet and electronic
caliper from 14,404 feet to 230 feet. Picked up drill
pipe rubbers and went in hole with diamond bit. Drilled
from 15,508 feet to 15,509 feet. Pipe stuck. Full
returns. Unable to rotate or work jars.
- 7.2.84 Worked stuck pipe. Spotted Black Magic in hole. Pipe
8/18/81 came free in 2 hours. Pulled out of hole changed out
Daily jars. Went in hole.
- 7.2.85 Went in hole. Broke circulation at 7,500 feet and at
8/19/81 casing shoe. Washed from 15,448 feet to 15,508 feet
without weight. Drilled from 15,508 feet to 15,534 feet
with excessive torque.
- 7.2.86 Drilled from 15,534 feet to 15,598 feet with excessive
8/20/81 torque.
- 7.2.87 Drilled from 15,598 feet to 15,633 feet with excessive
8/21/81 torque. Stopped rotary 2 minutes to grease swivel, pipe
stuck, jarred free with one stroke. Drilled from 15,633
feet to 15,655 feet with excessive torque. Fifteen
stand short trip. 50,000 lb. drag from bottom to 75
feet off bottom. Washed 95 feet back to bottom.
Excessive torque and rotary stalling with bit 4 feet off
bottom.
- 7.2.88 Drilled from 15,655 feet to 15,659 feet. Drilling
8/22/81 stopped. Pipe rotating free with no torque. Pulled out
of hole. Left diamond bit, shock sub, bit sub and 1
spiral collar in hole. (39.20 feet) Stabilizers under
gauge and some inserts missing. Picked up 8" overshot
with 6 1/2" grapple. Went in hole. Top of fish @
15,620 feet.

- 7.2.89
8/23/81 Raised weight of water cut mud from 14.0 ppg to 17.0 ppg. in tanks. Went in hole to tight spots at 15,587 feet and 15,593 feet. Unable to get below 15,594 feet with overshot. Pulled out of hole. Picked up taper tap. Went in hole to 15,540 feet. Washed to top of fish @ 15,620 feet. Tapped into fish, pulled 100,000 lb. over string weight. Pulled out. Tapped into fish again. Pulled 100,000 lb. over pull. Fish free. Indicator weight increased 2,000 lb.
- 7.2.90
8/24/81 Pulled out of hole. Did not recover fish. Went in hole with new taper tap. Tapped into fish. Worked and jarred fish free. Pulled out of hole.
- 7.2.91
8/25/81 Did not recover fish. Drained blowout preventer stack. 9 5/8" casing stub appeared worn. Set HOWCO retrievable bridge plug at 500 feet. Tested 9 5/8" casing and bridge plug to 3,000 psi. Ran 5 stands and displaced mud in casing. Calipered 9 5/8" casing, 8 5/8" N-S and 9" E-W. Wear not severe. Nippled up blowout preventer.
- 7.2.92
8/26/81 Tested blowout preventer stack. Went in hole to recover HOWCO bridge plug. Left bottom of bridge plug in hole. Ran modified retrieving tool and screwed into fish. Pulled out of hole with fish. Went in hole to 14,400 feet. Conditioned mud.
- 7.2.93
8/27/81 Went in hole 15,220 feet. Reamed from 15,220 feet to 15,439 feet.
- 7.2.94
8/28/81 Reamed from 15,439 feet to 15,504 feet. Pulled out of hole. Ran Schlumberger Dip meter (caliper, azimuth and deflection) from 14,426 feet to 15,010 feet. Tool stuck, closed calipers and pulled out of hole. Ran Borehole Geometry Log from 15,502 feet to 14,414 feet. This directional plot of the Borehole Geometry Log shows the hole spiralling at 15,040' to 15,170' EL. Five changes in direction occurred in this interval. Correlation of drill pipe measurement to log depth indicates that the 7 7/8" core assembly contributed to at least two of the five changes.

Also, the directional shows a departure from the 2° normal hole deviation to 10° from 15,318' to 15,490' (TD of log). This correlates with the third core point of 15,348' to 15,378' drill pipe measurements. Note: correlation from mud log while drilling indicated approximately 30' (decrease) correction on drill pipe measurements to electric log measurements.

- 7.2.95
8/29/81 Ran IES log #4 from 14,750 feet to 14,494 feet. Went in hole with open ended drill pipe to 15,620 feet. Mixed 285 sacks of class H cement with 15% 20-40 mesh sand, 0.75% CFR-2, 0.27% D-Air-1, and 0.7% HR-12 using Halliburton; spotted cement plug from 15,620 feet to 14,900 feet. Pulled 8 stands and circulated out.
- 7.2.96
8/30/81 Circulated hole clean. Pulled out of hole and waited on cement. Inspected bottom hole assembly going in hole. Circulated at 14,312 feet. Circulated green cement at 15,055 feet.
- 7.2.97
8/31/81 Went in hole to 15,213 feet. Circulated out green cement. Washed and reamed soft green cement from 15,213 feet to 15,500 feet (pipe sticking). Circulated hole clean. Pulled out of hole. Picked up 700 feet 2 7/8" tubing. Went in hole.
- 7.2.98
9/01/81 Drifted drill pipe and went in hole with 23 joints of 2 7/8" tubing on the bottom of the string, open ended. Halliburton mixed 300 sacks of Class H cement with 15% 20-40 mesh sand, 15% CFR-2, 0.27% D-Air-1, 1.5% HR-12 and 15 bbls of SAM spacer ahead of and behind the cement. Spotted the 17#/gal. cement plug from 15,500 feet to 14,750 feet with spacer ahead and behind cement. Followed spacer with wiper plug for plug cutter. Latched plug, pulled 9 stands and sheared plug with 3,000 psi. Circulated out. Plug in place at 1930 hours.
- 7.2.99
9/02/81 Layed down 2 7/8" cementing string. Made up bottom-hole assembly, went in hole and tagged cement at 14,681'. Drilled soft cement from 14,681' to 14,887'. Stuck drill pipe. Jarred and worked drill pipe. Spotted 40 Bbls of 17.2 ppg. Black Magic.
- 7.2.100
9/03/81 Pipe free 9 hours after spotting Black Magic. Circulated and conditioned mud. Drilled soft cement from 14,887' to 15,000' without weight. Circulated green cement. Pulled into 9 5/8" casing and waited on cement.
- 7.2.101
9/04/81 Waited on cement. Drilled from 15,000' to 15,072'. circulated hole clean, pulled into 9 5/8" casing and cut 110' of drill line while waiting on cement. Drilled soft cement from 15,072' to 15,530'. Cement did not set in 48 hours. Circulated hole clean at 15,530' and pulled out of hole.
- 7.2.102
9/05/81 Finished pulling out of hole. Picked up 30 joints of tubing with GEMCO "plug back stinger" equipment. In-

stalled HOWCO plug cutter sub and measured in the hole. Circulated and conditioned mud. Went in hole to tight spot at 15,156', picked up Kelly and started washing to bottom.

- 7.2.103
9/06/81 Finished washing to 15,490'. Circulated and conditioned mud. Rigged up Dowell, pumped 40 bbls of 17.2#/gal. spacer, mixed 350 sacks of Lone Star class H cement in a formalin mixture, spotted cement plug from 15,490' to 14,750'. Pulled 10 stands and sheared plug cutter. Circulated bottoms up and pulled out of hole. Cement in place at 1900 hours.
- 7.2.104
9/07/81 Layed down 2 7/8" tubing. Picked up new bottom hole assembly and went in hole to bottom of 9 5/8" casing, circulated and conditioned mud. Went in hole after 24 hours to top of cement and set 20,000 lb. on plug. Washed soft cement to 14,767'. Pulled into 9 5/8" casing and waited on cement.
- 7.2.105
9/08/81 Waited on cement for a total lapsed time of 37 1/2 hours, washed soft cement from 14,728' to 14,767' and circulated bottoms up. Waited on cement for 8 hours, washed and reamed from 14,768' to 14,849'. Layed down 11 joints of drill pipe and ran four stands out of derrick. Washed and reamed to 15,188. Circulated bottoms up, made a short trip into 9 5/8" casing, and washed and reamed from 15,188' to 15,198'.
- 7.2.106
9/09/81 Washed and reamed to 15,290'. Total lapsed time waiting on cement to set of 63 1/2 hours. Circulated hole clean, pulled into 9 5/8" casing, increased mud weight to 17.2 ppg. Washed and reamed from 15,290' to 15,295' at 10 fph. Measured out of hole, picked up hole opener and started in hole.
- 7.2.107
9/10/81 Went in hole to bottom of 9 5/8" casing, cut 110' of drill line and finished in hole to 15,295' without problems. Pulled out of hole, picked up diamond side track 8 3/8" MD411ST bit, Navi-drill, 1 1/2° bent sub, float sub and mule shoe joint, and went in hole. Changed out Daily Jars.
- 7.2.108
9/11/81 Finished in hole, filling drill pipe every 39 stand in. Rigged up wire line steering tool and time drilled to straighten hole and sidetrack fish from 15,300' to 15,310'.
- 7.2.109
9/12/81 Time drilled from 15,310' to 15,338'.

- 7.2.110 9/13/81 Time drilled from 15,338' to 15,344'. Navi-drill stopped. Worked on wire line truck. Started pulling out of hole.
- 7.2.111 9/14/81 Tripped out of the hole. Stand by for mule shoe sub. Oriented mule shoe sub and test Navi-drill. Tripped in hole with drilling assembly. Tripped in hole with wire line steering tool. Drilled from 14,344 feet to 15,359 feet. Steering tool failed and pulled wire line tool out of hole.
- 7.2.112 9/15/81 Cut 300 feet of badly washed out line off steering tool. Ran single shot survey (film burned up). Steering tool shorted out, reheaded tool, tripped in hole and oriented drilling assembly. Drilled from 14,359 feet to 15,361 feet. Probe shorted out, pulled out of the hole to change out probe. Drilled from 15,361 feet to 15,378 feet.
- 7.2.113 9/16/81 Drilled from 15,378 feet to 15,385 feet. Rigged up to run heat shield motion sensor survey. Pulled out of the hole to 12,200 feet. (Blew hydraulic line on Wilson wire line unit. Finished pulling out of the hole with the heat shield survey (oil pump going out on wire line unit). Survey did not take picture. Ran single shot survey. Attempted to circulate while running survey (bit plugged). Film burned. Circulated bottoms up (pressured up to 1,200 psi) to unplug bit. Slugged drill pipe, and pulled into casing. Cut drilling line.
- 7.2.114 9/17/81 Made up kelly hose to kelly. Kelly stuck in rat hole. Washed kelly out of rat hole. Mixed pill and slugged drill pipe. Finished pulling out of hole with Navi-drill. Picked up 8 3/8 inch hole opener. Made up and tripped in hole with new bottom hole assembly. Washed and reamed hole from 15,296 feet to 15,376 feet. Reamed with excessive torque from 15,334 feet to 15,376 feet. Stuck drill pipe. Worked and jarred stuck pipe. Jarred with 360,000#.
- 7.2.115 9/18/81 Worked stuck pipe. Pumped 80 bbls. of Black Magic. Attempted to jar. Pumped one barrel Black Magic every hour. Worked, torqued, and jarred pipe up every 1/2 hour.
- 7.2.116 9/19/81 Let Black Magic soak for 12 hours. Made blind pack-off. Backed drill pipe 400 feet below rotary, picked up pup joints to get kelly joint out of the

string. Worked stuck pipe and rig up Dia-log. Ran free point to top of drill collars at 14,830 feet. Let Black Magic soak for 6 hours.

7.2.117
9/20/81 Circulated out Black Magic pill (caught 90 bbls in trip tank. Circulated to condition mud. Jarred on stuck pipe. Pumped 90 barrels of old Black Magic and 100 bbls of new Black Magic in hole. Displaced 40 barrels new Black Magic outside drill pipe and left 60 bbls inside drill pipe. Let Black Magic soak for 16 hours. Moved the Black Magic in the drill pipe, displacing 2 BPH for the first 12 hours and 1 BPH thereafter.

7.2.118
9/21/81 Spotted Black Magic in uncased portion of the hole. Worked stuck drill pipe. Displaced one barrel of Black Magic from the drill pipe every hour.

7.2.119
9/22/81 Allowed Black Magic to soak for 6 hours. Rig up Dia-log to run Free point. Pipe free at 15,012 feet. Ran 700 grain shot and made back off in collars at 15,016 feet.

7.2.120
9/23/81 Chained out of the hole. Picked up new bottom hole assembly and trip in hole to 14,250 feet. Slipped and cut 110 feet of drill line. Finished tripping in hole to top of fish at 15,016 feet. Picked up kelly and circulated at top of fish. Screwed into fish and jarred on fish (unable to pump through fish).

7.2.121
9/24/81 Jarred on fish. Attempted to circulate. Chained out of the hole 12 stands (pulled into casing). Unplugged fish and circulated Black Magic out of the hole. Chained out of the hole with entire fish. Laid down fishing tools and 1 collar. Rigged up to test blowout preventers. Tested Hydril to 3,500 psi; tested blind rams top and bottom pipe rams, super choke, choke manifold, fill lines and valves to 7,500 psi. Tested TIW valve, kelly valve, kelly cock and stand pipe to 5,000 psi. Inspected bottom hole assembly.

7.2.122
9/25/81 Inspected drill collars, rigged down Dia-log and tripped in hole with 8 3/8 inch hole opener to 15,295 feet. Washed and reamed from 15,295 feet to 15,380 feet. Circulated bottoms up. Pumped down survey instrument. Pulled up to casing shoe. Tripped in hole with Totco overshot on wire line to recover the survey instrument--unsuccessful. Pulled out of the hole with 8 3/8 inch hole opener.

- 7.2.123 9/26/81 Finished tripping out of the hole. Survey failed (clock stopped). Lay down roller reamers and pick up blade stabilizers. Trip in the hole with 8 3/8 inch diamond bit. Drilled 8 3/8 inch hole from 15,385 feet to 15,421 feet.
- 7.2.124 9/27/81 Drilled from 15,421 feet to 15,464 feet taking deviation survey at 15,415 feet, 2° at 15,415'.
- 7.2.125 9/28/81 Drilled from 15,464 feet to 15,471 feet. Repaired mud pumps. Pulled out of the hole to casing shoe. Waited on electricians. Work on electrical short and removed rotary motor.
- 7.2.126 9/29/81 Circulated while waiting on electric rotary motor.
- 7.2.127 9/30/81 Circulated while waiting on electric rotary motor. Tripped in hole to 15,446 feet. Washed and reamed from 15,446 feet to 15,471 feet. Drilled from 15,471 feet to 15,480 feet.
- 7.2.128 10/01/81 Drilled from 15,480 feet to 15,486 feet. Worked on pumps. Drilled from 15,486 feet to 15,518 feet. Wire line directional survey at 15,508 feet. Made short trip with a maximum drag of 15,000 lbs. Drilled from 15,518 feet to 15,527 feet with excess torque.
- 7.2.129 10/02/81 Drilled from 15,527 feet to 15,533 feet. Pulled out of the hole. Check stabilizer gauge. Slipped and cut 110 feet of drill line. Repaired leak on water line running through drawworks drum. Pick up boot junk basket and roller reamers. Tripped in hole.
- 7.2.130 10/03/81 Washed 50 feet to bottom. Drilled from 15,533 feet to 15,580 feet with bit #24. Slugged drill pipe, dropped survey instrument, pulled out of the hole and gauge check roller reamers. Tripped in hole with 8 3/8 S-86-F bit. Drilled from 15,580 feet to 15,581 feet.
- 7.2.131 10/04/81 Drilled from 15,581 feet to 15,636 feet.
- 7.2.132 10/05/81 Made short trip out of the hole, layed down 21 joints. Tripped in hole. Drilled from 15,636 feet to 15,659 feet. Dropped survey instrument and pulled bit into the 9 5/8 inch casing. Retrieved survey instrument, 1 3/4° deviation at 15,659'. Finished pulling out of the hole to the bottom hole assembly. Inspecting bottom hole assembly.

- 7.2.133 10/06/81 Finished inspecting bottom-hole assembly. Tested blow out preventer stack. Cut 110 feet of drilling line. Picked up 3 joints of Hevi wate drill pipe. Made up bit #26 (8 3/8"-J-3). Turned pins on two stabilizers (stabilizers 30 feet, 60 feet and 120 feet). Drilled from 15,659 feet to 15,667 feet.
- 7.2.134 10/07/81 Drilled from 15,667 feet to 15,730 feet. Dropped survey instrument. Pulled into 9 5/8 inch casing and attempted to retrieve survey instrument with wire line (unable to retrieve instrument). Pulled out of the hole.
- 7.2.135 10/08/81 Tripped in the hole. Washed and reamed 15,644 feet to 15,730 feet. Drilled from 15,730 feet to 15,778 feet.
- 7.2.136 10/09/81 Drilled from 15,778 feet to 15,875 feet. Dropped survey. Pulled into 9 5/8 inch casing. Made two trips with wire line to retrieve survey instrument, 1 3/4° deviation at 15,875'. Trip in hole to bottom. Drilled from 15,875 feet to 15,941 feet.
- 7.2.137 10/10/81 Drilled from 15,941 feet to 16,065 feet. Made short trip into 9 5/8 inch casing (pulled 16 stands). Drilled from 16,065 feet to 16,162 feet.
- 7.2.138 10/11/81 Drilled from 16,162 feet to 16,300 feet. Made short trip into the 9 5/8 inch casing. Drilled from 16,300 feet to 16,399 feet.
- 7.2.139 10/12/81 Drilled from 16,399 feet to 16,510 feet. Dropped survey. Drill pipe stuck while waiting on survey. Jarred free. Pulled up to casing to retrieve survey, 1° deviation at 16,510 feet. Went in hole to 16,510 feet. Circulate and condition mud to log (excessive shale over shaker). Pulled out of hole to log.
- 7.2.140 10/13/81 Finished pulling out of the hole to log. Layed down 3 roller reamers. Rig up Schlumberger to log DIL-Sonic, FDC-CNT-GR. Dipmeter, side wall cores (loggers TD = 16,498 feet).
- 7.2.141 10/14/81 Ran 45 shot core gun, recovered 32, 7 misfires, lost 6 core shoes in hole. Tested blow out preventers. Tripped in hole, layed down 7 joints Hevi wate drill pipe. Washed 30 feet to bottom. Circulated and condition hole to run 7 inch liner.
- 7.2.142 10/15/81 Circulated and condition hole prior to running 7 inch liner. Slugged drill pipe, dropped rabbit and pulled

drill pipe to 9 5/8 inch casing (24 stands). Unstop flow line. Finished pulling out of the hole. Slipped and cut 110 feet drill line. Install 7 inch casing rams in top pipe ram preventer. Rigged up casing tools. Ran 79 joints 7 inch 38.0# AR 95 casing. Picked up liner tools. Rigged down casing running tools.

- 7.2.143
10/16/81 Finished rigging down 7 inch casing tools. Picked up champ packer and jars. Run in hole slow with liner, filling drill pipe every 14 stands in. (Set slips with 7 inch shoe at 16,044 feet.) Made up stand of drill pipe (liner stuck). Jarred on fish. Hooked up 2 inch chicksan line to drill pipe and pressured up to 800 psi, bled off pressure slowly, continued pressuring up on drill pipe until circulation was established with a slow pump rate.
- 7.2.144
10/17/81 Circulated and condition mud. Pumped 80 bbls. Black Magic (displaced with 263 bbls 17.3#/gal. mud). Worked stuck pipe and let Black Magic soak. Pumped and moved 1 bbl. of Black Magic each hour.
- 7.2.145
10/18/81 Let Black Magic soak and worked stuck pipe at 16,044 feet. Circulation and worked stuck pipe. (Moved pipe up the hole 90 inch.)
- 7.2.146
10/19/81 Circulate and work stuck liner with no progress. Dropped ball, sheared liner hanger pin with 2,500 psi, liner shoe set at 16,036 feet with top of liner at 12,694 feet. Top of PBR 14,006 feet. Bottom of PBR at 14,036 feet. Circulated 7 inch liner. Released liner hanger and cement liner in place with 20 bbls. SAM-4 spacer, 354 sacks Trinity Class "H" with 40% silica flour, 1% CFR-2 12.5#/sack Hidense, 0.27% D-air-1, 1.12#/sack Kel, 0.6% Halicle 22-A, 0.9% HR12 (slurry density of 18.0 ppg). Followed drill pipe plug with 10 bbls. SAM-4 and 281 bbls. 17.3 ppg. mud. Bumped plug with 2,400 psi. Released pressure and recovered 2 bbls. of mud. Float equipment checked OK. Pulled 15 stands (drill pipe pulling wet but not flowing back). Slugged drill pipe. Chained out of the hole with Champ packer and TIW setting tool.
- 7.2.147
10/20/81 Finished pulling out of the hole, layed down Champ packer and liner setting tools. Tripped in hole with 8 3/8 inch rerun bit #29. No cement on top of liner. Circulated bottoms up. Test top of liner with 1,000 psi. Pulled out of hole with bit #29. Made up 5 3/4 inch bit, bit #30 and TIW Polish mill and started to trip in the hole.

- 7.2.148 10/21/81 Finished trip in the hole with polish mill. Circulated and polished tie-back sleeve. Measured out of the hole (liner top at 12,598.87 feet). Slip and cut 110 feet of drilling line. Rigged up Schlumberger and ran 1 11/16 inch gamma ray/CCL log to 14,000 feet. Gamma ray tool failed. Ran 1-11/16 inch CCL to 13,000 feet (top of liner 12,610 feet, wire line measurement). Ran in hole with 3-3/8 inch gamma ray log; tool could not get below 12,687 feet. Rigged down Schlumberger. Wait on TIW serviceman.
- 7.2.149 10/22/81 Finished laying down drill pipe. Slip and cut 110 feet of drilling line. Rigged up to run 7 inch casing (Ran 240 joints.)
- 7.2.150 10/23/81 Finished running 7 inch tie-back casing with TIW locator. Rigged up Halliburton and circulated 900 bbls. of mud. Mix and pump 2,000 gal. of mud flush, 35 bbls. of SM-4 at 17.0 ppg, 730 sacks H cement with 40% Oklahoma #1 sand 1% CFR-2, 0.4% HR 5, pumped 5 bbls. SAM 4 at 17.0 ppg. Displaced with 933 bbls. 17.3 ppg mud. Bumped plug with 1,800 psi (float equipment held). Rigged down Haliburton.
- 7.2.151 10/24/81 Wait on cement to set.
- 7.2.152 10/25/81 Wait on cement to set.
- 7.2.153 10/26/81 Wait on cement to set.
- 7.2.154 10/27/81 Waiting on cement to set. Picked up and hung off blow-out preventer stack. Pulled 600,000# on 7 inch casing with 6 feet of stretch. Landed casing with 6,000# tension. Rough cut 7 inch casing and installed 10 3/4 inch X 7 inch Gray test protectors. Nipple up BOP's. Picked up bottom-hole assembly. Installed drill pipe casing protector rubbers. Started in the hole.
- 7.2.155 10/28/81 Picked up 2 7/8 inch drill pipe. Tagged top of cement at 12,574 feet. Drilled hard cement from 12,574 feet to 12,629 feet. Circulated and rigged up Timco pickup and lay down machine.
- 7.2.156 10/29/81 Finished trip in hole picking up 2 7/8 inch drill pipe. Took weight at 15,663 feet. Washed to bottom from 15,663 feet to 15,826 feet. Conditioned mud. Cut mud density to 14.0 ppg and displaced in well. Layed down 2 7/8 inch drill pipe and 3 1/2 inch drill collars. Rigged down lay down machine.

- 7.2.157 Washed mud tanks. Removed 7 inch rams. Nipple down
10/30/81 blow out preventers. Layed down Kelly. Made final cut
on 7 inch casing. Installed tubing head and tested to
6,000 psi. Installed master valve and blind flange with
1/2 inch tap on top. Rigged down floor and clean mud
tanks.
- 7.2.158 Rigged down floor and clean tanks.
10/31/81
- 7.2.159 Rigged down. Merit Drilling Company Rig #9 released
11/01/81 Monday, November 2, 1981 at 17:00 hours (5:00 p.m.).

7.3 COMPLETION OPERATIONS

- 7.3.1 Completed mobilization of Well Tech Rig No. 69 on
01/10/82 January 10, 1982 at 1200 hours. Tested BOP stack to
2000 psi, installed flow line, made up 5 3/4" bit and 7"
casing scraper. Could not get scraper inside casing;
laid down assembly, made up replacement scraper, tripped
in hole with assembly, picking 2 7/8" IF drill pipe up
from pipe racks.
- 7.3.2 Tripped in hole with 5 3/4" bit and 7" 38# casing
01/11/82 scraper measuring 2 7/8" drill pipe going in the hole.
Hit cement sheath in 7" casing at 12,574'. Mixed barite
pill to slug the drill pipe.
- 7.3.3 Thawed out frozen mud lines, slugged drill pipe, started
01/12/82 out of hole with scraper and bit.
- 7.3.4 Finished pulling out of hole, laid down 7" 38# casing
01/13/82 scraper, tripped in hole with 5 3/4" bit, picked up
kelly joint, drilled cement from 12,571' to 12,660',
circulated out cement and mixed mud.
- 7.3.5 Circulated hole, mixed barite pill, slugged 2 7/8"
01/14/82 drill pipe. Set kelly back, picked drill pipe up off
of racks, ran in hole to top of PBR at 13,918' drill
pipe measurement. Circulated and conditioned mud,
slugged drill pipe, started out of hole with 5 3/4"
bit.
- Finished out of hole, tripped in hole with 5 3/4" bit
and 7" 38# casing scraper, tagged top of PBR at 13,918',
circulated hole clean, pulled out of hole.

- 7.3.6
01/15/82 Made up 2 7/8" drill pipe mule shoe, ran in hole with drill pipe in derrick, picked pipe up off of racks, measured pipe in hole, tagged bottom of hole at 15,825'. Circulated well clean, mixed and pumped 30 bbls of Drispac spacer fluid and started displacing mud in hole with 10.5 ppg calcium chloride water with inhibitor added, and heated with hot-oil trucks to 150°F. (10.5 ppg fluid at 150°F has a density of 10.3 ppg.) Maximum pump pressure of 4,000 psi to displace the 14.2 ppg mud.
- 7.3.7
01/16/82 Finished displacing 14.2 ppg mud with 10.5 ppg calcium chloride water, pulled out of hole with drill pipe and mule shoe joint. Made up TIW polish mill, spacer sub, and locator sub; started in hole with mill assembly.
- 7.3.8
01/17/82 Finished trip in hole, cleaned mud tank to accomodate CaCl₂ water, circulated hole, rotated and polished the PBR. Pulled out of hole, laid down polish mill. Made up test seal assembly, tripped in hole, picked up kelly to test the seal assembly in the PBR.
- 7.3.9
01/18/82 Unsuccessful in testing the PBR. Pulled out of hole with the seal assembly; all of the chevron packing had washed off of the test mandrel. Redressed the assembly with new packing, tripped in hole lowering pipe slowly.
- 7.3.10
01/19/82 Finished trip in hole. Tested PBR at 5 different depths to 2,000 psi on the annulus and to 4,900 psi down the 2 7/8" drill pipe. All tests OK. Started out of hole laying down drill pipe. Mechanical problems with the rig at 1,500 hours; waited on mechanic to arrive location.
- 7.3.11
01/20/82 Jack-shaft broken on rig draw works.
- 7.3.12
01/21/82 Installed new jack-shaft (rig down 48 hrs). Pulled out of hole laying down drill pipe.
- 7.3.13
01/22/82 Finished pulling out of the hole, laying down drill pipe and test seal assembly. Slipped and cut drill line, levelled derrick. Rigged up Timco Casing Service and Loomis hydraulic testing equipment. Started in hole with TIW seal assembly and 5" 18 ppf P-110 tubing with modified Atlas-Bradford TC-4S couplings of V-150 steel. Extraneous personnel on location: Timco casing crew running pipe, Loomis crew testing joint integrity to 7,500 psi, Atlas-Bradford representative directing pipe make-up and handling, TIW representative controlling

speed of pipe lowering to protect PBR seal assembly, roustabout crew assisting rig crew in cleaning pipe threads and rolling pipe to the "V" door.

7.3.14 Picked 5" tubing up off of racks and tripped in hole.
01/23/82

Note: Tripping in hole at 12,000' with 5-10,000# drag down and 6,000# drag up when making connections. At 12,054' (20' in on 307th joint) pipe took 33,000# weight and would not go deeper. Pulled up with 5,000# drag and set back down with 30,000# weight -- did this 4 times. On 5th set down pipe went down with 20,000# weight and fell free.

7.3.15 Finished trip in hole with seal assembly and 5" tubing,
01/24/82 tagged PBR with seal assembly locator sub at 13,918'. Tested PBR to 5,000 psi down the tubing and to 2,000 psi in the 5" x 7" annulus with the rig pump. Nippled down BOP's, spaced out the seal assembly in the PBR to allow 16' of free down travel for expansion, nipped up master valve assembly of the Christmas tree. Timco torqued all connections to 6,200 foot lbs as directed by Atlas Bradford on location representative; Loomis hydrotested all connections to 7,500 psi; tubing hanger installation was directed By Gray Tool representative who tested the tubing head to 10,000 psi. Halliburton tested the 7" x 5" annulus to 2,000 psi and the 5" tubing to 6,000 psi, a 13,500 psi bottom hole equivalent. Released Well Tech Rig No. 69 January 24, 1982 at 2400 hours.

8.0 T-F&S/DOE GLADYS MCCALL SALT WATER DISPOSAL WELL-REENTRY AND COMPLETION

8.1 INTRODUCTION

Work on the T-F&S/DOE Gladys McCall saltwater disposal well began November 20, 1981 and was completed December 7, 1981. Following is a detailed day-to-day description of reentry and completion operations.

8.2 REENTRY AND COMPLETION OPERATIONS

8.2.1 Moved in Well Tech Rig No. 9 and spotted rig on 11/20/81 location. Rig to work day-light hours 5 days per week.

8.2.2 No activity.
11/21/81

8.2.3 No activity.
11/22/81

8.2.4 Raised derrick, installed guyline anchors, secured guy lines. Filled mud tank with 200 bbls of fresh water, cut flange off of 10 3/4" casing and welded on 10 3/4 x 7" casing hanger. Spotted pipe racks and off loaded 10" BOP's from delivery truck. Worked 12 hours secured rig for the night.

8.2.5 Serviced rig, off loaded to racks and tallied 131 joints of 2 7/8" EUE 8 round thread 6.50# N-80 tubing. Rigged up power-sub, made up 9 7/8" bit, bit sub, cross-over sub, and 2 7/8" x 10' pup joint. Off loaded flanges, spools, and stripper head from delivery truck. Worked 12 hours, secured well for the night.

8.2.6 Started up rig, nipped up BOP's and tested same to 1,500 psi for 15 minutes--OK. Picked up power sub, tagged top of cement plug at 6.69', drilled 52' of hard cement plug from 6.69' to 58.69', cleaned hole to 100' pushing plug and broken cement while circulating both direct and reverse. Worked 12 hours, secured the well for the holiday.

8.2.7 No activity, Thanksgiving Day.
11/26/81

8.2.8 Started up rig, ran in hole to 326.28', circulated hole, drilled 48' of cement and junk. Ran 9 7/8" bit to 898' and reverse circulated the hole clean. Ran to 2,243' and reverse circulated the hole clean with a maximum pump pressure of 1,000 psi. Ran work string to 2,859', reverse circulated, pipe plugged with 1,300 psi pump pressure; pulled pipe up to 2,733.13' (4 singles)

re-established circulation with 1,300 psi pump pressure. Ran in hole to 2,858.95'. Work 11-hours, secured the well for the week end.

8.2.9 No activity.
11/28/81

8.2.10 Serviced rig and opened the well. Ran 2 7/8" tubing, reverse circulated, hit bridge at 3,120'. Drilled from 3,120' to 3,492' PBD, reverse circulated and cleaned hole. Tripped out with bit, nipped down stripper head, made up 10 3/4" casing scraper, re-installed stripper head, ran in hole with scraper and 2 7/8" tubing to 3,492' PBD. Reverse circulated hole clean, pulled 2-stands (4jts). Worked 11 hours, secured well for the night.

8.2.11 Serviced rig and opened well, ran bit and scraper to 3,492'. Pumped fresh water out of mud tank, cleaned tank and filled with salt water from the Sweet Lake well. Displaced fresh water in the hole with salt water and pulled out of the hole standing 30-stands (60 joints) of 2 7/8" tubing in the derrick and laying down 52 joints. Nipped down stripper head, removed 9 7/8" bit and 10 3/4" casing scraper, installed Schlumberger flange. Rigged up Schlumberger, ran CBL-VDL-Gamma Ray logs. Worked 11 hours. Secured well for the night.

8.2.12 Serviced rig, opened well. Made 9 runs with Schlumberger 4" perforating gun - 3 dry runs and 6 effective runs - perforated 10 3/4" casing from 3,500' to 3,470' and from 3,370' to 3,305' (wire line measurement) with 4-shots per foot. Rigged up Halliburton pump trucks to the well head and attempted an injectivity test; at 400 psi formation took 3/4 bbls salt water per minute; rigged down Halliburton. Schlumberger made trip in to perforate the 3,223' to 3,238' interval, but gun failed to fire; pulled the gun from the hole. Worked 11 hours, secured the well for the night.

8.2.13 Opened the well, ran the 30 stands of 2 7/8" tubing in the derrick in the hole, pulled out laying the joints on the pipe racks. Ran Schlumberger 4" gun, perforated 3,238' to 3,193' and 3,140' to 3,050' with 4 shots per foot. Ran injectivity test with rig pump - pumped into the well at the rate of 4 1/2 bbls per minute with 250 psi pump pressure. Worked 11 hours, secured well for the night.

- 8.2.14
12/04/81   Opened the well; set 10 3/4" Otis Perma-drill packer on Schlumberger wire line at 2,050' wire line measurement, 2,019' by pipe measurement. Nippled down BOP's and drilling spool, rigged up casing tools, ran 7" tubing and seal assembly to 2,019'. Set seal assembly and filled 10 3/4" x 7" annulus to test the packer. Rigged down casing tools, installed 7" casing hanger, spaced 7" to allow 3.08' of travel for expansion, cut casing and installed the tree. Worked 12 hours, secured well.
- 8.2.15
12/05/81   No activity.
- 8.2.16
12/06/81   No activity.
- 8.2.17
12/07/81   Serviced and started up rig. Removed tree, tightened bolts on 7" pack-off in 7" x 10 3/4" hanger and re-installed tree. Pressured up on annulus to 700 psi to test down hole packer and top tubing pack-off. Tested OK. Rigged down equipment, lowered derrick, loaded out equipment and moved out rig. Worked 8 hours this day; work complete.

9.0 ENVIRONMENTAL MONITORING

9.1 INTRODUCTION

Louisiana State University is responsible for conducting environmental monitoring at each of the designed geopressured-geothermal test wells. The following description of environmental studies at the Gladys McCall test site was taken from the University's 1981 year-end contract report to DOE.

9.2 ROCKEFELLER REFUGE

The Rockefeller Refuge geothermal prospect area is within the Chenier Plain of southwest Louisiana, a physiographic region characterized by relict beach ridges and low-lying coastal marsh. The DOE Gladys McCall test well was drilled near the western border of Rockefeller Refuge in an area of impounded brackish marsh. The well is located in the East Crab Lake field approximately 2.3 miles south of Grand Chenier Ridge. Land use in the immediate vicinity of the test site is extractive; surface hydrology of the area has been modified by levees and canals excavated for oil and gas development.

During December of 1980, LSU investigators conducted several site visits and a low altitude aerial survey to determine drainage patterns and land use/land cover within the prospect. A review of available published and unpublished data collected in the vicinity of the prospect was also conducted. Considering both site characteristics and the potential impacts of resources testing, an environmental monitoring plan was prepared for the Gladys McCall well test. In accordance with this plan, field stations were established to monitor 1) surface and ground water quality, 2) subsidence, 3) land loss and shoreline erosion, and 4) seismicity. Historical data was collected and interpreted to establish baseline conditions, where possible. The results of the first year of environmental monitoring studies in the Rockefeller Refuge prospect are provided below.

9.3 WATER QUALITY MONITORING

9.3.1 SURFACE WATER

The Gladys McCall test site is located within the coastal marshlands of southwestern Louisiana. The marsh surrounding the test site has very low relief, is at or very near sea level, and is bounded to the north by Grand Chenier Ridge, to the south by a migrating beach, and to the east and west by roads and levees. The tide dominated drainage is,

therefore, restricted to breeches in the road and levee systems. In addition, the area immediately surrounding the test site is completely encircled by a large levee. Water flow is controlled through a culvert in the southeastern corner of the levee into Second Lake and subsequently into leveed Hog Bayou which travels southwesterly to a lone breach in the shoreline beach.

Three surface water sampling stations were established for representative sampling of this system (Figure 9-1). The first station is located 1000 feet NNE of the test site in a shallow pond within the large levee. A second station was placed outside of the southeastern corner of the levee near the drainage access point. These two stations were installed and initially sampled in May 1981. Sampling commenced in August 1981 at a third station installed in Hog Bayou approximately one mile southwest of the test site.

Monthly changes in the surface water parameters reflect seasonal patterns and cannot, at this time, be attributed to test well operations. The concentration of constituents versus time profiles for the surface water stations are parallel and indicate very little water quality variability between stations.

Drilling fluids and/or local drainage from the test site were observed flowing through a break in the ring levee during June 1980. A mud pit sample was taken and analyzed in July 1980 to determine potential effects on ambient surface water quality. In most cases, pollutant quantity in surface drainage from the site and in the mud pit sample was less than or equal to that in the natural environment. Therefore, no adverse effects on water quality have been attributed to the June discharge.

9.3.2 GROUND WATER

Wells located within a 10 mile radius of the test site are used for oil and gas exploration/production and observation. Only a few are used for domestic and industrial water supply; these are shallow (200 to 1,200 feet deep) and produce from depths of 200 to 600 feet. Oil and gas wells, on the other hand, are from 10,000 to 17,000 feet deep.

A typical electric log (Figure 9-2) illustrates the following vertical stratigraphic sequence:

FIGURE 9-1

Field Stations for Environmental Monitoring in the Rockefeller Refuge Prospect

ROCKEFELLER REFUGE
GEOPRESSURE - GEOTHERMAL
TEST SITE

- △ SURFACE WATER SAMPLING STATION
- ⊗ SEISMOMETER
- WELL
- BENCHMARK

LOUISIANA GEOLOGICAL SURVEY

9-3

FIGURE 9-2

Typical Electric Logs for Wells in the Gladys McCall Area (Texas Crude Oil and Union of California, Mermentau Mineral Land Company #1)

<u>feet (msl)</u>	<u>lithology</u>
-200	fresh water sand down to -340 feet msl,
-400	shale to -420 feet msl, sand, fresh at top,
-600	grading to saline near -800 feet msl,
-800	shale from -800 feet to
-1,000	-1,150 feet msl,
-1,200	salt water sand to -1,240 feet msl, then salt water sand with
-1,400	small shale stringers to -1,600 feet msl, another shale to
	-1,670
-1,600	feet msl, a salt water sand to
-1,800	-1,900 feet msl, top of
-2,000	lowermost shale

The stratigraphy of the area is represented by a cross-section (Figure 9-3) which transects the test site from northeast to southwest. In general, the upper 2,000 feet of section in the area contains 3 to 4 main clay units separated by 3 to 5 main bodies of sand. Data is lacking in the upper 200 feet of the section. The uppermost sand averages approximately 150 feet in thickness. The sand's base is between -100 and -400 feet msl. Below the upper sand is a shale 100 to 300 feet thick which contains a couple of thin (less than 100 feet thick) fresh water sand lenses. The clay bottoms out at a relatively constant depth of -500 to -600 feet msl. The sand below this clay has an average thickness of 400 feet, no observable clay lenses or tongues, and contains the lower limit of fresh water in the area. The next clay in the sequence is approximately 200 feet thick. A moderately thick sand (200 feet thick on the average) separates the second clay from the third clay which is the lower most unit of interest in this study.

The freshness of the water in the upper sand and in the sand lens in the upper shale can be confirmed with an analysis of water quality (Table 9-1). Water sampled from wells Cn-127 and Cn-126 (which produce from these sands, respectively) have a low concentration of chloride and total dissolved solids. These factors are much higher in all the other wells which produce from the lower sands.

The above information was used to install ground water quality observation wells in May of 1981. The first well, lo-

FIGURE 9-3

Characteristic Stratigraphic Cross Section Through the Gladys McCall Test Site

TABLE 9-1

Water Quality Analysis

Well No.	Depth	Date	Water Level	SC	pH	C _a CO ₃	TDS	SiO ₂	HCO ₃	SO ₄	NO ₃	PO ₄	CO ₃	CO ₂	Fe	Ca	Mg	Na	K	Cl	F	Mn	B	Br
Cn-20	---	06-09-49	---	2280	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	432	--	--	--	--
Cn-41	460	02-02-55	---	2270	7.5	198	1230	30	416	2.1	0.2	0.19	0	--	0.04	48	19	408	4.5	547	0.1	0.01	0.05	--
Cn-42	460	02-02-55	---	1840	7.4	181	1000	28	360	0.5	4.5	0.36	0	--	0.01	44	17	317	3.6	416	0.1	0.02	0.11	--
Cn-111	590	11-13-75	---	6770	7.6	410	3950	23	288	4.8	0.08	--	0	--	0.87	90	45	1400	8.0	2100	0.2	0.16	--	--
Cn-118	637	09-07-74	---	2800	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	920	--	--	--	--
Cn-126	336	12-03-75	23.24 GL	1120	7.9	80	656	17	412	0	0.42	--	0	--	0.14	18	8.5	240	2.9	170	0.2	0.04	--	--
Cn-127	204	12-03-75	---	1020	7.1	85	601	24	377	22.0	0.43	--	0	--	0.19	18	9.7	210	4.2	160	0.2	0.06	--	--

cated within 200 feet north-north-west of the Gladys McCall test well, was drilled to a depth of 660 feet, encountering the following lithologies during its descent:

0' - 20'	Black Clay
20' - 43'	Yellow-White Clay
43' - 95'	Gray Clay
95' - 290'	Fine to coarse, glauconitic sand with pea gravels
295' - 625'	Grey Clay
625' - 680'	Sand

An electric log run in the well, combined with the preceeding driller's log, confirmed the oil well log interpretation (Figure 9-4), with the addition of a surficial layer of clay approximately 100 feet thick. The well was screened in the lowermost sand at 670 feet. A second observation well, located 2000 feet NNW of the test site, was drilled to and screened at a depth of 310 feet, in the upper-most sand of the section. Sampling began at both wells in June, 1981. A total of 22 parameters were analyzed in the laboratory. No changes can be attributed to test well operations thus far, although some seasonal changes are obvious. The quantity versus time profiles for sodium, magnesium, chloride, specific conductance, hardness, temperature, and sulfates illustrate the relative depths of the observation wells. Values for these parameters are, for the most part, higher and more variable in the deeper well.

9.4 SUBSIDENCE MONITORING

In order to assess the subsidence impacts of resource testing, a field monitoring program was designed to 1) determine baseline subsidence rates in the prospect prior to well testing and 2) to monitor changes in land surface elevation during and after the test period.

Baseline subsidence, or subsidence existing in the prospect area prior to flow testing, was determined by comparing successive years of elevation surveys in the region of the designed well. In addition, a network of new benchmarks was installed in the immediate vicinity of the test well. This network was designed to cross each of the faults which define the geothermal reservoir and was connected to a vertical control line established in 1965 by the National Geodetic Survey. This historical line extends from west to east along State Highway 82, sub-parallel to the coastline (Figure 9-5a).

FIGURE 9-4

Electric Log for Deep Ground Water Well (Louisiana State University;
Gladys McCall Observation Well No. 1)

During the fall of 1980, LSU subcontractors surveyed both the historical NGS line and the new benchmarks in the immediate vicinity of the test well. In order to determine trends, the 1980 survey data was compared with the 1965 data, which was used as a baseline. Two spatial reference marks were selected for reference. When the western-most benchmark was used for reference, the survey profile indicated slight uplift in the eastern portion of the prospect (Figure 5b). When the easternmost benchmark (Y 213 - not shown) was used, the profile indicated subsidence along the entire length of the line (Figure 9-5b). For this reason, no conclusion regarding historical subsidence will be drawn until the line is resurveyed during February of 1982 by the National Geodetic Survey.

To assist in interpreting subsidence data, a study of growth faults and surface lineations within the prospect was conducted. Growth faults are a major structural element of the Gulf Coast Geosyncline and provide the mechanism by which fluids in the geopressured zones are trapped. These faults are usually quite steep in their upper reaches but tend to flatten with depth coincident with increases in fluid pressure. Growth faults that define the geopressured-geothermal reservoir were extrapolated to the land surface using the Law of Tangents and a range of fault angles between 45° and 60° (Figure 6).

Fault planes that intersect the land surface are likely to produce fault traces or lineations. Lineations were mapped from high altitude (1:65,000) NASA U-2 photography and available 1:24,000 black and white prints. Dates of the black and white and U-2 photography were 1955 and 1978, respectively. Lineations were visible due to tonal variations, usually a result of soil moisture differences and geomorphic irregularities such as angular drainage diversions and land form boundaries. Care was taken not to confuse possible fault traces with man-made features, such as straightened canals and political boundaries. Soil boundaries were also delineated.

On the NASA imagery abandoned beach ridges on cheniers were evident due to tonal variations, vegetation differences, and drainage anomalies. These cheniers are indicated on the map (Figure 9-6) as soil boundaries. There are no cheniers which could be confused with fault trace lineations south of Highway 82.

Two lineations in Figure 6 are parallel with extrapolated fault zones A' and B'. Lineations which are subparallel to the fault zones may be surface expressions of shallower faults. Other lineations strike parallel and subparallel to the existing shoreline and cheniers, thus are probably depositional or erosional in origin.

FIGURE 9-6

Subsurface Faults, Extrapolated Fault Zones and Mapped Lineations in the Rockefeller Refuge Prospect

9.5 LAND LOSS AND SHORELINE EROSION

Several recent studies have documented dramatic rates of shoreline erosion and land loss in coastal Louisiana. One study published in 1981 by the U.S. Fish and Wildlife Service estimates that a total of 39.4 square miles of Louisiana's coastal wetlands are converted to open water each year. Minute changes in the elevation of near sea level marsh environments can result in land loss. In order to determine the rates of land loss and shoreline retreat within the two coastal prospects prior to well testing, an analysis of historical changes in land/water interface was performed.

A study of land loss during 1955-1978 was completed for the Rockefeller Refuge prospect. Land and water features were mapped within an area south of Grand Chenier Ridge and between Price Lake Road, on the east, and Club Canal, on the west (Figure 9-1). Brackish marshes occur in the northern portion of the study area and are dominated by Spartina patens (wire grass) and Distichlis spicata (salt grass). More saline environments dominate the southern half of the study area. Saline marshes within the region have a greater vegetation diversity and include the following forms:

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>
<u>Spartina alterniflora</u>	oyster grass
<u>Batis maritima</u>	saltwort
<u>Spartina patens</u>	wire grass
<u>Scirpus robustus</u>	slatmarsh bulrush
<u>Borrchia frutescens</u>	sea ox-eye

Major land features such as roads, canals, open water, and impounded marsh were delineated from 1955 (Figure 9-7) and 1978 (Figure 9-8) aerial photographs. Calculations for area were then computed with an electronic digital planimeter. Changes in land/water ratio were determined for the total study area, the shoreline zone, and the inland marsh.

Total lengths of canals and roads during 1955 and 1978 were also calculated. Linear shoreline erosion was determined at several points along the seven mile coastline.

The study revealed a significant amount of marshland loss -- 1240 acres over the 23 year period. (Table 9-2). The immediate coastline below the test site receded at an average rate of 47.5 feet per year, between 1955 and 1978, accounting for a total loss of 872 acres. Since the early 1950's, a large amount of marshland was reverted to open water due to expanding oil and gas development in the immediate area. Roads and canals increased 52% and 35%, respectively, over the 23 year period. Within the impounded area,

FIGURE 9-7

1955 Map of Land and Water Features in the Rockefeller Refuge Study Area

LAND / WATER INTERFACE 1955

FIGURE 9-8

1978 Map of Land and Water Features in the Rockefeller Refuge Study Area

TABLE 9-2

Marshland Loss Due to Shoreline Erosion

Land Loss Results - Rockefeller Refuge

	<u>1955-1978</u>	<u>Net Change (%)</u>
Total land loss	1240 acres	9% loss
Shoreline area	872 acres	5% loss
Roads	17 miles	52% gain
Canals	17 miles	35% gain

Linear Shoreline Erosion

<u>Location</u>	<u>Shoreline Retreat (feet per 23 yrs)</u>	<u>Shoreline Retreat (average feet per year)</u>
Club Canal	1060	46
East boundary line of study area	1122	49

water is constantly being trapped, increasing open water by 72%. Standing water and storm surges within the impounded marsh caused the disappearance of some halophyte vegetation. Coincidental with land loss, vegetation patterns have been altered within the study area.

9.6 MICROSEISMIC MONITORING

On April 1, 1981, a subcontract was awarded to Woodward-Clyde Consultants to perform microseismic monitoring in the Rockefeller Refuge prospect. This contract provides for the installation and operation of an eight station array of continuous recording seismometers. During May and June of 1981 the design and installation of six of the eight monitoring stations were completed. These seismometers are located within a 5-km radius of the Gladys McCall test site, as shown in Figure 1. Station coordinates, seismometer depths, and installation dates are presented in Table 9-3.

The field stations consist of a seismometer and a standard amplifier/voltage-controlled oscillator unit and power supply. The signal is transmitted by high-frequency radio telemetry to the equipment shed at the Gladys McCall well entrance. The sensors installed are Mark Products L28LV 4.5 Hz seismometers installed in boreholes at depths ranging from 35 to 50 feet below ground surface.

The standard seismic electronics packages which are manufactured by Sprengnether, Inc., consist of an amplifier and voltage-controlled oscillator (VOC) that provides continuous data transmission via radio. The radio transmitters are Monitron 100 mW transmitters coupled to Scala Yaga transmit-and-receive antennas. Each field station is transmitted on a different carrier frequency to the equipment shed, near the testing manager's trailer, where the signals are multiplexed and transmitted to the central recording facilities on standard, voice-grade telephone lines. The VOC frequencies used for data transmission are 680 Hz, 1360 Hz, 1700 Hz, 2040 Hz, 2380 Hz, 2720 Hz, and 3060 Hz. Field telemetry packages are powered by 12 volt DC air-cell batteries.

The central recording facilities include the following: one recording and one playback 1/2-inch magnetic tape recorder (Honeywell 101) that record 24 hours of incoming data on a single tape pass; signal discriminators for each telemetered data frequency (from the multiplexed incoming signal); three dual-pen drum recorders (Sprengnether VR-60) that provide visible monitoring of selected incoming data (station) signals; and oscillograph playback facilities for hard copy recovery of all data recorded on magnetic tape.

TABLE 9-3

Seismometer Stations - Rockefeller Refuge Prospect

Station Code	Station Name	North Latitude	West Longitude	Seismometer Depth, Ft.	Date Seism. Installed	Date on Line to B.R. Office	Date First Recorded on Mag. Tape
BCH 680 Hz	Beach	29°40'38"	92°53'19"	35	6/24/81	7/9/81	7/20/81
LEV 020 Hz	Levee	29°42'43"	92°52'54"	50	6/25/81	7/9/81	7/20/81
SHE 360 Hz	Sohio Rd.	29°42'25"	92°50'31"	50	6/25/81	7/9/81	7/20/81
PLR 700 Hz	Price Lake Rd.	29°41'14"	92°50'00"	50	6/25/81	7/9/81	8/22/81
ALP 2040 Hz	Alligator Ponds	29°43'13"	92°48'32"	50	6/26/81	7/9/81	7/20/81
GCS 2380 Hz	Grand Chenier School Property	29°44'05.3" (Tentative)	92°53'54" Not yet installed				
--- 2720 Hz		Not yet installed					
HQS 3060 Hz	Equipment Shed	29°44'31"	92°52'27"	35	6/23/81	7/9/81	7/20/81

Note: Problems with telephone telemetry to Baton Rouge office prevented recording station signals until 20 July, 1981.

Stations PLR and HQS had noise interference until maintenance field trip on 21 August 1981, revealed defective batteries, which were replaced. PLR first recorded beginning 8/22/81.

Appurtenant facilities include a time code generator and time code reader for recording and playing back station data on a common time base. Recorded time is the basis for analysis of seismic data and hypocentral (location and depth) determination of all events.

Incoming data is recorded on magnetic tape in multiplexed format and simultaneously sent through signal discriminators and recorded on visible drum recorders. Seismic data can be played back when the multiplexed signal from magnetic tape is fed through discriminators onto a multichannel oscillograph (paper) recorder. Recorded time code is then simultaneously played back off magnetic tape and is the basis for scaling the arrival of various incoming seismic waves.

Recording of baseline data begin in late May of 1981. Data was collected using a portable micro earthquake monitoring device (Sprengnether, Inc. MEQ-800). Data recovery was intermittent and of poor quality due to the high background noise level found at the surface in the Refuge area. Several sites were selected to monitor with the portable unit, but no satisfactory site could be found that was quiet enough to observe anomalous ground motion caused by natural or man-made events. The portable seismometers were placed in hand-augered boreholes at a depth of one to two feet. Review of the data collected with the portable instrument indicated a high surface noise level over a wide area surrounding the well site. No features other than the high noise level were detected during this early period of data collected.

Review of data collected since the installation of the permanent network indicates that the noise level has been significantly reduced by placing the seismometers in deeper boreholes. Background noise at the borehole stations is low, comparable to that of the Sweet Lake seismic monitoring network, and a variety of seismic signals have been detected from nearby cultural activities and geophysical operations.

All signals received during the period through August 31, 1981, have been classified as man-induced events. Many of the geophysical blasts detected during this time period at the Refuge network have also been recorded at the Sweet Lake network.

During September 1981, one local natural event was recorded. This event occurred on September 14 at 14.23 UTC (Universal Time Coordinate), 9:23 local time, and was recorded by all the seismometers in the network. The event was also detected at the Sweet Lake network. Assuming a P-wave to S-wave velocity ratio of 1.66 for the Rockefeller Refuge area, the location of the September 14 event is lat 29°42'14" N and long 92°49'33" W along Wildlife and Fisheries Union Canal at an unconstrained depth of 6.56 km (Figure 9-9). The given depth of 6.56 km (21,500 feet) is an approximation

Location of September 14, 1981 Seismic Event (oriented along axes of error ellipse)

because focal depth is the least accurate earthquake parameter. Magnitude of this event was approximated at 1.5 or less, a calculation based on the duration of the event at each station.

Seven events were recorded during October and probably have a local natural origin. These seven events, as listed in the October event log, occurred offshore in the Gulf of Mexico approximately 1/4 mile north and 3 miles southeast of the beach station (Figure 9-10). Magnitudes of about 1.5 were calculated based on the duration of the seismic wave at each station. The most likely explanation of the occurrence of the September and October events is slippage along the subsurface fault system.

Four series of events, which were recorded November 13, 14, 15, and 18 have been tentatively classified as man-induced due to their frequency occurrence and time of day. These events occurred two to three minutes apart during daylight hours, similar to previously recorded geophysical blasting associated with oil exploration on land. The shape of the signals differ from those for the earlier blasts in that the arrival times at each station are more erratic. All four events were detected at the beach station (BCH). Computer location of these seismic events indicate that the signals are associated with nearby offshore geophysical exploration.

FIGURE 9-10

Location of the October 7, 1981 Natural Seismic Events (⊕ oriented along respective error ellipse axes)

Appendix A

LOGGING PROGRAM

LOGGING PROGRAM

Production Well

Date	Log	Bottom Interval	Top Interval
6-7-81	Directional	4500	873
6-7-81	Borehole Geometry	4500	873
6-7-81	Dual Induction SFL Sonic	4500	873
7-11-81	Dipmeter	14483	9986
7-11-81	Dipmeter	14474	9986
7-11-81	Dipmeter	14483	4486
7-11-81	Compensated Neutron - Formation Density	14483	4188
7-11-81	Compensated Neutron - Formation Density	14483	4486
7-11-81	Dual Induction SFL Sonic	14483	4486
7-11-81	Temperature	14486	Surface
7-11-81	Directional	14483	4486
7-13-81	High Resolution Thermometer	14486	Surface
7-18-81	Temperature	14350	100
7-31-81	Dual Induction SFL Sonic	15065	14414
8-17-81	*Casing Inspection & Electronic Caliper	14400	Surface
8-28-81	Directional	15502	14414
8-28-81	Borehole Geometry	15502	14414
8-29-81	Dual Induction SFL Sonic	15494	14750
10-13-81	Borehole Compensated Sonic	16498	14412
10-13-81	Sonic	16498	14412
10-13-81	Cyberlook	16498	14412
10-13-81	Volan	16440	14420
10-14-81	Cyberdip	16498	14412
10-14-81	Dipmeter	16498	14412
10-14-81	Dipmeter	16482	14436
10-14-81	Directional	16498	14412
2-25-82	**Gamma-Collar Perforation Record	16510	14426
2-25-82	**Temperature	15636	Surface
2-27-82	**Perforating Record	15627	15597
3-3-82	**Fluid Travel	14100	Surface

NOTE: All logs are Schlumberger except as noted

*NL McCullough
 **Welex

LOGGING PROGRAM
Saltwater Disposal Well

Date	Log	Bottom Interval	Top Interval
12-1-81	Cement Bond Variable Density	3500	200
12-2-81	Casing Collar and Perforating Record	3500	3050

NOTE: All logs are Schlumberger

Appendix B

PALEODATA

PALEO-DATA, INC.

T. WAYNE CAMERON
JOHN B. DUNLAP, JR.
FRANCIS S. PLAISANCE, JR.

6619 FLEUR DE LIS DRIVE
NEW ORLEANS, LOUISIANA 70124
(504) 488-3711

ARTHUR S. WATERMAN
ALBERT F. PORTER, JR.
MICHAEL W. CENTER
NORMAN S. VALLETTE

October 22, 1981

Department of Energy
Section 27, T15S-R5W

#1 Gladys McCall
Cameron Parish, La.

11010	First sample
11040	In Robulus mayeri. Ecologic Zone 3.
11100	Cristellaria A (first noted, possibly in Zone)
15600	Sample total depth. Original Hole.
15570	First sample Side Track Hole. In Ecologic Zone 3. Cristellaria A
16410	Ecologic Zone 4
16440	Siphonina davisii
16500	Sample total depth.

Respectfully submitted,

John B. Dunlap, Jr.

- 11010 (Lithology of washed cuttings) 100% mud additives
No fauna
- 11040 (L) 80% shale, 20% sand and shell fragments
Robulus americanus, Quinqueloculina sp., Globigerina sp.,
Nonion sp., Robulus mayeri
- 11070 (L) Same
Same fauna plus Cibicides floridanus, Textularia sp.,
Cibicides concentricus, Eponides antillarum
- 11100 (L) 90% shale, 10% sand and shell fragments
Same fauna plus Cristellaria A
- 11130 (L) Same
Same fauna
- 11160-190 (L) Same
Same fauna
- 11190 (L) 80% shale, 20% sand
Amphistegina sp., Cristellaria A, Robulus mayeri,
Globigerina sp., Uvigerina howei
- 11220 (L) Same
Same fauna
- 11250 (L) Same
Same fauna plus Quinqueloculina sp.
- 11280 (L) 90% shale, 10% sand
Robulus americanus, Robulus mayeri, Globigerina sp.,
Cristellaria A, Nonion 21, Eponides ornata
- 11310 (L) Same
Same fauna
- 11340 (L) Same
Cristellaria A, Robulus americanus, Nonion 21, Quinqueloculina sp.,
Globigerina sp., Discorbis I
- 11370 (L) Same
Same fauna plus Textularia sp.
- 11400 (L) Same
Same fauna
- 11430 (L) Same
Same fauna
- 11460 (L) Same
(continued...)

- 11460 (...continued) *Cristellaria* A, *Robulus mayeri*, *Globigerina* sp., *Quinqueloculina* sp., Nonion 21
- 11490 (L) Same
Same fauna
- 11520 (L) Same
Same fauna
- 11550 (L) 80% shale, 20% sand
Cristellaria A, *Quinqueloculina* sp., *Robulus mayeri*
- 11580 (L) Same
Same fauna
- 11610 (L) Same
Same fauna
- 11640-70 Gap
- 11670 (L) 80% shale, 20% sand
Cristellaria A, *Globigerina* sp., *Robulus mayeri*, Nonion 21, *Quinqueloculina* sp.
- 11700 (L) Same
Same fauna plus *Discorbis* I
- 11790 (L) 80% shale, 20% sand
Cristellaria A, *Robulus americanus*, *Quinqueloculina* sp., *Uvigerina howei*, *Robulus mayeri*, Nonion sp
- 11820 (L) Same
Same fauna
- 11850 (L) 90% shale, 10% sand
Cristellaria A, *Textularia articulata*, *Uvigerina howei*, Nonion sp., *Robulus mayeri*
- 11880 (L) Same
Same fauna plus *Quinqueloculina* sp., *Globigerina* sp.
- 11910 (L) 80% shale, 20% sand
Same fauna
- 11940 (L) Same
Robulus americanus, *Cristellaria* A, *Robulus mayeri*, *Quinqueloculina* sp.
- 11970 (L) 70% shale, 30% sand
Same fauna
- 12000 (L) 80% shale, 20% sand
Same fauna - rare

- 12030 (L) Same
Robulus mayeri, Robulus americanus, Quinqueloculina sp.,
Cristellaria A
- 12060 (L) 60% shale, 40% sand with shell fragments
Same fauna
- 12070 (L) 70% shale, 30% sand with shell fragments
Same fauna
- 12120 (L) Same
Robulus mayeri, Cristellaria A, Robulus americanus, Quinqueloculina
sp.
- 12150 (L) Same
Same fauna
- 12180 (L) 90% shale, 10% sand
Robulus mayeri, Quinqueloculina sp.,
- 12210 (L) Same
Same fauna plus Robulus americanus
- 12240 (L) 80% shale, 20% sand
Robulus americanus, Robulus mayeri, Cristellaria A, Siphonina
advena, Quinqueloculina sp., Nonion sp.
- 12270 (L) Same
Same fauna
- 12300 (L) Same
Same fauna
- 12330 (L) Same
Same fauna
- 12360 (L) Same
Same fauna
- 12390 (L) Same
Robulus mayeri, Robulus americanus, Globigerina sp., Quinqueloculina
sp.
- 12420 (L) 70% shale, 30% sand
Same fauna
- 12450 (L) 80% shale, 20% sand
Same fauna
- 12480 (L) Same
Same fauna

- 12510 (L) Same
Robulus americanus, Robulus mayeri, Globigerina sp.
- 12540 (L) Same
Same fauna plus Cristellaria A
- 12570 (L) Same
Same fauna
- 12600 (L) 60% shale, 40% consolidated sand
Cristellaria A, Robulus americanus, Nonion sp., Quinqueloculina sp.
- 12630 (L) Same
Robulus americanus, Quinqueloculina sp.
- 12660 (L) 80% shale, 20% sand
Same fauna
- 12690 (L) 70% shale, 30% consolidated sand
Robulus americanus, Robulus mayeri, Globigerina sp.
- 12720 (L) Same
Robulus americanus
- 12750 (L) Same
No fauna
- 12780 (L) Same
No fauna
- 12810 (L) 80% shale, 20% sand
Robulus americanus
- 12840 (L) Same
No fauna
- 12870 (L) 90% shale, 10% sand
Robulus americanus, Robulus mayeri
- 12900 (L) Same
No fauna
- 12930 (L) 80% shale, 20% sand
Robulus americanus, Robulus mayeri, Cristellaria A, Nonion sp.
- 12960 (L) 90% shale, 10% sand
Robulus americanus
- 12990 (L) Same
Robulus americanus, Quinqueloculina sp.

- 13020 (L) 80% shale, 20% consolidated sand
Cristellaria A, Globigerina sp., Robulus americanus,
Textularia articulata
- 13050 (L) Same
Same fauna
- 13080 (L) 60% sand, 40% shale
Robulus americanus, Quinqueloculina sp.
- 13110 (L) 60% shale, 40% sand
Robulus americanus
- 13140 (L) Same
Cristellaria A, Robulus americanus, Globigerina sp.,
Quinqueloculina sp.
- 13170 (L) 90% shale, 10% sand
Cristellaria A, Globigerina sp., Robulus americanus,
Nonion sp.
- 13200 (L) Same
Same fauna plus Robulus mayeri
- 13230 (L) Same
Same fauna
- 13260 (L) 70% shale, 30% sand
Same fauna plus Eponides antillarum
- 13290 Gap
- 13320 (L) 80% shale, 20% sand
Cristellaria A, Robulus americanus, Nonion sp.,
Globigerina sp.
- 13350 (L) Same
Same fauna
- 13380 (L) Same
Same fauna
- 13410 (L) Same
Same fauna
- 13440 (L) 70% shale, 30% sand
Same fauna
- 13470 (L) 70% shale, 30% consolidated shaley sand
Cristellaria A, Robulus mayeri, Globigerina sp., Nonion sp.,
Siphonina advena

- 13500 (L) 90% shale, 10% sand
Same fauna
- 13530 (L) Same
Same fauna plus Eponides antillarum
- 13560 (L) 70% shale, 30% consolidated sand
Same fauna - rare
- 13590 (L) 90% shale, 10% sand
Same fauna plus Quinqueloculina sp.
- 13620 (L) Same
Same fauna
- 13650 (L) 70% shale, 30% consolidated sand
Cristellaria A, Robulus americanus, Globigerina sp.
- 13680 (L) Same
Same fauna
- 13710 (L) 80% shale, 20% consolidated shaley sand
Same fauna
- 13740 (L) Same
Same fauna
- 13770 (L) Same
Same fauna
- 13800 (L) 70% shale, 30% sand, siltstone
Robulus sp., sparse fauna
- 13830 (L) Same
Robulus mayeri
- 13860 (L) Same
Uvigerina howei, Cristellaria A, Robulus mayeri
- 13920 (L) Same
Same fauna with Robulus americanus
- 13950 (L) Same
Same fauna
- 13980 (L) Same
Same fauna with Reophax sp., Discorbis bolivarensis
- 14010 (L) 50% shale, 50% sandstone fragments
Same fauna - sparse
- 14040 (L) 70% shale, 30% sand and sandstone fragments, pyrite
shell material
Robulus sp., Robulus mayeri, Eponides antillarum

- 14070 (L) Same
Same fauna - rare
- 14100 (L) Same
Same fauna - rare
- 14130 (L) Same
Same fauna - rare
- 14160 (L) 50% shale, 50% sand and sandstone fragments with
shell material, rare pyrite
Robulus mayeri
- 14190 (L) Same
Robulus mayeri, Robulus americanus - sparse fauna
- 14220 (L) Same
No fauna
- 14250 (L) Same
No fauna
- 14280 (L) Same
No fauna
- 14310 (L) Same
No fauna
- 14340 (L) Same
No fauna
- 14370 (L) Same
Robulus sp.
- 14400 (L) Same
Robulus mayeri, Uvigerina howei - sparse fauna
- 14430 (L) Same
Same fauna
- 14460 (L) Same
Discorbis bolivarensis, Robulus sp.
- 14490 (L) 70% shale, 30% sandstone plus cement
No fauna
- 14520 (L) 70% shale, 30% sandstone
No fauna
- 14550 (L) 80% shale, 20% sandstone
No fauna

- 14580 (L) Same
Cristellaria sp. (1)
- 14610 (L) Same
No fauna
- 14640 (L) Same plus cement
No fauna
- 14700 (L) 70% shale, 30% sand plus cement
No fauna
- 14730 (L) Same
Robulus sp. (1), Robulus mayeri (1)
- 14760 (L) 70% shale, 30% sandstone and loose sand plus cement
No fauna
- 14790 (L) 80% shale, 20% sandstone
No fauna
- 14820 (L) 50% fine to medium grain sandstone fragments, 50% shale
No fauna
- 14850 (L) Same
No fauna
- 14880 (L) Same
No fauna
- 14910 (L) Same
No fauna
- 14940 (L) Same
No fauna
- 14970 (L) Same
Robulus sp.
- 15000 (L) Same
No fauna
- 15030 (L) 60% shale, 40% consolidated sand
Cristellaria A, Globigerina sp., Robulus americanus, Robulus
mayeri, Nonion sp.
- 15060 (L) Same
Same fauna

- 15090 (L) 60% sand, 40% shale
Cristellaria A, Robulus americanus, Nonion sp.
- 15120 (L) Same
Same fauna - very rare
- 15150 (L) 80% shale, 20% sand
Same fauna - rare
- 15180 (L) 60% shale, 40% consolidated sand and mud material
Robulus americanus
- 15210 (L) Same
Same fauna
- 15240 (L) Same
Cristellaria A, Robulus americanus, Globigerina sp., Nonion sp.
- 15270 (L) Same
Same fauna
- 15300 (L) Same
Same fauna
- 15330 (L) 60% shale, 40% sand
Same fauna - rare
- 15360 (L) Same
Same fauna
- 15390 (L) Same
Same fauna
- 15420 (L) Same
Same fauna
- 15450 (L) Same
Same fauna
- 15480 (L) 80% shale, 20% sand
Cristellaria A, Robulus americanus, Globigerina sp.
- 15510 (L) 60% shale, 40% sand
Same fauna
- 15540 (L) Same
Same fauna
- 15570 (L) Same
Same fauna - rare plus Quinqueloculina sp.,

Side Track Hole

- 15570 (L) 80% shale, 20% sand
Cristellaria A, Robulus americanus, Globigerina sp.
- 15600 (L) 60% shale, 40% sand
Cristellaria A, Robulus mayeri, Globigerina sp., Nonion sp., Uvigerina howei
- 15630 (L) Same
Same fauna
- 15660 (L) Same
Same fauna - very rare
- 15690 (L) 80% shale, 20% sand
Robulus americanus, Globigerina sp., Nonion sp.
- 15720 (L) 60% shale, 40% sand
Robulus americanus, Nonion sp., Quinqueloculina sp.
- 15750 (L) Same
Same fauna
- 15780 (L) 60% sand, 40% shale
Same fauna - rare
- 15810 (L) Same
Same fauna
- 15840 (L) Same
Same fauna - very rare
- 15870 (L) 80% shale, 20% sand
Robulus americanus, Nonion sp.
- 15900 (L) Same
Robulus americanus
- 15930 (L) Same
No fauna
- 15960 (L) Same
Robulus americanus
- 15990 (L) 70% shale, 30% very fine grain sandstone, siltstone, sand grains
No fauna
- 16020 (L) 80% shale, 20% very fine grain sandstone, siltstone, sand grains, pyrite, cement
No fauna

- 16050 (L) Same
No fauna
- 16080 (L) 90% shale, 10% very fine grain sandstone and sand grains,
siltstone, cement
No fauna
- 16110 (L) Same
No fauna
- 16140 (L) 70% shale, 30% sand, very fine grain sandstone fragments,
cement
No fauna
- 16170 (L) Same
No fauna
- 16200 (L) 60% shale, 40% sand and very fine grain sandstone
fragments plus common mud additives
No fauna
- 16230 (L) Same
No fauna
- 16260 (L) 70% shale, 30% sand and very fine grain sandstone
fragments
Cristellaria A
- 16290 (L) Same plus cement
Nonion pizzarensis, Uvigerina peregrina, Globorotalia
siakensis
- 16320 (L) 60% shale, 40% sand (common chert) and very fine
grain sandstone fragments, cement, mud additives
No fauna
- 16350 (L) 50% shale, 50% sand and very fine grain sandstone
fragments
No fauna
- 16380 (L) Same
Same fauna
- 16410 (L) Same
Same fauna plus Siphogenerina fredsmithi, Siphogenerina
lamellata, Gyroidina scalata
- 16440 (L) Same
Same fauna plus Siphonina davisi

16470 -500

(L) Same

Same fauna with *Siphonina davis*

Appendix C

CORE LOG

C-2
CORE LOG
FDC CNL

DEPTH CORE	TYPE CORE	O, %	KA, MD	KW, MD
14570	S	19.3	16	7
14625	S	25.9	160	32
14645	S	23.8	94	20
14660	S	14.9	4.2	--
14715	S	27.3	275	50
14745	S	27.9	285	50
14790	S	27.1	240	45
			178 average	34 average
14935	S	26.5	205	40
14950	S	22.5	22	7
			113 average	24 average
15182.7-84	D	18.8	64	15
15184.8-86	D	18.0	220	40
15186-87	D	20.1	185	35
15187.5-89	D	18.2	93	20
15189-91	D	20.8	545	95
15285	S	22.8	37	10
15348-50	D	12.2	145	30
15350	S	26.1	190	35
15350-52	D	12.7	61	15
15352-54	D	14.7	150	35
15354-56	D	12.2	65	15
15356-58	D	15.6	21	7
15358-60	D	10.4	90	20
15360	S	22.4	38	8
15360-62	D	16.8	115	25
15362-64	D	15.1	90	20
15364-66	D	15.1	60	15
15366-68	D	16.1	135	27
15368-70	D	13.6	80	18
15370-72	D	15.2	7.4	--
15372-74	D	13.6	55	14
15400	S	22.9	38	10
15420	S	25.2	84	18
15460	S	23.6	40	10
15470	S	23.3	31	8
			109 average	23 average
15520	S	22.8	20	7
15550	S	25.3	78	18
15810	S	23.7	35	9
			44 average	11 average
16160	S	24.1	48	11
16215	S	24.5	96	20
16230	S	27.2	415	80
16250	S	21.7	18	7
16315	S	17.2	6.5	--
			144 average	30 average

Kah 37,380 - 35.87%
Kwh 7,140 - 32.92%

Kah 4,520 - 4.34%
Kwh 960 - 4.43%

Kah 34,880 - 33.47%
Kwh 7,360 - 33.93%

Kah 12,320 - 11.82%
Kwh 3,080 - 14.20%

Kah 15,120 - 14.51%
Kwh 3,150 - 14.5%

TOTAL: Kah 104,220 - 100.01%
Kwh 21,690 - 100.00%

Appendix D

CORE ANALYSIS

Coring Program

Three 4" diameter diamond cores were taken in the Gladys McCall well for analysis by Core Laboratories:

Core No. 1	15167' - 15177'
Core No. 2	15179' - 15192'
Core No. 3	15348' - 15374.5'

Plugs were taken from approximate two foot intervals in the sand sections for porosity and permeability analyses. The results of these analyses are shown in Table 6-1, p. 6-3. The porosity values range from 10-18%, and the air permeabilities from 7 to 545 md, with an average of 100 md. Additional plugs were taken to obtain vertical permeabilities. These results are shown in Table D-1. The vertical air permeabilities ranged from 1 to 50 md, with an average of 65 md. The ratio of vertical to horizontal permeability varies from 1/1 to 1/10.

Sidewall cores were taken over the entire target sand section. Results of porosity and permeability analyses are given in Table 6-2, p. 6-5. Sidewall core porosities range from 14% to 27% with air permeabilities of 4 to 415 md. The porosity measurements are much higher than those of the diamond cores. This is most likely an artificial increase -- the diamond core porosities are closer to the true values.

The diamond core plugs were then put through petrographic, XRD and SEM analyses (report follows). The sands are all fine grained sandstones, of quartz arenite or subarkose. They are moderately sorted and contain primarily quartz with minor amounts of feldspar, rock fragments, calcite and clays. Trace amounts of heavy minerals are present. The cementing material is quartz overgrowth.

Terra Tek performed rock mechanics testing, and preliminary results are presented in Table 6-3, p. 6-15. Effective porosities as measured by Terra Tek range from 17 - 20%. In situ permeabilities range from 50 to 60 md, approximately 1/3 to 1/2 that of bench condition permeabilities. Results of compaction tests and long term creep tests should be available in September 1982.

A heel slab was cut from the entire core for the repository at the Louisiana Geological Survey. Material from the remaining part of the core was then distributed to the USGS, Terra Tek and Aerospace Corporation. A few pieces were retained by T-F&S for display, and the remainder of the core was sent to the LGS repository.

TABLE D-1

VERTICAL PERMEABILITY MEASUREMENTS

Sample Number	Depth	Permeability Vertical (K)
1	15348.0	150.
2	15351.0	50.
3	15354.0	110.
4	15355.5	26.
5	15357.0	4.8
6	15359.0	1.1
7	15361.0	105.
8	15362.5	19.
9	15365.5	60.
10	15367.5	135.
11	15369.5	1.0
12	15372.0	84.
13	15373.5	97.
14	15191.0	55.

Note: All core samples from 15182 feet to 15190 feet were shipped to Terra Tek on 9-10-81.

Special Core Analysis Study
for
TECHNIDRIL-FENIX & SCISSON
Gladys McCall Well No. 1
Petrographic Analysis

D-5

CORE LABORATORIES, INC.

Special Core Analysis

LAB

December 28, 1981

Technadril-Fenix & Scisson
3 Northpoint Drive
Suite 200
Houston, Texas 77060

Attention: Mr. Art Pyron

Subject: Combination Petrology Study
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana
File Number: SCAL-308-81328

Gentlemen:

On August 24, 1981, eighteen core samples from the subject well were submitted to the Special Core Analysis Department of Core Laboratories, Inc. at Dallas, Texas, by Charles Chiasson, Core Laboratories, Inc., Lafayette, Louisiana, with a request on behalf of Technadril-Fenix & Scisson for a Combination Petrographic Study to be performed on each sample. This combination study consisted of Petrographic Thin Section Analyses, Mineral Content Determinations by X-Ray Diffraction and Scanning Electron Microscope (SEM) Study. The results of these analyses are presented herein, and the original set of SEM photomicrographs appears as an appendix to one copy of the report.

A thin section slide was prepared from each submitted sample and described in detail with the aid of a polarizing microscope. The results of these analyses appear on Pages 1 through 18.

An additional portion of each sample was prepared for mineral content determinations. The total sample and clay-sized (less than 4 microns in diameter) fractions were analyzed separately using an x-ray diffraction technique with monochromatic $\text{CuK}\alpha$ radiation. The results of these tests appear on Pages 19 through 28.

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Page Two

A third portion of each submitted sample was prepared for SEM study by creating freshly broken surfaces and coating these surfaces with a thin (750Å) film of gold-palladium. A discussion of the features revealed in the SEM photomicrographs appears on Pages 23 through 32.

It has been a pleasure performing this study on behalf of Technadril-Fenix & Scisson. Should any questions arise concerning the results of this study, or if we can be of further assistance, please do not hesitate to contact us.

Very truly yours,

Core Laboratories, Inc.

John A. Koerner
JAK

John A. Koerner, Laboratory Supervisor
Special Core Analysis

JAK:SRO:sd
7 cc. - Addressee

CORE LABORATORIES, INC.

Petroleum Reservoir Engineering

DALLAS, TEXAS 75247

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File SCAL-308-81328

PETROGRAPHIC ANALYSIS

Technidril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,182.7-84

Fine Sandstone: Subarkose

This sample is a moderately sorted, moderately packed fine sandstone consisting of 90 percent quartz, 5 percent feldspar, 3 percent rock fragments, 1 percent calcite and 1 percent clay. Also present are traces of organic matter, pyrite, muscovite and tourmaline. Framework grains averaging 0.16mm are sub-angular to subrounded and subelongate to equant. Contacts between grains are planar, concavo-convex and occasionally sutured.

Monocrystalline quartz predominates, exhibiting straight or undulose extinction. Less common are polycrystalline quartz grains displaying undulatory extinction. Vacuoles, some forming linear "bubble trains", are present in these quartz grains in addition to microlite inclusions of zircon, tourmaline, rutile and muscovite. The feldspar present is mostly potassium-rich orthoclase and less commonly albite-twinning plagioclase. Most of these grains show partial to extensive alteration marked by significant dissolution creating secondary porosity. Vacuolization, sericitization and minor replacement by calcite are also noted. Especially common representing the lithic portion of the sample is detrital chert, which is composed of microcrystalline quartz and megaquartz. Minor alteration is evident in these chert grains, resulting in clayey overlays, sericitization and replacement by calcite. In addition to these framework grains, organic matter, tourmaline and muscovite are scattered throughout the section.

An early to intermediate stage of quartz overgrowth development is the primary source of cementation. Characterized by euhedral grain terminations, "dust rim" inclusions and concavo-convex contacts, these overgrowths significantly reduce primary intergranular porosity. Additional porosity loss is enhanced by calcite replacement in feldspars and replacement of organic matter by pyrite concentrated within the pore space. Minor clays are also evident coating grains, suggesting a possible authigenic origin.

Remnant primary and secondary porosities account for 15 percent of this sample.

All percentages were obtained by point count.

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File SCAL-308-81328

PETROGRAPHIC ANALYSIS

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,184.8-86.0

Fine Sandstone: quartz arenite

This sample is a moderately sorted, moderately packed fine sandstone consisting of 92 percent quartz, 3 percent feldspar, 3 percent clay and 2 percent rock fragments. Traces of tourmaline, zircon, pyrite and organic matter are also present. Framework grains are angular to subrounded and subelongate to equant. Averaging 0.20mm, grain size ranges from silt to medium sand. Grain contacts are tangential, planar and occasionally concavo-convex.

The predominant framework grain is monocrystalline quartz displaying straight or undulose extinction. Less common is polycrystalline quartz showing undulose extinction. These quartz grains occasionally contain vacuoles and microlite inclusions of acicular rutile, muscovite, zircon and tourmaline. The feldspar present consists of potassium-rich orthoclase and plagioclase marked by albite twinning. Most of the feldspar grains have undergone partial to extensive alteration resulting in vacuolization, replacement by sericite or calcite and dissolution creating secondary porosity. The lithic portion of the sample is mostly detrital chert composed of microcrystalline quartz. These chert grains are characterized by clayey overlays, replacement by sericite and minor dissolution created as a result of alteration. Organic matter, tourmaline and zircon occur as accessories scattered throughout the section.

The primary source of cementation is an early stage of quartz overgrowth development. These overgrowths are characterized by "dust rim" inclusions, euhedral grain terminations and minor concavo-convex contacts. As a result of overgrowth cementation, primary intergranular porosity is considerably reduced. Secondary calcite occurring as pore-filling cement and as a minor replacement of feldspars also contributes to porosity loss. Pore-filling authigenic kaolinite forms stacked booklets of pseudohexagonal platelets which create some microporosity. Additional clay, possibly chlorite, appears to coat some grains. Organic matter is dispersed throughout the section.

Remnant primary and secondary porosities account for 21 percent of the sample.

All percentages were obtained by point count.

PETROGRAPHIC ANALYSIS

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,186.0-87.0

Fine Sandstone: quartz arenite

This sample is a loosely to moderately packed, moderately sorted fine sandstone consisting of 92 percent quartz, 3 percent clay, 3 percent feldspar, 1 percent rock fragments and 1 percent calcite. Traces of organic matter, pyrite and tourmaline are also present. Framework grains are angular to subrounded and subelongate to equant, averaging 0.18mm. Grain to grain contacts are planar or concavo-convex.

Monocrystalline quartz is the predominant framework element. It exhibits straight or undulatory extinction, and occasionally contains vacuoles and microlite inclusions of rutile, zircon and tourmaline. Polycrystalline quartz containing planar or crenulate subcrystals and showing undulose extinction is much less common. The feldspar present includes plagioclase and the potassium feldspars, orthoclase and microcline. Plagioclase is marked by albite twinning, and grid-iron twinning characterizes microcline. Although some feldspars appear fresh, most grains show partial to extensive alteration resulting in clayey overlays, replacement by sericite or calcite and minor dissolution creating secondary porosity. The lithic portion of the sample is mostly detrital chert. Composed of microcrystalline quartz and megaquartz, these chert grains show minor alteration resulting in clayey overlays and some replacement by sericite. In addition to these framework grains, organic matter and tourmaline are scattered throughout the section.

Secondary quartz overgrowths are the predominant cementing agent in this sample. Euhedral grain terminations, concavo-convex contacts and "dust rim" inclusions characterize these quartz overgrowths, and an early to intermediate stage of overgrowth development substantially reduces primary intergranular porosity. Secondary calcite plays a minor role in cementation, replacing feldspar grains and occurring as a minor pore-filling cement. Pyrite is also evident partially replacing organic matter finely dispersed throughout the pore space. Patches of pore-filling authigenic kaolinite occur as stacked booklets of pseudo-hexagonal platelets creating significant microporosity. Additional clay, rich in chlorite, appears to coat some framework grains.

Remnant primary and secondary porosities account for 21 percent of the sample.

All percentages were obtained by point count.

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Petroleum Reservoir Engineering

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PETROGRAPHIC ANALYSIS

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,187.5-89.0

Fine sandstone: quartz arenite

This sample is a moderately packed, moderately sorted fine sandstone consisting of 90 percent quartz, 3 percent feldspar, 2 percent rock fragments, 2 percent clay, 2 percent organic residue and 1 percent calcite. Also present are traces of pyrite, zircon and tourmaline. Framework grains are subangular to subrounded, subelongate to equant and average 0.19mm in size. Grain contacts are planar, concavo-convex and occasionally sutured.

The major framework constituent is monocrystalline quartz showing straight or undulose extinction. Polycrystalline quartz occurs much less frequently and displays undulose extinction. Vacuoles, "bubble trains" and inclusions of muscovite, zircon and tourmaline are evident in these quartz grains. Orthoclase, grid-iron twinned microcline and plagioclase marked by albite twinning represent the feldspathic fraction of the sample. Most of the feldspars have undergone partial to extensive alteration resulting in clayey overlays, sericitization, replacement by calcite and minor dissolution. The lithic portion of the sample is almost entirely detrital chert. Minor alteration in these chert grains shows clayey overlays, replacement by sericite or calcite and some dissolution. Organic residue is concentrated within the pore space, and additional trace accessories of zircon and tourmaline are dispersed throughout the section.

The major cementing agent is an early to intermediate stage of secondary quartz overgrowths characterized by euhedral grain terminations, "dust rim" inclusions and concavo-convex or sutured contacts. As a result of this overgrowth cementation, primary intergranular porosity is significantly reduced. Calcite occurring as a pore-filling cement and partially replacing feldspar grains also contributes to cementation. Some pore-lining clays are present, suggesting a possible authigenic origin. Rare patches of authigenic kaolinite form stacked booklets of pseudo-hexagonal platelets creating microporosity. In addition, organic residue scattered throughout the section has been replaced by pyrite.

Remnant primary and secondary porosities account for 15 percent of the sample.

All percentages were obtained by point count.

PETROGRAPHIC ANALYSIS

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,189.0-91.0

Fine sandstone: subarkose

This sample is a loosely packed, moderately sorted fine sandstone consisting of 90 percent quartz, 5 percent feldspar, 3 percent clay and 2 percent rock fragments. Traces of organic residue, tourmaline, pyrite and calcite are also present. Subangular to subrounded framework grains are subelongate to equant, averaging 0.17mm. Contacts between grains are tangential, planar or concavo-convex.

Quartz, the major framework element, is predominantly monocrystalline and shows straight or undulose extinction. Less common is polycrystalline quartz exhibiting undulose extinction. Vacuoles, some as linear "bubble trains," and inclusions of muscovite, zircon and rutile are occasionally evident in these quartz grains. The feldspar present includes orthoclase and plagioclase marked by albite twinning. Most of these feldspars show partial to extensive alteration along cleavage traces and twinning planes, resulting in clayey overlays, replacement by sericite or calcite and dissolution. The lithic fraction of the sample is mostly detrital chert. Minor alteration of these chert fragments reveals clayey overlays and replacement by sericite. In addition to these framework grains, traces of tourmaline and organic residue are scattered throughout the section.

The primary source of cementation is an early stage of secondary quartz overgrowth development. Delineated by "dust rim" inclusions, concavo-convex contacts and euhedral grain terminations, these overgrowths considerably reduce primary intergranular porosity. A trace of secondary calcite occurs as a pore-filling cement and occasionally replaces feldspar grains. Minor patches of authigenic kaolinite also contribute to porosity reduction. In addition, organic residue is partially replaced by pyrite scattered throughout the pore system.

Remnant primary and secondary porosities account for 24 percent of the sample.

All percentages were obtained by point count.

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PETROGRAPHIC ANALYSIS

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,348.0-50.0

Fine sandstone: subarkose

This sample is a moderately sorted, loosely to moderately packed fine sandstone composed of 87 percent quartz, 7 percent feldspar, 3 percent rock fragments and 3 percent clay. Traces of organic residue, pyrite, zircon, tourmaline and calcite are also present. Framework grains are subangular to subrounded and subelongate to equant, averaging 0.19mm. Contacts between grains are planar or concavo-convex.

The predominant framework element is monocrystalline quartz exhibiting straight or undulose extinction. Less common are polycrystalline quartz grains showing undulatory extinction. Occasionally, vacuoles and inclusions of muscovite, zircon, tourmaline and rutile are present in these quartz grains. The feldspathic portion of the sample is comprised of plagioclase and the potassium feldspars, orthoclase and microcline. Microcline shows characteristic grid-iron twinning, and plagioclase is marked by albite or pericline twinning. Most of the feldspars appear relatively fresh with only minor alterations resulting in clayey overlays, replacement by sericite and leaching creating secondary porosity. Lithic fragments present include detrital chert and less common claystone clasts. Composed of microcrystalline quartz and megaquartz, these chert grains reveal clayey overlays and replacement by calcite, sericite and pyrite created as a result of alteration. Trace accessories of zircon, tourmaline and organic residue are scattered throughout the section.

An intermediate to advanced stage of secondary quartz overgrowths and concavo-convex contacts is the major cementing agent. As a result of this interlocking texture, primary intergranular porosity is substantially reduced. Rare patches of authigenic kaolinite occur as stacked booklets of pseudohexagonal platelets which create significant microporosity. In addition, possible grain-coating authigenic clay contributes to cementation. Organic residue partially replaced by pyrite is also dispersed throughout the section.

Remnant primary and secondary porosities account for 16 percent of the sample.

All percentages were obtained by point count.

PETROGRAPHIC ANALYSIS

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,350.0-52.0

Fine sandstone: subarkose

This sample is a moderately sorted, loosely to moderately packed fine sandstone composed of 89 percent quartz, 6 percent feldspar, 3 percent rock fragments and 2 percent clay. Also present are traces of organic residue, muscovite, tourmaline and zircon. Framework grains are subangular to subrounded, sub-elongate to equant and average 0.16mm. Contacts between grains are planar, concavo-convex and sutured.

Monocrystalline quartz exhibiting straight or undulatory extinction is the predominant framework element. Polycrystalline quartz displaying undulose extinction is much less common. Vacuoles, some as linear "bubble trains," and inclusions of zircon, muscovite, tourmaline and rutile are evident in these quartz grains. Orthoclase, grid-iron twinned microcline and plagioclase marked by albite and pericline twinning represent the feldspathic fraction of the sample. Although some of the feldspars appear fresh, most of the grains show alteration resulting in clayey overlays, replacement by sericite and minor dissolution. The lithic portion of the sample is mostly detrital chert and minor claystone clasts. Minor alteration of these rock fragments results in clayey overlays, sericitization and dissolution creating secondary porosity. In addition, traces of muscovite, organic residue, tourmaline and zircon are scattered throughout the section.

Overgrowths of secondary quartz are the primary cementing agent and are characterized by "dust rim" inclusions, euhedral grain terminations and concavo-convex or sutured contacts. As a result of an early to intermediate stage of overgrowth cementation, primary intergranular porosity is significantly reduced. In addition, patches of authigenic kaolinite occur as stacked booklets of pseudohexagonal platelets which create substantial microporosity.

Remnant primary and secondary porosities account for 14 percent of the sample.

All percentages were obtained by point count.

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PETROGRAPHIC ANALYSIS

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,352.0-54.0

Fine sandstone: subarkose

This sample is a moderately sorted, moderately packed fine sandstone consisting of 90 percent quartz, 6 percent feldspar, 3 percent rock fragments and 1 percent clay. Also present are traces of organic residue, pyrite, tourmaline and zircon. Subangular to subrounded framework grains are subelongate to equant and average 0.18mm. Contacts between grains are planar or concavo-convex.

Quartz, the predominant framework element, is generally monocrystalline and exhibits straight or undulatory extinction. Polycrystalline quartz displaying undulose extinction is much less common. Vacuoles, "bubble trains" and inclusion of rutile, tourmaline and zircon occasionally are present in these quartz grains. The feldspar present consists of plagioclase and the potassium feldspars, orthoclase and microcline. Plagioclase is marked by albite or percline twinning, and microcline is characterized by grid-iron twinning. Most of the feldspars appear to have undergone partial to extensive alteration resulting in clayey overlays, replacement by sericite and dissolution. The lithic portion of the sample includes detrital chert and minor claystone clasts. As a result of alteration, clayey overlays and sericitization are evident in these chert fragments. In addition, zircon, tourmaline, and organic residue are scattered throughout the section.

The primary source of cementation is an early stage of secondary quartz overgrowths. Delineated by concavo-convex contacts, euhedral grain terminations and "dust rim" inclusions, the development of overgrowth cement has substantially reduced primary intergranular porosity. Additional porosity loss is attributed to rare patches of pore-filling authigenic kaolinite. Organic residue is partially replaced by pyrite and finely dispersed throughout the pore space.

Remnant primary and secondary porosities account for 24 percent of the sample.

All percentages were obtained by point count.

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PETROGRAPHIC ANALYSIS

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,354.0-56.0

Fine sandstone: subarkose

This sample is a moderately sorted, loosely to moderately packed fine sandstone composed of 85 percent quartz, 9 percent feldspar, 4 percent rock fragments, and 2 percent clay. Traces of organic residue, pyrite, zircon and muscovite are also present. Framework grains are subangular to subrounded, subelongate to equant and average 0.20mm. Contacts between grains are planar or concavo-convex.

The predominant framework element is monocrystalline quartz displaying straight or undulose extinction. Less common are polycrystalline quartz grains exhibiting undulose extinction. Vacuoles, some as linear "bubble trains," and inclusions of zircon, muscovite, tourmaline and rutile are evident in these quartz grains. Orthoclase, grid-iron twinned microcline and plagioclase marked by albite or pericline twinning represent the feldspathic fraction of the sample. Although some grains appear relatively fresh, most of the feldspars show minor to extensive alteration resulting in clayey overlays, replacement by sericite and dissolution. The lithic portion of the sample is mostly detrital chert. The chert fragments are composed of microcrystalline quartz and show minor alteration to clay and sericite. Traces of organic residue, zircon and muscovite are scattered throughout the section.

An early to intermediate stage of secondary quartz overgrowth development is the major cementing agent. These overgrowths are delineated by "dust rim" inclusions, concavo-convex contacts and euhedral grain terminations. As a result of overgrowth cementation, primary intergranular porosity is considerably reduced. Minor patches of pore-filling authigenic kaolinite also contribute to porosity reduction. In addition, organic residue finely dispersed throughout the section is partially replaced by pyrite.

Remnant primary and secondary porosities account for 19 percent of the sample.

All percentages were obtained by point count.

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PETROGRAPHIC ANALYSIS

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,356.0-58.0

Fine sandstone: subarkose

This sample is a moderately sorted, loosely to moderately packed fine sandstone composed of 88 percent quartz, 6 percent feldspar, 4 percent clay and 2 percent rock fragments. Traces of zircon, tourmaline, organic residue, pyrite and muscovite are also present. Framework grains are subangular to subrounded, subelongate to equant and average 0.17mm. Grain to grain contacts are either planar or concavo-convex.

Monocrystalline quartz showing straight or undulose extinction is the major framework constituent and occasionally contains vacuoles and microlite inclusions of rutile, zircon, tourmaline and muscovite. Polycrystalline quartz exhibiting undulose extinction is much less common. The feldspar present consists of plagioclase and the potassium feldspars, orthoclase and microcline. Microcline shows characteristic grid-iron twinning, and albite or pericline twinning is evident in the plagioclase feldspars. Minor to extensive alteration of these feldspars has resulted in clayey overlays and replacement by sericite. Leaching has further created appreciable secondary porosity. The lithic portion of the sample is mostly detrital chert. Pronounced alteration of these chert grains to clay and sericite is noted. Traces of organic residue, zircon, tourmaline and muscovite are scattered throughout the section.

Secondary quartz overgrowths, as characterized by euhedral grain terminations, "dust rim" inclusions and concavo-convex contacts, are the primary source of cementation. This early to intermediate stage of overgrowth development has resulted in a reduced primary intergranular porosity. Patches of authigenic kaolinite occur as stacked booklets of pseudo-hexagonal platelets which create significant microporosity. In addition, possible authigenic clay appears to coat grains. Organic matter partially altered to pyrite is dispersed throughout the pore space.

Remnant primary and secondary porosities account for 18 percent of the sample.

All percentages were obtained by point count.

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PETROGRAPHIC ANALYSIS

Technadri1-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,358.0-60.0

Fine sandstone: subarkose

This sample is a moderately sorted, moderately packed fine sandstone consisting of 85 percent quartz, 8 percent feldspar, 5 percent clay and 2 percent rock fragments. Also present are traces of organic residue, pyrite, muscovite, tourmaline and zircon. Framework grains are subangular to subrounded and subelongate to equant, averaging 0.16mm. Contacts between grains are planar, concavo-convex and occasionally sutured.

The predominate framework element is monocrystalline quartz exhibiting straight or undulose extinction and containing vacuoles and inclusions of muscovite, rutile, tourmaline and zircon. Less common is polycrystalline quartz displaying undulatory extinction. Orthoclase and plagioclase marked by albite or pericline twinning are the most abundant feldspars present. Pronounced alteration to clay and sericite is evident in most of these feldspars along with dissolution creating appreciable secondary porosity. Microcline characterized by grid-iron twinning is much less common, and only slight alteration to clay and sericite is noted in these grains. The lithic portion of the sample is mostly detrital chert composed of microcrystalline quartz and megaquartz. Minor alteration is evident in these chert grains, resulting in clayey overlays, replacement by sericite and dissolution. In addition, traces of organic residue, zircon, tourmaline and muscovite are scattered throughout the section.

An early stage of secondary quartz overgrowth development characterized by euhedral grain terminations, "dust rim" inclusions and concavo-convex or sutured contacts is the primary cementing agent. As a result of this interlocking texture, primary intergranular porosity is significantly reduced. Patchy interstitial clay appears sericitized and further contributes to porosity reduction. Rare patches of authigenic kaolinite occur as stacked booklets of pseudo-hexagonal platelets creating significant microporosity. In addition, organic residue is finely dispersed throughout the section, partially replaced by pyrite.

Remnant primary and secondary porosities account for 11 percent of the sample.

All percentages were obtained by point count.

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PETROGRAPHIC ANALYSIS

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,360.0-62.0

Fine sandstone: subarkose

This sample is a moderately sorted, loosely packed fine sandstone consisting of 88 percent quartz, 6 percent feldspar, 4 percent rock fragments and 2 percent clay. Also present are traces of organic matter, pyrite, muscovite, tourmaline and zircon. Framework grains averaging 0.18mm are subangular to subrounded and subelongate to equant. Contacts between grains are planar or concavo-convex.

The predominant framework element is monocrystalline quartz displaying straight or undulose extinction. Less common is polycrystalline quartz exhibiting undulose extinction. Vacuoles, some as linear "bubble trains," and microlite inclusions of rutile, zircon, tourmaline and muscovite are evident in these quartz grains. Orthoclase, grid-iron twinned microcline and plagioclase marked by albite or pericline twinning represent the feldspathic fraction of the sample. Although some feldspars appear fresh, most grains show minor to extensive alteration resulting in clayey overlays, replacement by sericite and dissolution along cleavage traces and twinning planes. The lithic portion of the sample consists of detrital chert and less common claystone clasts. Clayey overlays, sericitization and minor dissolution are evident forms of alteration in these chert grains. Traces of organic matter, tourmaline, muscovite and zircon are scattered throughout the section in addition to the above framework elements.

Overgrowths of secondary quartz are the primary source of cementation and are delineated by euhedral grain terminations, "dust rim" inclusions and concavo-convex contacts. As a result of this early to intermediate stage of overgrowth development, primary intergranular porosity has been reduced significantly. Rare patches of authigenic kaolinite occur as stacked booklets of pseudohexagonal platelets which create some microporosity. Traces of possible authigenic clays are noted as grain coatings. Organic matter has been partially replaced by pyrite and is scattered throughout the section.

Remnant primary and secondary porosities account for 20 percent of the sample.

All percentages were obtained by point count.

PETROGRAPHIC ANALYSIS

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,362.0-64.0

Fine sandstone: sublithic subarkose

This sample is a moderately sorted, loosely packed fine sandstone consisting of 88 percent quartz, 5 percent feldspar, 5 percent rock fragments and 2 percent clay. Also present are traces of zircon, tourmaline, organic matter, muscovite and pyrite. Framework grains are subangular to subrounded and subelongate to equant. Averaging 0.20mm, grains range from silt to medium sand-size. Contacts between grains are planar or concavo-convex.

The predominant framework element is monocrystalline quartz exhibiting straight or undulose extinction. Polycrystalline quartz displaying undulose extinction is much less common. Vacuoles, some as linear "bubble trains," and inclusions of tourmaline, apatite, zircon, rutile and muscovite occasionally occur in these quartz grains. The feldspar present consists of plagioclase and the potassium feldspars, orthoclase and microcline. Relatively fresh, microcline shows typical grid-iron twinning. Plagioclase is marked by albite or pericline twinning. Alteration to clay and sericite is quite pronounced in most of the plagioclase and orthoclase grains. In addition, extensive leaching in some of these grains has created appreciable secondary porosity. The lithic portion of the sample includes detrital chert and lesser amounts of claystone clasts. Alteration resulting in clayey overlays, sericitization, replacement by pyrite and minor dissolution is evident in these rock fragments. Organic matter, zircon, tourmaline and muscovite are scattered throughout the section as trace accessories.

Framework elements are cemented primarily by an early stage of secondary quartz overgrowths. Delineated by concavo-convex contacts, "dust rim" inclusions and euhedral grain terminations, these overgrowths have considerably reduced primary intergranular porosity. Authigenic kaolinite occurs as a pore-filling cement further contributing to porosity loss. Additional clay appears to coat grains, suggesting an authigenic origin. Finely dispersed throughout the section is organic matter which has been partially replaced by pyrite.

Remnant primary and secondary porosities account for 2 percent of the sample.

All percentages were obtained by point count.

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PETROGRAPHIC ANALYSIS

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,364.0-66.0

Fine sandstone: subarkose

This sample is a moderately packed, moderately sorted fine sandstone composed of 87 percent quartz, 7 percent feldspar, 4 percent rock fragments and 2 percent clay. Also present are traces of organic matter, pyrite, zircon and muscovite. Framework grains are subangular to subrounded, subelongate to equant and average 0.18mm. Grain contacts are planar, concavo-convex and occasionally sutured.

Monocrystalline quartz displaying straight or undulose extinction is the major framework constituent and occasionally contains vacuoles and inclusions of zircon, muscovite, tourmaline and rutile. Less common is polycrystalline quartz exhibiting undulatory extinction. Orthoclase, plagioclase and minor amounts of microcline represent the feldspathic fraction of the sample. Plagioclase is marked by albite or pericline twinning and grid-iron twinning characterizes microcline. Microcline grains appear relatively fresh; however the remaining feldspars show appreciable alteration to clay and sericite along cleavage traces and twinning planes. Extensive leaching creating secondary porosity is evident in some of the feldspar grains. The lithic fragments present are mostly detrital chert and minor claystone clasts. Minor alteration resulting in clayey overlays, sericitization and replacement by pyrite are common in these chert fragments. In addition, traces of muscovite, zircon and organic matter are scattered throughout the section.

The primary source of cementation is an early stage of secondary quartz overgrowth development. These overgrowths are characterized by "dust rim" inclusion, euhedral grain terminations and concavo-convex or sutured contacts. Patches of authigenic kaolinite and rare grain-coating clays further contribute to cementation. In addition, organic matter partially replaced by pyrite is finely dispersed throughout the sample.

Remnant primary and secondary porosities account for 15 percent of the sample.

All percentages were obtained by point count.

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PETROGRAPHIC ANALYSIS

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,366.0-68.0

Fine sandstone: subarkose

This sample is a loosely to moderately packed, moderately sorted fine sandstone consisting of 88 percent quartz, 5 percent feldspar, 4 percent rock fragments and 3 percent clay. Also present are traces of organic matter, pyrite, muscovite and tourmaline. Subangular to subrounded framework grains are subelongate to equant and average 0.21mm. Grain contacts are planar or concavo-convex.

Quartz, the major framework constituent, is generally monocrystalline showing straight or undulose extinction. Scattered polycrystalline quartz grains display undulatory extinction. Vacuoles and occasional inclusions of rutile, zircon, muscovite and tourmaline are evident in these quartz grains. The feldspar present consists of orthoclase, grid-iron twinned microcline and plagioclase showing albite or pericline twinning. Although some of the grains appear fresh, most feldspars show minor to extensive alteration resulting in clayey overlays, replacement by sericite and dissolution along cleavage traces and twinning planes. The lithic portion of the sample is mostly detrital chert. These chert grains reveal clayey overlays, sericitization, replacement by pyrite and minor dissolution created as a result of alteration. In addition to these framework grains, accessories of muscovite, tourmaline and organic matter are scattered throughout the section.

The development of secondary quartz overgrowths marked by concavo-convex contacts, euhedral grain terminations and "dust rim" inclusions is the major source of cementation. An early to intermediate stage of overgrowth cementation has considerably reduced primary intergranular porosity. Minor patches of authigenic kaolinite occur as stacked booklets of pseudo-hexagonal platelets creating significant microporosity. Additional clay appears to be pore-lining further reducing porosity. Organic matter dispersed throughout the section has been partially replaced by pyrite.

Remnant primary and secondary porosities account for 20 percent of the sample.

All percentages were obtained by point count.

PETROGRAPHIC ANALYSIS

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,368.0-70.0

Fine sandstone: sublithic subarkose

This sample is a moderately sorted, loosely to moderately packed fine sandstone composed of 86 percent quartz, 6 percent feldspar, 5 percent rock fragments and 3 percent clay. Also present are traces of organic matter, pyrite and muscovite. Framework grains are subangular to subrounded and subelongate to equant. Ranging from silt to medium sand, grains average 0.20mm. Contacts between grains are planar or concavo-convex.

The predominant framework element is monocrystalline quartz exhibiting straight or undulose extinction and occasionally containing vacuoles and inclusions of tourmaline, muscovite, apatite, rutile and zircon. Polycrystalline quartz is much less abundant, displaying undulatory extinction. The feldspar present includes orthoclase, albite or pericline-twinning plagioclase and less prevalent microcline marked by grid-iron twinning. Although some feldspars appear fresh, most grains show alteration resulting in clayey overlays, replacement by sericite and dissolution. The lithic portion of the sample is mostly detrital chert composed of microcrystalline quartz and megaquartz. Minor alteration to clay and sericite is evident. In addition, traces of organic matter and muscovite are scattered throughout the section.

Framework grains are primarily cemented by an early to intermediate stage of secondary quartz overgrowth development. Characterized by euhedral grain terminations, "dust rim" inclusions and concavo-convex contacts, these overgrowths substantially reduce primary intergranular porosity. Patches of authigenic kaolinite occur as stacked booklets of pseudohexagonal platelets which create significant microporosity. Additional pore-lining clays are indistinguishable; however, their high birefringence suggests an authigenic origin. Trace amounts of pyrite partially replace organic debris finely dispersed throughout the section.

Remnant primary and secondary porosities account for 17 percent of the sample.

All percentages were obtained by point count.

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PETROGRAPHIC ANALYSIS

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,370.0-72.0

Fine sandstone: subarkose

This sample is a moderately sorted, moderately packed fine sandstone consisting of 86 percent quartz, 8 percent feldspar, 3 percent rock fragments and 3 percent clay. Traces of calcite, organic matter, pyrite, zircon, tourmaline and muscovite are also present. Framework grains are subangular to subrounded and subelongate to equant. Averaging 0.23mm, grains range in size from silt to coarse sand. Contacts between grains are planar, concavo-convex and sutured.

Monocrystalline quartz exhibiting straight or undulose extinction is the predominant framework element, occasionally containing vacuoles and microlite inclusions. Less common is polycrystalline quartz displaying undulatory extinction. Orthoclase, grid-iron twinned microcline and plagioclase marked by albite or pericline twinning represent the feldspathic fraction of the sample. Most of the feldspars show pronounced alteration to clay and sericite. Leaching of these grains is also noted, creating secondary porosity. The lithic portion of the sample is mostly detrital chert and minor claystone clasts. These rock fragments show alteration resulting in clayey overlays, sericitization and replacement by pyrite. Traces of zircon, tourmaline, muscovite and organic matter are scattered throughout the section.

The primary source of cementation is an early stage of secondary quartz overgrowth development. Euhedral grain terminations, "dust rim" inclusions and concavo-convex or sutured contacts characterize these overgrowths. As a result of this interlocking texture, primary intergranular porosity is appreciably reduced. Sericitized clay appears to form stringers as a result of pressure solution, and accessory minerals in addition to organic matter partially replaced by pyrite are closely associated with these stringers of clay. Minor patches of authigenic kaolinite are present filling some pore spaces. These stacked, pseudo-hexagonal platelets create significant microporosity.

Remnant primary and secondary porosities account for 10 percent of the sample.

All percentages were obtained by point count.

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PETROGRAPHIC ANALYSIS

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,372.0-74.0

Fine sandstone: sublithic subarkose

This sample is a moderately sorted, moderately packed fine sandstone consisting of 82 percent quartz, 11 percent feldspar, 5 percent rock fragment and 2 percent clay. Traces of calcite, organic matter, pyrite, tourmaline and muscovite are also present. Framework elements are subangular to subrounded and subelongate to equant, averaging 0.17mm. Grain to grain contacts are planar, concavo-convex and occasionally sutured.

Monocrystalline quartz displaying straight or undulatory extinction is the major framework constituent. Less common is polycrystalline quartz displaying undulose extinction. Vacuoles, some as linear "bubble trains," and inclusions of tourmaline, zircon, muscovite and rutile occasionally are evident in these quartz grains. The feldspar present includes plagioclase and the potassium feldspars, orthoclase and microcline. Grid-iron twinning is characteristic of microcline, and the plagioclase shows albite or pericline twinning. Many feldspars show pronounced alteration to clay and sericite. Leaching creating secondary porosity is also noted. The lithic portion of the sample is mostly detrital chert in which minor alteration has resulted in clayey overlays, sericitization and replacement by calcite or pyrite. Accessories of muscovite, tourmaline and organic matter are scattered throughout the section.

The primary source of cementation is an intermediate stage of secondary quartz overgrowth development. These overgrowths are characterized by "dust rim" inclusions, euhedral grain terminations and concavo-convex or sutured contacts. As a result of the interlocking texture, primary intergranular porosity is substantially reduced. Scattered patches of calcite occur as a replacement for feldspars, quartz and chert grains. Authigenic pyrite also replaces organic matter dispersed throughout the section. Pore-filling authigenic kaolinite and indistinguishable pore-lining clays further contribute to cementation.

Remnant primary and secondary porosities account for 18 percent of the sample.

All percentages were obtained by point count.

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MINERAL CONTENT DETERMINATION

(by X-ray Diffraction)

Technadril-Fenix & Scisson
 Gladys McCall Well No. 1
 Grand Chenier Field
 Cameron Parish, Louisiana

Sample Identification:	1		2		3		4		5	
Sample Depth, feet:	15,182.7-84.0		15,184.8-86.0		15,186.0-87.0		15,187.5-89.0		15,189.0-91.0	
Particle Size of Sample Fraction:	Whole Rock	Clay	Whole Rock	Clay	Whole Rock	Clay	Whole Rock	Clay	Whole Rock	Clay
Estimate of Net Percent Clay Minerals:	1.4		3.3		3.1		1.9		2.7	
Mineral	Fraction of Sample Analyzed									
Quartz	92		94		93		94		91	
Feldspars	7		3		4		4		6	
Barite	Trace		Trace		Trace		Trace		Trace	
Kaolinite			2	48	2	59	<1	42	2	66
Chlorite (Fe-Rich)	1	97	1	44	1	31	1	46	<1	24
Illite/Mica	Trace	3	Trace	8	Trace	10	Trace	12	Trace	10

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(by X-ray Diffraction)

Sample Identification:	6		7		8		9		10	
Sample Depth, feet:	15,348.0-50.0		15,350.0-52.0		15,352.0-54.0		15,354.0-56.0		15,356.0-58.0	
Particle Size of Sample Fraction:	Whole Rock	Clay	Whole Rock	Clay	Whole Rock	Clay	Whole Rock	Clay	Whole Rock	Clay
Estimate of Net Percent Clay Minerals:	3.0		2.1		1.8		1.8		4.0	

Mineral	Fraction of Sample Analyzed									
Quartz	91		91		93		90		92	
Feldspars	6		7		5		8		4	
Barite	Trace		Trace		Trace		Trace		Trace	
Kaolinite	2	57	<1	35	1	47	<1	41	2	42
Chlorite (Fe-Rich)	1	31	Trace	24	<1	32	<1	25	<1	20
Illite/Mica	Trace	12	<1	27	Trace	21	<1	25	1	24
Mixed Layer Clay* *Illite/Chlorite			Trace	14			Trace	8	Trace	14

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MINERAL CONTENT DETERMINATION
(by X-ray Diffraction)

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Sample Identification:	11		12		13		14		15	
Sample Depth, feet:	15,358.0-60.0		15,360.0-62.0		15,362.0-64.0		15,364.0-660		15,366.0-68.0	
Particle Size of Sample Fraction:	Whole Rock	Clay	Whole Rock	Clay	Whole Rock	Clay	Whole Rock	Clay	Whole Rock	Clay
Estimate of Net Percent Clay Minerals:	5.0		1.9		2.1		2.6		2.5	
Mineral	Fraction of Sample Analyzed									
Quartz	87		94		94		91		93	
Feldspars	8		4		4		6		4	
Barite	Trace		Trace		Trace		Trace		Trace	
Kaolinite	1	25	1	52	1	52	Trace	12	<1	27
Chlorite (Fe-Rich)	<1	18	<1	24	<1	26	<1	19	<1	25
Illite/Mica	2	45	<1	24	Trace	22	1	50	1	32
Mixed Layer Clay*	<1	12					<1	19	Trace	16

*Illite/Chlorite

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MINERAL CONTENT DETERMINATION

(by X-ray Diffraction)

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Sample Identification:	16		17		18	
Sample Depth, feet:	15,368.0-70.0		15,370.0-72.0		15,372.0-74.0	
Particle Size of Sample Fraction:	Whole Rock	Clay	Whole Rock	Clay	Whole Rock	Clay
Estimate of Net Percent Clay Minerals:	3.5		2.7		2.4	
Mineral	Fraction of Sample Analyzed					
Quartz	90		88		89	
Feldspars	6		9		9	
Barite	Trace		Trace		Trace	
Kaolinite	2	43	<1	23	1	48
Chlorite (Fe-Rich)	1	26	1	35	<1	27
Illite/Mica	1	31	1	42	Trace	25

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SCANNING ELECTRON MICROSCOPE STUDY

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,182.7-84.0

Sample 1 is a light gray, moderately sorted, moderately consolidated, fine-grain sandstone. Photomicrograph A1 (50X) shows a moderately packed aggregate of subangular to subrounded fine sand grains cemented by an early to intermediate state of secondary quartz overgrowths and authigenic clay. Primary intergranular porosity has been greatly reduced by the cements; however, photomicrographs B1 (300X) and C1 (400X) indicate significant remnant porosity. In addition, microporosity has been created by the crystalline morphologies of authigenic clays. A more detailed examination, provided by photomicrograph C2 (2000X), reveals idiomorphic plates of pore-lining authigenic chlorite. Idiomorphic plates of authigenic chlorite occur with morphologies resembling pyrite in photomicrograph B2 (1500X).

Depth, feet: 15,184.8-86.0

Sample 2 is a light gray, moderately sorted, moderately consolidated, fine-grain sandstone. Photomicrograph A1 (50X) shows a moderately packed aggregate of subangular to subrounded fine sand and silt grains cemented by an early stage of quartz overgrowths and pore-filling authigenic clays. Although primary intergranular porosity has been substantially reduced by the cements, photomicrograph B1 (300X) indicates significant porosity remains. In addition, microporosity occurs in association with the delicate crystalline morphologies of authigenic clays. Photomicrograph B2 (1500X) provides a more detailed examination of these morphologies and reveals idiomorphic plates of authigenic chlorite. The presence of poorly defined clay material in association with authigenic chlorite in this photomicrograph suggests recrystallization of detrital clays. Stacked pseudo-hexagonal plates of authigenic kaolinite are shown by photomicrograph B1 (300X).

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SCANNING ELECTRON MICROSCOPE STUDY

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,186.0-87.0

Sample 3 is a light gray, moderately sorted, moderately consolidated, fine-grain sandstone. Photomicrograph A1 (50X) shows a moderately packed aggregate of subangular to subrounded fine and silt grains cemented by an early stage of secondary quartz overgrowths and pore-filling authigenic clay. Primary intergranular porosity has been substantially reduced by the cements; however, photomicrographs B1 (300X) and C1 (400X) indicate significant interparticle porosity remains. Additional porosity in the form of microporosity occurs as a result of the crystalline morphology of authigenic clay. A more detailed view, provided by photomicrograph C2 (2000X), reveals idiomorphic plates of pore-lining authigenic chlorite occurring with delicate lath-like terminations of authigenic illite. In addition, photomicrograph B2 (1500X) examines stacked, pseudo-hexagonal plates of pore-filling authigenic kaolinite.

Depth, feet: 15,187.5-89.0

Sample 4 is a light gray, moderately sorted, moderately consolidated, fine-grain sandstone. Photomicrograph A1 (50X) shows a moderately packed aggregate of subangular to subrounded fine sand and silt grains cemented by an early stage of secondary quartz overgrowths and authigenic clay. Although primary intergranular porosity has been substantially reduced by the cements, photomicrographs B1 (300X) and C1 (600X) suggest significant remnant porosity. In addition, microporosity occurs as a result of the crystalline morphologies of authigenic clays. A more detailed view, provided by photomicrograph B2 (1500X), reveals idiomorphic plates of authigenic chlorite and delicate lath-like terminations of authigenic illite. The occurrence of these authigenic clays with poorly defined clay material suggests recrystallization of detrital clays. Photomicrograph C1 (600X) shows authigenic chlorite and stacked, pseudo-hexagonal plates of authigenic kaolinite.

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SCANNING ELECTRON MICROSCOPE STUDY

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,189.0-91.0

Sample 5 is a light gray, moderately sorted, moderately consolidated, fine-grain sandstone. Photomicrograph A1 (50X) shows a moderately packed aggregate of subangular to subrounded fine sand and silt grains cemented by an early stage of quartz overgrowths and authigenic clay. Primary intergranular porosity has been greatly reduced by the cements; however, photomicrograph B1 (300X) suggests significant interparticle porosity remains. In addition, microporosity has been created by the crystalline morphologies of authigenic clays. Photomicrograph B2 (1500X) provides a more detailed examination of these morphologies and reveals booklets of pore-filling authigenic kaolinite and delicate lath-like terminations resembling authigenic illite. Pore-lining authigenic chlorite is shown by photomicrograph B1 (300X).

Depth, feet: 15,348.0-50.0

Sample 6 is a light gray, moderately sorted, moderately consolidated, fine-grain sandstone. Photomicrograph A1 (50X) shows a moderately packed aggregate of subangular to subrounded fine sand grains cemented by an early stage of quartz overgrowths and pore-filling authigenic clay. Although primary intergranular porosity has been reduced by the cements, photomicrograph B1 (300X) indicates substantial remnant porosity. In addition, significant microporosity has been created by the crystalline structures of authigenic clays. A more detailed examination of these structures, provided by photomicrograph B2 (1500X), reveals stacked pseudohexagonal plates of authigenic kaolinite and delicate projections resembling authigenic illite.

SCANNING ELECTRON MICROSCOPE STUDY

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,350.0-52.0

Sample 7 is a light gray, moderately sorted, moderately consolidated, fine-grain sandstone. Photomicrograph A1 (50X) shows a moderately packed aggregate of subangular to subrounded fine sand grains cement by an early stage of secondary quartz overgrowths and authigenic clay. Primary intergranular porosity has been substantially reduced by the cements; however, photomicrographs B1 (300X) and C1 (300X) indicate significant porosity remains. In addition, microporosity occurs in association with crystalline morphologies of authigenic clays. Photomicrograph B2 (1500X) provides a more detailed view of these clays, revealing delicate lath-like projections of authigenic illite and illustrating the pore-bridging habit of this clay. In addition, stacked pseudohexagonal plates of authigenic kaolinite and delicate projections of authigenic illite are shown in photomicrograph C2 (1500X).

Depth, feet: 15,352.0-54.0

Sample 8 is a light gray, moderately sorted, moderately consolidated, fine-grain sandstone. Photomicrograph A1 (50X) shows a moderately packed aggregate of subangular to subrounded fine sand grains cemented by an early stage of quartz overgrowths and pore-filling authigenic clay. Primary intergranular porosity has been substantially reduced by the cements; however, photomicrograph B1 (300X) suggests significant remnant porosity. Additional microporosity occurs as a result of the delicate crystalline morphology of authigenic clay. Photomicrograph B2 (1500X) examines this morphology in greater detail and reveals stacked pseudohexagonal plates of authigenic kaolinite.

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SCANNING ELECTRON MICROSCOPE STUDY

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,354.0-56.0

Sample 9 is a light gray, moderately sorted, moderately consolidated, fine-grain sandstone. Photomicrograph A1 (50X) shows a moderately packed aggregate of subangular to subrounded fine sand grains cemented by an early stage of quartz overgrowths and pore-filling authigenic clay. The cements in this sample have substantially reduced primary intergranular porosity; however, photomicrograph B1 (300X) suggests significant interparticle porosity remains. In addition, microporosity occurs in association with the crystalline structures of authigenic clays. Photomicrograph B2 (1500X) provides a more detailed view of these structures revealing delicate lath-like projections of authigenic illite. Photomicrograph B1 (300X) shows morphologies resembling authigenic kaolinite booklets.

Depth, feet: 15,356.0-58.0

Sample 10 is a light gray, moderately sorted, moderately consolidated, fine-grain sandstone. Photomicrograph A1 (50X) shows a moderately packed aggregate of fine sand grains cemented by an early stage of quartz overgrowths and pore-filling authigenic clay. Although primary intergranular porosity, viewed in photomicrograph B1 (300X), has been significantly reduced by the cements, substantial interparticle porosity remains. In addition, microporosity occurs in association with crystalline morphologies of authigenic clays. A more detailed examination, provided by photomicrograph B2 (1500X), reveals delicate laths of authigenic illite. Booklets of authigenic kaolinite are shown in photomicrograph B1 (300X).

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SCANNING ELECTRON MICROSCOPE STUDY

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,358.0-60.0

Sample 11 is a light gray, moderately sorted, moderately consolidated, fine-grain sandstone. Photomicrograph A1 (50X) shows a moderately packed aggregate of subangular to subrounded fine sand grains cemented by an early stage of secondary quartz overgrowths and pore-filling authigenic clay. Primary intergranular porosity has been substantially reduced; however, significant remnant porosity is indicated by photomicrographs B1 (400X) and C1 (300X). In addition, microporosity has been created by the crystalline morphologies of authigenic clays. A more detailed view, provided by photomicrograph B2 (2000X), reveals delicate lath-like terminations of authigenic illite and illustrates the pore-bridging habit of this authigenic clay. Photomicrograph C2 (1500X) examines stacked, pseudo-hexagonal plates of pore-filling authigenic kaolinite occurring with wisps of authigenic illite.

Depth, feet: 115,360.0-62.0

Sample 12 is a light gray, moderately sorted, moderately consolidated, fine-grain sandstone. Photomicrograph A1 (50X) shows a moderately packed aggregate of subangular to subrounded fine sand grains cemented by an early stage of quartz overgrowths and authigenic clay. Although primary intergranular porosity, viewed in photomicrograph B1 (300X), has been significantly reduced by the cements, substantial interparticle porosity remains. In addition, microporosity occurs in association with the crystalline morphologies in greater detail and reveals delicate lath-like terminations of authigenic illite occurring with idiomorphic plates resembling authigenic chlorite.

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SCANNING ELECTRON MICROSCOPE STUDY

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,362.0-64.0

Sample 13 is a light gray, moderately sorted, moderately consolidated, fine-grain sandstone. Photomicrograph A1 (50X) shows a moderately packed aggregate of subangular to subrounded fine sand grains cemented by an early stage of quartz overgrowths and pore-filling authigenic clay. Primary intergranular porosity, viewed in photomicrographs B1 (300X) and C1 (300X) has been substantially reduced by the cements; however, significant interparticle porosity remains. In addition, microporosity has been created by the crystalline morphologies of authigenic clays. Photomicrograph B2 (1500X) provides a more detailed view of these morphologies, revealing delicate laths of authigenic illite. Stacked pseudo-hexagonal plates of pore-filling authigenic kaolinite are shown by photomicrograph C2 (1500X).

Depth, feet: 15,364.0-66.0

Sample 14 is a light gray, moderately sorted, moderately consolidated, fine-grain sandstone. Photomicrograph A1 (50X) shows a moderately packed aggregate of subangular to subrounded fine sand and silt grains cemented by an early stage of secondary quartz overgrowths and pore-filling authigenic clay. Although primary intergranular porosity has been substantially reduced by the cements, photomicrograph B1 (300X) suggests significant remnant porosity. In addition, microporosity occurs as a result of the crystalline morphologies of authigenic clays. A more detailed examination of these morphologies, provided by photomicrograph B2 (500X), reveals delicate laths of authigenic illite.

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SCANNING ELECTRON MICROSCOPE STUDY

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,366.0-68.0

Sample 15 is a light gray, moderately sorted, moderately consolidated, fine-grain sandstone. Photomicrograph A1 (50X) shows a moderately packed aggregate of subangular to subrounded fine sand grains cemented by an early stage of secondary quartz overgrowths. Primary intergranular porosity has been somewhat reduced by the cements; however, photomicrograph B1 (300X) indicates substantial porosity remains. A more detailed view of the clay material in this sample, provided by photomicrograph B2 (1500X), reveals a poorly defined structure suggesting a primarily detrital origin.

Depth, feet: 15,368.0-70.0

Sample 16 is a light gray, moderately sorted, moderately consolidated, fine-grain sandstone. Photomicrograph A1 (50X) shows a moderately packed aggregate of subangular to subrounded fine sand grains cemented by an early stage of secondary quartz overgrowths and pore-filling authigenic clay. Although primary intergranular porosity, examined by photomicrograph B1 (300X), has been significantly reduced by the cements, substantial interparticle porosity remains. In addition, microporosity has been created by the delicate structure of authigenic clays. Photomicrograph B2 (1500X) provides a more detailed view of these structures, revealing stacked pseudo-hexagonal plates of pore-filling authigenic kaolinite and morphologies resembling authigenic illite.

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SCANNING ELECTRON MICROSCOPE STUDY

Technadril-Fenix & Scisson
Gladys McCall Well No. 1
Grand Chenier Field
Cameron Parish, Louisiana

Depth, feet: 15,370.0-72.0

Sample 17 is a light gray, moderately sorted, moderately consolidated, fine-grain sandstone. Photomicrograph A1 (50X) shows a moderately packed aggregate of angular to subrounded fine sand and silt grains cemented by an early stage of quartz overgrowths. Primary intergranular porosity, viewed in photomicrographs B1 (300X) and C1 (400X), has been reduced by the cement and a silty matrix such that only microporosity associated with the matrix particles remains. A more detailed view of these particles, provided by photomicrographs B2 (1500X) and C2 (2000X), reveals a poorly defined structure suggesting a primarily detrital origin.

Depth, feet: 15,372.0-74.0

Sample 18 is a light gray, moderately sorted, moderately consolidated, fine grain sandstone. Photomicrograph A1 (50X) shows a moderately packed aggregate of subangular to subrounded fine sand and silt grains cemented by an early to intermediate stage of quartz overgrowths and pore-filling authigenic clay. Although primary intergranular porosity has been substantially reduced by the cements and a silty matrix, photomicrographs B1 (300X) and C1 (400X) indicate significant porosity remains. In addition, microporosity occurs in association with the particles of the matrix and the morphologies of authigenic clays. A more detailed view, provided by photomicrograph B2 (1500X), reveals the poorly defined structure of detrital clay; however, photomicrograph C2 (2000X) shows delicate lath-like projections of pore-lining authigenic illite.

Appendix E

RIG SPECIFICATIONS

MERIT DRILLING COMPANY

RIG 4

25,000 FT. LAND RIG

DRAWWORKS

- Oilwell E-2000 input H.P. driven by two (2) GE 752 DC motors with Crown-o-matic, automatic driller, 1-3/8" grooving, Baylor Model 7838 electric brake, Foster catheads, and air purged drillers console, with automatic driller.

MUD PUMPS

- Two (2) Oilwell A 1400 PT Triplex pumps, 1400 input H.P., each driven by two (2) GE 752 DC motors complete with 6" x 8" centrifugal charging pump, K-20 pulsation dampener, suction stabilizer.

POWER

- Three (3) Caterpillar D-399-TA engines, each driving a 1050 KW Kato AC generator, 1200 RPM, 600 volt.

One (1) Caterpillar D-353 TA-300 KW auxiliary generator set.

AC-DC

- Ross Hill 4 bay SCR power conversion system each rated 1650 amps DC complete with all associated control equipment, generator switchgear and controls, 750 KVA transformer 600 volt to 480 volt, distribution panel, and motor control centers, all enclosed in an air conditioned house.

ROTARY

- Oilwell A 27-1/2" electric rotary drilling unit complete with Oilwell RT-2010-D two speed transmission, Airflex brake, driven by GE 752 DC motor.

BLOCK

- Oilwell 500 ton, 6 sheave, 50" diameter, 1-3/8" groove.

HOOK

- Byron Jackson Model 5500 Dynaplex - 500 ton.

SWIVEL

- Oilwell PC-500 swivel.

BAILS

- Byron Jackson 2-3/4" x 132".

ELEVATORS

- Two (2) Byron Jackson 4-1/2" GG 350 ton elevator.

Two (2) Byron Jackson 8" TA-150 ton drill collar elevator.

Two (2) Byron Jackson 6-3/4" TA-150 ton drill collar elevator.

MAST

- Pyramid Derrick 142' x 30' cantilever mast 1,270,000 lb. hook load designed to API 4E specification with 7 sheave 60" diameter crown block, adjustable casing stabbing board, 240 stand racking board, middle board, catline sheave, tong weights, and Beebe derrick winch.

SUBSTRUCTURE

- Self elevating substructure, 30 ft. floor height, 39 ft. wide x 56 ft. long, 1,250,000 lb. casing capacity and 800,000 lb. setback simultaneous loading, complete with drawworks elevating system, bottom bearing plates, handrails, stairs, V-door ramp, BOP trolley beams, Allenvator and Hercules Model 100 deadline anchor.

BOP's

- One (1) 13-5/8" 5,000 psi WP Shaffer annular BOP - H₂S internal trim.

One (1) 13-5/8" 10,000 psi WP Cameron single ram BOP Type U - H₂S internal trim.

One (1) 13-5/8" 10,000 psi WP Cameron double ram BOP Type U - H₂S internal trim.

One (1) 13-5/8" 10,000 psi drilling spool.

One (1) 3" 10,000 psi WP choke manifold, H₂S trim, built to accommodate Swaco or Cameron automatic choke with

buffer tank and vertical mud-gas separator, 2" 10,000 psi kill manifold.

One (1) 3" 10,000 psi Cameron Type F remote operated valve.

CLOSING UNIT

- Koomey 160 gallon 3,000 psi accumulator closing unit complete with 6 station control panel, remote control panel, 20 H.P. electric pump, air pumps and test connection.

MUD SYSTEM

- Three (3) mud tanks 1000 bbl. total capacity compartmented.

Trip tank, 100 bbl. capacity 3 compartment with two (2) 20 H.P. 2" x 3" centrifugal pumps.

Shale Shakers - Hutchinson-Hayes dual tandem, high speed.

Desander - Picenco Model 123, 3 cone with 50 H.P. 6" x 8" pump.

Desilter - Picenco 412-H, 12 cone with 50 H.P. 6" x 8" pump.

Degasser - Wellco 5200.

Agitators - Five (5) Brandt Model MA 7-1/2 driven by 7-1/2 H.P. explosion-proof motors.

Guns - Demco submerged low pressure,

Hopper - Mission low pressure.

Mud Mix Pumps - Two (2) 6" x 8" centrifugal pumps with 75 H.P. motors.

Mud House - 800 ft.² enclosed.

Mud Lines - 5" dual with Demco 5" 5,000 psi WP valves.

RIG FLOOR

- BJ Type 'DB' tongs 3-1/2" to 21-1/2".
Varco Series 6500 Kelly spinner.

Two (2) Varco SDXL slips 4-1/2".

Mathey Type 'O' survey unit with
15,000 ft. of .092 wireline.

Split Bushing

Varco MSPC solid master bushings.

Varco 27 HDP Kelly bushing-pin drive.

Two (2) Varco Type DCS-L drill collar
slips.

Two (2) IR 20UWB591 air hoists.

Rig floor dog house.

AIR SYSTEM

- Two (2) Quincy screw compressors. 235 CFM each.

One (1) Ingersoll Rand air start compressor, driven by Lister diesel engine.

Three (3) air tanks, 53 ft.³ capacity each.

INSTRUMENTATION

- Instrument console, Model DC-38 with rotary RPM, pump pressure, pump strokes.

Pressure gauges.

Tong torque indicator.

Weight indicator, Martin Decker Type 100.

DRILL STRING

- 10,000 ft. - 4-1/2" Grade E 16.60 lbs/ft drill pipe with 6-1/4" OD Reed X-Hole tool joints, fine particle hardbanding, and internal plastic coating.

5,000 ft. - 4-1/2" Grade X-95 16.60 lbs/ft drill pipe with 6-1/4" OD Reed X-Hole tool joints and internal plastic coating.

5,000 ft. - 4-1/2" Grade X-95 22.85 lbs/ft drill pipe with 6-1/4" OD Reed X-Hole tool joints and internal plastic coating.

18 - 8" OD x 2-13/16" ID drill collars with 6-5/8" API regular connections and zip slip.

21 - 7" OD x 2-13/16" ID drill collars with 5" H90 connections and zip slip.

5-1/4" Hex Kelly.

10,000 psi Lynn International upper and lower Kelly valve, trimmed for H₂S.

10,000 psi Lynn International inside BOP, trimmed for H₂S.

MISCELLANEOUS

- Pipe Racks - 120 ft. long.

Catwalk.

475 bbl. drill water tank with two (2) centrifugal pumps.

12,000 gallon fuel tank with fuel filter and transfer pumps.

Bug blowers, two (2) each Brandt.

Toolpusher's bunkhouse, 10' x 35', two-bedroom furnished.

Auxiliary and crew change house, 7' 10" x 40'.

Crew bunk house 10' x 52'.

WellTech, Inc.

Southeastern Division
Post Office Box 731
Laurel, Mississippi 39440
601/649-5824

RIG 69

RIG: Wilson Model 75 drive-in, self propelled winchmobile powered by two 475 H.P. 3408 Turbo Caterpillar diesel engines. Selective controls permit operation of either engine if desired or should loss of one engine occur. Engines are compounded and equipped with 1-1/8" drill line, water circulating brakes, rotary drive, V80 Parkersburg Hydrotarder. The mast is 116' angular with hook load capacity of 350,000#. Hydraulically raised and telescoped. The crown consists of six sheaves allowing 10 line string up.

MAST: Racking capacity - 2-7/8" tbg. - 25,000 ft.
2-7/8" D.P. - 20,000 ft.*
3-1/2" D.P. - 18,000 ft.**
Mast with 2 hydraulically operated breakout and makeup cylinders.

POWER PLANTS: Two (2) 75 KW generators powered by 3304 Caterpillar diesel engines, skid mounted, along with 8' X 12' steel doghouse.

MUD MIX PUMP: One (1) 5" X 6" centrifugal mud mixing pump powered by 3304 Caterpillar diesel engine.

FRESH WATER: One (1) 2-1/2" X 2" centrifugal fresh water transfer
TRANSFER PUMP: pump - electric power.

MUD PUMPS: Two (2) Gardner Denver PJ-8 Triplex mud pumps powered by 3408 V-8 Caterpillar diesel engines.

SUBSTRUCTURE: 16' high X 17' wide X 20' long, rated at 350,000#, raised hydraulically. (can be worked at 18' height.)

ROTARY TABLE: Oilwell 17-1/2", 300 ton capacity.

ROTARY HOSE: 3" X 45' rotary hose, 5000 PSI working pressure.

* Assumes 4-1/8" O.D. tool joint

**Assumes 4-3/4" O.D. tool joint

PIPE RACKS
& CATWALK: One (1) 40' long catwalk and four (4) 28' long pipe racks.

MUD TANKS: Two (2) 225 bbl. mud tanks, equipped with mud mixing hopper, 30 bbl. slugging tank and bottom mud guns.

WATER TANK: One (1) 4700 gallon water tank to be used for water circulating brakes and the hydromatic brake.

FUEL TANK: One (1) 1850 gallon diesel tank.

BLOCK: One (1) McKissick 150 ton, 4 sheave traveling block grooved for 1-1/8" line with Web Wilson 250 ton hydra hook.

POWER TONGS: One (1) set Foster 58-93-R hydraulic tubing tongs with jaws for 1", 1-1/4" and 2-3/8" tubing, maximum of 6000 ft. - lbs. torque.

WT. INDICATOR: One (1) Martin Decker type "FS" weight indicator with Hercules Model 118 anchor.

DOGHOUSE: One (1) 8' x 12' steel doghouse, skid mounted, on same skid as the generator house.

TRAILER HOUSE: Air conditioned skid mounted house. Accomodations for WellTech pusher and two others.

SAFETY EQUIP.: One (1) industrial intercom system with two stations.

CREW: One (1) Toolpusher on duty 24 hours.
One (1) Driller per tour.
One (1) Derrickman per tour.
Two (2) Floorhands per tour.

SWIVEL: One (1) Ideco Swivel, 200 ton capacity.

KELLY: One (1) 3-1/2" O. D. square kelly Baash ross. (^{42'}~~30'~~)

UPPER KELLY
VALVE: One (1) Upper kelly valve OMSCO, 5000 PSI working pressure.

KELLY DRIVE
BUSHING: Baash Ross for 3-1/2" O.D. square kelly.

SLIPS: One (1) Cavins type "C" air operated spider slips with inserts for 2-3/8", 2-7/8" and 3-1/2" tubing.

ELEVATORS: One set each 175 ton center latch elevators for 2-3/8" 2-7/8" and 3-1/2" tbg.

BLOWOUT: One (1) double Cameron type "U" ram blowout preventer,
PREVENTERS 6" - 1500 series, flanged top and bottom, H₂S trim.

One (1) Hydril "GK" annular blowout preventer, 6" - 1500 series, studded top, flanged bottom, H₂S trim.

HOKE MANIFOLD: 5000 PSI working pressure, adjustable chokes, gas buster, all necessary lines, skid mounted, H₂S trim.

BOP CLOSING: One (1) N. L. Shaffer five station closing unit with air
UNIT and electric pumps, three, eleven gallon accumulators.

SHALE SHAKER: One (1) Brandt "Junior" unit single screen shale shaker.

WellTech, Inc. **Louisiana Division**

Post Office Box 51933, O.C.S.
 Lafayette, Louisiana 70505
 318/232-3413

RIG #7 - DAYLIGHT DOUBLE

Wilson Super Model "38" self-propelled unit, equipped with 1" drill line. Unit is powered by 1-8V71-N Series G.M. Diesel, 10,000 Series, 3 stage twin disc converter, and 8041 transmission. Mast is 94' angular hydraulically raised, and telescoped with 140,000# hook load. Working platform attached to mast. Paramount rod hangers installed on mast.

- 1   National Model J.W.S. 165-L 2488# W.P. Triplex pump with 4" pistons by 5" stroke, powered by G.M. 6V-71 diesel engine with 5 speed transmission
- 1   130 barrel steel tank with mud hopper and mud mixing lines
- 2   6" Series 900 Guiberson hydraulically operated preventers with blind rams, 2-3/8 and 2-7/8 rams.
- 1   40 ft. rotary hose with 2000# working pressure
- 1 set   2-3/8" and 2-7/8" elevators
- 1 set   Advance Model "B" air spider complete with 2-3/8" and 2-7/8" slips
- 1   180,000# Martin Decker weight indicator
- 1 set   Hillman Kelly tubing tongs with 2-3/8" and 2-7/8" jaws
- 1   Complete set of hand tools
- 1   Model A.G. 2000 Al George, trailer mounted power sub, powered by 4-71 G.M. Diesel Engine, complete with all hoses (price upon request)

F-1

Appendix F

TIME USE DIAGRAM

TIME UTILIZATION DIAGRAM

160 DAYS TOTAL

Appendix G

DRILLING PROGRESS DIAGRAM

Appendix H

DIRECTIONAL SURVEYS

DIRECTIONAL DRILLING REPORT

ORIGINAL

DATE October 21, 1981

COMPANY Technadrill

WELL G. McCall Well #1

LOCATION Cameron Parish, LA

Job #19369-D

MAGNETIC DECLINATION 5 degrees East, TRUE

TEL. NADRILL
G. MCCALL WELL #1
CAMERON PARISH, LOUISIANA

WILSON DOWNHOLE DIRECTIONAL DRILLING
DECLINATION 5 DEGREES EAST, TRUE
10-15-81 JOB #19369-D

RECORD OF SURVEY

ALL CALCULATIONS PERFORMED BY DIGITAL ELECTRONIC COMPUTER

RADIUS OF CURVATURE METHOD

MEAS. DRIFT		TRUE	VERTICAL	VERTICAL	DRIFT	PAGE	1	TOTAL	COORDINATES	C L O S U R E S			
DEPTH	ANGLE	DEPTH	SECTION	DIREC						DISTANCE	ANGLE	D	M S
	D M			DEG									
14410	1 30	14410.00	0.00	N 37 W				0.00 N	0.00 W	0.00 N	90	0	0 W
14420	1 45	14420.00	-0.03	S 82 W				0.09 N	0.23 W	0.25 N	70	5	37 W
ASSUMED VERTICAL TO 14410''													
14430	1 45	14429.99	-0.02	N 26 W				0.20 N	0.45 W	0.50 N	66	1	36 W
14440	1 30	14439.99	0.16	N 21 W				0.46 N	0.57 W	0.73 N	50	46	39 W
14450	1 45	14449.98	0.37	N 15 W				0.73 N	0.65 W	0.98 N	41	40	30 W
14460	1 45	14459.98	0.58	N 25 W				1.02 N	0.76 W	1.27 N	36	34	14 W
14470	1 45	14469.97	0.77	N 26 W				1.29 N	0.89 W	1.57 N	34	25	18 W
14480	1 30	14479.97	0.95	N 25 W				1.55 N	1.01 W	1.85 N	33	3	40 W
14490	1 15	14489.97	1.10	N 25 W				1.77 N	1.11 W	2.09 N	32	8	7 W
14500	1 30	14499.96	1.25	N 23 W				1.99 N	1.21 W	2.32 N	31	17	14 W
14510	1 30	14509.96	1.41	N 30 W				2.22 N	1.33 W	2.59 N	30	48	11 W
14520	1 30	14519.96	1.55	N 35 W				2.44 N	1.47 W	2.85 N	30	57	33 W
14530	1 45	14529.95	1.68	N 37 W				2.67 N	1.63 W	3.13 N	31	25	23 W
14540	1 30	14539.95	1.80	N 42 W				2.89 N	1.81 W	3.41 N	32	4	37 W
14550	1 30	14549.95	1.86	N 56 W				3.06 N	2.01 W	3.66 N	33	15	46 W

MEAS.	DRIFT	TRUE	VERTICAL	VERTICAL	DRIFT	PAGE	TOTAL	COORDINATES	CLOSURE
DEPTH	ANGLE	DEPTH	SECTION	BIREC					DISTANCE
	D M			DEG					ANGLE
									D M S
14560	1 30	14559.94	1.91	N 53 W		3.21 N	2.22 W	3.90 N 34 39 20 W	
14570	1 15	14569.94	1.96	N 49 W		3.36 N	2.41 W	4.14 N 35 36 7 W	
14580	1 15	14579.94	2.00	N 55 W		3.50 N	2.58 W	4.34 N 36 24 51 W	
14590	1 15	14589.94	2.02	N 62 W		3.61 N	2.77 W	4.55 N 37 26 49 W	
14600	1 0	14599.93	2.04	N 56 W		3.71 N	2.94 W	4.73 N 38 20 0 W	
14610	1 15	14609.93	2.05	N 66 W		3.80 N	3.11 W	4.91 N 39 14 4 W	
14620	1 15	14619.93	2.05	N 58 W		3.91 N	3.30 W	5.11 N 40 10 46 W	
14630	1 0	14629.93	2.07	N 61 W		4.01 N	3.47 W	5.30 N 40 52 36 W	
14640	1 0	14639.93	2.07	N 65 W		4.09 N	3.62 W	5.46 N 41 33 60 W	
14650	1 0	14649.92	2.07	N 63 W		4.16 N	3.78 W	5.62 N 42 14 46 W	
14660	1 0	14659.92	2.07	N 66 W		4.24 N	3.94 W	5.78 N 42 54 5 W	
14670	1 0	14669.92	2.07	N 65 W		4.31 N	4.10 W	5.94 N 43 32 54 W	
14680	1 0	14679.92	2.06	N 66 W		4.38 N	4.26 W	6.11 N 44 9 39 W	
14690	1 15	14689.92	2.05	N 67 W		4.46 N	4.44 W	6.29 N 44 50 35 W	
14700	1 15	14699.92	2.07	N 52 W		4.57 N	4.62 W	6.50 N 45 19 34 W	
14710	1 0	14709.91	2.13	N 38 W		4.71 N	4.76 W	6.69 N 45 20 21 W	
14720	1 30	14719.91	2.23	N 35 W		4.88 N	4.89 W	6.91 N 45 3 6 W	
14730	1 30	14729.91	2.36	N 31 W		5.10 N	5.03 W	7.16 N 44 36 53 W	
14740	1 30	14739.90	2.49	N 38 W		5.32 N	5.18 W	7.42 N 44 15 36 W	
14750	1 0	14749.90	2.59	N 35 W		5.49 N	5.31 W	7.64 N 44 2 51 W	
14760	1 15	14759.90	2.69	N 34 W		5.65 N	5.42 W	7.83 N 43 48 28 W	
14770	1 30	14769.90	2.81	N 34 W		5.85 N	5.56 W	8.07 N 43 31 2 W	
14780	1 30	14779.89	2.92	N 44 W		6.05 N	5.72 W	8.33 N 43 22 33 W	
14790	1 15	14789.89	3.02	N 35 W		6.24 N	5.87 W	8.57 N 43 16 45 W	
14800	1 15	14799.89	3.12	N 38 W		6.41 N	6.00 W	8.78 N 43 6 40 W	
14810	1 15	14809.89	3.22	N 34 W		6.59 N	6.13 W	9.00 N 42 56 21 W	
14820	1 15	14819.88	3.33	N 31 W		6.77 N	6.25 W	9.21 N 42 41 36 W	
14830	1 0	14829.88	3.44	N 33 W		6.94 N	6.35 W	9.41 N 42 28 9 W	
14840	1 0	14839.88	3.52	N 36 W		7.08 N	6.45 W	9.58 N 42 19 28 W	
14850	1 30	14849.88	3.56	N 65 W		7.21 N	6.62 W	9.79 N 42 33 49 W	

MEAS.	DRIFT	TRUE	VERTICAL	DRIFT	PAGE	TOTAL	COORDINATES	CLOSURE
DEPTH	ANGLE	DEPTH	SECTION	DIREC				DISTANCE
	D M			DEG				ANGLE
								D M S
14860	1 30	14859.87	3.57	N 56 W		7.34 N	6.85 W	10.04 N 43 1 21 W
14870	1 0	14869.87	3.61	N 54 W		7.46 N	7.03 W	10.25 N 43 16 48 W
14880	1 0	14879.87	3.63	N 56 W		7.56 N	7.17 W	10.42 N 43 28 30 W
14890	1 15	14889.87	3.66	N 59 W		7.67 N	7.34 W	10.61 N 43 44 6 W
14900	1 15	14899.87	3.67	N 64 W		7.77 N	7.53 W	10.82 N 44 5 14 W
14910	1 15	14909.86	3.66	N 66 W		7.86 N	7.73 W	11.02 N 44 29 32 W
14920	1 0	14919.86	3.66	N 60 W		7.95 N	7.90 W	11.21 N 44 48 58 W
14930	1 15	14929.86	3.66	N 66 W		8.04 N	8.08 W	11.39 N 45 7 45 W
14940	1 15	14939.86	3.66	N 66 W		8.13 N	8.28 W	11.60 N 45 30 48 W
14950	1 15	14949.85	3.66	N 60 W		8.23 N	8.47 W	11.81 N 45 49 52 W
14960	1 15	14959.85	3.66	N 66 W		8.33 N	8.66 W	12.01 N 46 8 17 W
14970	1 30	14969.85	3.65	N 68 W		8.42 N	8.89 W	12.24 N 46 32 23 W
14980	1 15	14979.85	3.62	N 74 W		8.50 N	9.11 W	12.46 N 46 59 29 W
14990	1 0	14989.84	3.61	N 61 W		8.57 N	9.29 W	12.64 N 47 18 43 W
15000	0 45	14999.84	3.61	N 67 W		8.64 N	9.43 W	12.79 N 47 30 12 W
15010	1 0	15009.84	3.59	N 71 W		8.69 N	9.57 W	12.93 N 47 45 16 W
15020	0 45	15019.84	3.58	N 69 W		8.75 N	9.72 W	13.07 N 48 0 34 W
15030	0 45	15029.84	3.57	N 68 W		8.79 N	9.84 W	13.19 N 48 12 31 W
15040	0 30	15039.84	3.56	N 70 W		8.83 N	9.94 W	13.29 N 48 22 26 W
15050	0 15	15049.84	3.56	N 56 W		8.86 N	10.00 W	13.36 N 48 27 19 W
15060	0 30	15059.84	3.54	N 89 W		8.87 N	10.06 W	13.41 N 48 35 20 W
15070	0 15	15069.84	3.50	S 22 W		8.85 N	10.11 W	13.44 N 48 47 50 W
15080	0 30	15079.84	3.44	S 36 W		8.80 N	10.15 W	13.43 N 49 4 14 W
15090	0 30	15089.84	3.36	S 62 W		8.74 N	10.21 W	13.44 N 49 25 47 W
15100	0 30	15099.84	3.29	S 70 W		8.71 N	10.29 W	13.48 N 49 45 51 W
15110	0 30	15109.84	3.25	N 79 W		8.70 N	10.37 W	13.54 N 50 0 53 W
15120	0 30	15119.84	3.24	S 67 E		8.69 N	10.38 W	13.53 N 50 3 1 W
15130	0 30	15129.84	3.26	N 85 E		8.68 N	10.29 W	13.46 N 49 51 53 W
15140	0 30	15139.84	3.28	S 59 E		8.66 N	10.21 W	13.39 N 49 42 10 W
15150	0 45	15149.84	3.25	S 37 E		8.58 N	10.13 W	13.28 N 49 44 4 W

MEAS.	DRIFT	TRUE	VERTICAL	DRIFT	PAGE	TOTAL	COORDINATES	C L O S U R E S
DEPTH	ANGLE	DEPTH	SECTION	DIREC	4			DISTANCE ANGLE
	D M			DEG.				D M S
15160	0 30	15159.84	3.21	S 51 E		8.50 N	10.06 W	13.17 N 49 47 35 W
15170	1 0	15169.83	3.22	S 76 E		8.46 N	9.94 W	13.05 N 49 37 11 W
15180	1 30	15179.83	3.28	S 84 E		8.42 N	9.73 W	12.86 N 49 7 4 W
15190	1 30	15189.83	3.36	S 79 E		8.38 N	9.47 W	12.64 N 48 28 58 W
15200	1 30	15199.83	3.43	S 80 E		8.34 N	9.21 W	12.42 N 47 51 37 W
15210	1 45	15209.82	3.52	S 83 E		8.29 N	8.93 W	12.19 N 47 7 10 W
15220	1 30	15219.82	3.61	S 82 E		8.26 N	8.65 W	11.96 N 46 19 53 W
15230	1 30	15229.81	3.70	S 85 E		8.23 N	8.39 W	11.75 N 45 33 36 W
15240	1 45	15239.81	3.79	S 83 E		8.20 N	8.11 W	11.53 N 44 41 6 W
15250	1 45	15249.81	3.90	S 88 E		8.17 N	7.80 W	11.30 N 43 40 24 W
15260	1 30	15259.80	4.00	S 79 E		8.14 N	7.52 W	11.08 N 42 43 48 W
15270	1 30	15269.80	4.07	S 79 E		8.09 N	7.27 W	10.87 N 41 54 50 W
15280	1 45	15279.79	4.14	S 78 E		8.04 N	6.99 W	10.65 N 41 0 17 W
15290	1 45	15289.79	4.21	S 78 E		7.97 N	6.69 W	10.41 N 39 59 32 W
15300	1 45	15299.78	4.28	S 75 E		7.90 N	6.39 W	10.16 N 38 58 3 W
15310	1 45	15309.78	4.34	S 75 E		7.82 N	6.10 W	9.92 N 37 55 45 W
15320	2 0	15319.77	4.43	S 84 E		7.76 N	5.78 W	9.68 N 36 38 21 W
15330	2 15	15329.77	4.63	N 72 E		7.81 N	5.42 W	9.50 N 34 44 30 W
15340	2 45	15339.76	4.94	N 68 E		7.96 N	5.01 W	9.40 N 32 10 3 W
15350	3 15	15349.74	5.32	N 72 E		8.14 N	4.51 W	9.30 N 29 1 1 W
15360	3 15	15359.73	5.71	N 72 E		8.31 N	3.98 W	9.21 N 25 33 6 W
15370	3 30	15369.71	6.12	N 73 E		8.49 N	3.41 W	9.15 N 21 53 46 W
15380	4 0	15379.69	6.59	N 67 E		8.71 N	2.80 W	9.15 N 17 48 10 W
15390	4 30	15389.66	7.18	N 60 E		9.05 N	2.14 W	9.29 N 13 17 26 W
15400	4 45	15399.63	7.85	N 59 E		9.45 N	1.45 W	9.56 N 8 40 9 W
15410	5 15	15409.59	8.60	N 54 E		9.94 N	0.72 W	9.96 N 4 7 20 W
15420	5 45	15419.55	9.46	N 52 E		10.51 N	0.05 E	10.51 N 0 16 4 E
15430	6 0	15429.49	10.39	N 50 E		11.16 N	0.85 E	11.19 N 4 19 42 E
15440	6 45	15439.43	11.41	N 48 E		11.89 N	1.69 E	12.01 N 8 3 12 E
15450	7 15	15449.36	12.54	N 48 E		12.70 N	2.59 E	12.96 N 11 30 54 E

MEAS. DEPTH	DRIFT ANGLE D M	TRUE	VERTICAL SECTION	DRIFT DIREC DEG	PAGE	TOTAL	COORDINATES	C L O S U R E S		
		VERTICAL DEPTH						DISTANCE	ANGLE D M S	
15460	7 45	15459.27	13.76	N 45 E		13.60 N	3.54 E	14.05 N	14 33 50 E	
15470	8 30	15469.17	15.11	N 43 E		14.62 N	4.52 E	15.30 N	17 9 45 E	
15480	9 0	15479.05	16.57	N 43 E		15.73 N	5.56 E	16.68 N	19 26 27 E	
15490	9 30	15488.92	18.10	N 44 E		16.90 N	6.66 E	18.16 N	21 30 36 E	
15500	9 30	15498.79	19.67	N 43 E		18.09 N	7.80 E	19.70 N	23 18 29 E	
15510	9 30	15508.65	21.25	N 43 E		19.30 N	8.92 E	21.26 N	24 48 25 E	
15520	9 30	15518.51	22.83	N 43 E		20.51 N	10.05 E	22.84 N	26 6 1 E	
BOTTOM HOLE CLOSURE			22.84 FEET AT N 26 6 1 E							

We certify that this is a true and correct report of our survey and that it affords a true and correct representation of our findings as to the nature and conditions of the well at the time the survey was made.
WILSON DOWNHOLE DIRECTIONAL DRILLING, INC.

Jodie Broussard

TECHNADRILL
G. McCall Well No 1
CAMERON PARISH, LOUISIANA

HORIZONTAL PROJECTION

Scale 1" = 5'

Appendix I

BIT RECORD

BIT RECORD

T-F&S/DOE Gladys McCall No. 1 Production Well

County		Cameron		Field	Crablake		State	LA.	Section	27	Township	T15S	Range	RW5	Location				G. McCall	Well No.				1											
Contractor				Meritt		Rig No.		1	Operator				Technadrii - Fenix & Scisson				Toolpusher				Mike Hillman, Floyd Treadeaux				Salesman										
Spud		5-29-81		Under Surf.		Under Inter.		Set Sand St.		Reached T.D.		Pump No. 1		OIL 1400 PT		Liner		6-1/2		Pump No. 2		OILWELL 1400 PT		Liner		6-1/2		Pump Power		399 Cats		Type Mud		Ligno/Sulfonate	
Drill Pipe				TOOL JOINTS		Size		4-1/2XH		Type		6-1/8		O.D.		DRILL COLLARS		Number		12		O.D.		8		I.D.		6-1/2		Length		Drawworks Power		OILWELL 2000	
NO.	SIZE	MAKE	TYPE	JET 32ND IN	SERIAL	DEPTH OUT	FEET	HOURS	FT/HR	ACCUM. DRLG. HRS.	WT. 1000 LBS.	R P M	VERT. DEV.	PUMP PRESS.	PUMP OPER-ATION	S P M		M U D			DULL. COND.				FORMATION REMARKS										
1	2b	Hfco	OSC5A-J	2-16 1-18	K29449	870	870	11-1/2	75.6	11.5	5/10	100/170	1/2	2200	P	74	74	8.7	35	18.2	2	2	1		Run 20 CSG										
2	17-1/2	Sec	SES	3-16	1Q3914	4500	3630	47-1/2	76.4	59	10/15	180	.	2000	P	92	92	8.9	45	18.2	3	4	1		Run 13-3/8 CSG										
3	12-1/4	Sec	S-33-S	3-11	211686	6516	2016	29-1/2	68.3	88.5	25	180		2400	S	110		9.0	41	22	5	6	1												
4	12-1/4	Sec	S-33-SF	3-11	978306	7817	1301	29-1/2	44.1	118	25	180		2400	S	110		9.0	40	19.2	6	8	1												
5	12-1/4	Sec	S-33-SF	3-11	978326	8754	953	30	31.7	148	25	120	.	2500	P	56	56	9.0	40	18.2	6	8	1												
6	12-1/4	Sec	S-33-SF	2-11 1-12	923152	9275	521	15-1/2	33.6	163.5	35/40	120	3/4	2500	P	56	56	9.0	40	16.2	5	5	1												
7	12-1/4	Sec	S-84-F	3-12	102273	10805	1530	58-1/2	26.1	222	40	70/100	1/2	2500	P	57	58	9.0	40	16.2	4	5	1												
8	12-1/4	Sec	S-84-F	3-12	978569	11987	1182	88-1/2	13.4	310.5	40	80/90	.	2500	P	57	58	9.2	39	10.0	2	6	1												
9	12-1/4	Sec	S-84-F	3-12	102542	13120	1138	103	11	413.5	40	70/90	1/4	2500	S	100		10.5	40	8.2	7	6	1												
10	12-1/4	Sec	S-84-F	3-13	102506	13843	723	100-1/2	7	514	40	70	1-1/2	2500	S	105		11.8	40	5.5	8	6	1												
11	12-1/4	Sec	S-84-F	3-13	107016	14500	657	68	9.6	582	40	100	1-1/2	2500	S	96		12.5	37	4.9	6	7	1												
12	8-3/8	Sec	S-44-F	3-16	111409	Corr 10" 14836	326	31-1/2	10.3	613.5	25/30	100	1	2500	S	80		17	46	3.8	8	8		0-1/2"											
13	8-3/8	Sec	S-44-F	3-16	110523	15080	244	33	7.4	646.5	30	84	1/2	2500	S	76		17	46	3.8	8	8	0		Lost one cone										
14	8-3/8	Sec	S-84-F	3-16	959555	15166	86	8-1/2	10.1	665	18	70		2500	S	76		17	47	3.2	2	2	1												
rel 14	7-7/8	Chr is.	MC23			15197	31	14-1/2	2.1	679.5	14/18	75/90		2500		57		17	46	3.0				GOOD	Core #1										
rel 14	8-3/8	Sec	S-84-F	3-16	959555	15266	69	11-1/2	6	691	30/35	60/70		2500		76		17	49	2.8	4	6	1		Ream 31 Rathole										
15	8-3/8	Sec	M-44-NG	3-16	231903	15289	23	7	3.2	698	15/30	80/110		2500		76		17	52	3.0	4	4		0-1/8"											
16	8-3/8	Sec	S-44-F	3-16	110202	15317	28	13	2.1	711	15	100		2500		76		17	54	2.8	6	4		0-1/8"											
rel 16	8-3/8	Sec	S-44-F	3-18	228508	16510	0	0	0					1700				17.3	54	2.6	6	4	1		Clean out run to top of the 7" Liner										
17	8-3/8	Chr is.	MD262	.50	1L7732	15348	31	6-1/2	4.8	717.5	10/20	100		25		62		17	51	2.9				GOOD											
rel 17	7-7/8	Chr is.	MD262	.50	1L7732	15508	133	41	3.2	759.5	20	100		3000			69	17	52	2.6				10%											
18	8-3/8	Sec	M44NG	3-16	232035	15375	5	1	5	718.5	10/20	85	2	2500			75	17	52	2.6	2	2		0-1/32	Fished mill blade out of hole										
19	8-5/8	Chr is.	MD262	.45	1L7014	15659	151	66	2.3	839.5	6/26	90/120		2200	S	57		17	51	1.6					Twisted off left in hole. Bit Sub, 1-DC, Shock Sub										
20	8-3/8	Chr is.	MD262	.50	1L7938		284	31																	Reaming.										
21	8-3/8	Sec	M44NG-J	3-16	232035																4	6			Dressing off cnt. plugs										
22	8-3/8	Chr is.	MD411ST	.60	1L7968	15385	82	71-1/2	1.1	911	3	80		1800	S	65		17.3	52	2.0	10%				Sidetrack hole										
23	8-3/8	Chr is.	MD262	.50	1L8038	15533	148	165-1/2	.9	1076.5	16	115		3000	S	71		17.3	53	2.8	10%														
24	8-3/8	Sec	S-44-F	16	110205	15580	47	8-1/2	5.5	1085	20	60		2900	S	77		17.3	53	2.4	6	4	1												
rel 24	8-5/8	Sec	S-44-F	None	110205	16510	0	0	0	1215				1600				17.3	54	2.4	6	4	1		Conditioning trip preparatory to running 7" Liner										
25	8-5/8	Sec	S-84-F	15	857948	15659	79	34	2.3	1119	22	64		2900	S	79		17.3	53	2.3	3	3	1												
26	8-3/8	Hfco	J5	3-15	MR431	15730	71	20-1/2	3.5	1139.5	22	60		2900	S	80		17.3	53	2.4	7	5	1												
27	8-3/8	Chr is.	MD262	.60	L2365	16510	780	75-1/2	10.3	1215	20	95-100	1	3000				17.3	54	2.3	12%				T.O. 16,510"										
28	5-3/4	Sec	WJ4	Reg	J96654	12605	0	0	0					1000				17.3	56	2.0	2	2	1		Clean out run into the 7" Liner, polish the TIM PBR										
29	5-3/8	Sec	WJ4	Reg		15826	0	0	0					1000				17.3	59	3.1	3	3	1		Clean out run thru the 7" tie back and PBR dis- place 17.3 PPG mud w/14.0 PPG.										

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Appendix J

MUD RECORD

MUD RECAP

CONTRACTOR Merit Drilling Company OPERATOR Technadril-Fenix & Scisson/DOE LEGAL SURVEY Section 27-T 15 S - R 5 W
 RIG NO. 4 JOB NO.   WELL NAME T-F&S/DOE Gladys McCall No. 1 FIELD E. Crab Lake T.D. 16,510'
 SPUD DATE 5-30-81 DATE T.D. MADE 11-12-81 COUNTY/PARISH Cameron STATE Louisiana MUD COST \$581,688.00

CASING DATA		BIT DATA		TYPE DRILLING FLUID		SOLIDS REMOVAL EQUIPMENT		ADDITIONAL INFORMATION			
Depth (ft)	Size (in)			Type	Depth Interval (ft)	Type	Depths Used (ft)	Pumps:	Drig. String:	OTHER:	
222	30 D.P.	26"	1	Gel & Caustic	0-6400	Desilter, desander	0-11900	#1 6½ 10	D.P. 4½ D.C. 8	A	
869	20	12½"	11	Lignite, Lignosulfonate	6400-TD	Derrick shaker	0-16510	#2 6½ 10	Depth Interval: 0 to 14500	B	
4500	13 3/8	8 3/8	19					Depth Interval 0 to TD	D.C. 6½	C	
14426	9 5/8							#1	D.P. 4½ D.P.	D	
								#2	Depth Interval: 14500 to 16510	E	
								Depth Interval		F	
										G	

Date 19 81	Time	Depth (ft.)	Wt. lb./gal.	Funnel Viscosity (sec./qt.)		Plastic Viscosity		Yield Point lb./100 ft.2	Gels lb./100 ft.2 0/10	pH	Filtrate (ml/30 min.)			Cake 32nd in.	Alkalinity			Cl— (ppm)	Ca + + (ppm)	Sand % by Vol.	Solids % by Vol.	Oil % by Vol.	Water % by Vol.	MBT mc/ml Mud	Circ. Volume (bb)	Hrs. Ran Centri- fuge	BIT DATA																												
				API	@*F	CP	@*F				API	HTHP	*F		Pm	Pf	Mf										Bit No.	Bit Size	Depth In	Depth Out	Hrs. Ran																								
5-30	0500	222	8.7	38																							1	26	0	870	11½																								
5-31	0500	869	8.7	32		6		10	2/12	9.0	18.2																2	17½	870	4500	47½																								
6-1	0500	869	8.9	32		6		10	2/14	9.0	18.0																3	12½	4500	6516	29½																								
6-2	0500	898	8.9	34		4		6	1/10	9	20																4	12½	6516	7817	29½																								
6-3	0500	1465	9.0	37		10		25	15/20	10	18		2		1.0	1.9											5	12½	7817	8754	30																								
	Lost returns. Spotted high viscosity gell pill																																																						
6-4	0500	3089	9.0	47		8		17	7/23	10	18.2		2		.7	.9	2300	120		7			93		1500		7	12½	9275	10805	58½																								
6-5	0500	4534	9.0	47		7		16	5/24	9	20		2		.2	.5	3100	120		7			93		1650		8	12½	10805	11982	88½																								
6-6	0500	4500	8.9	44		8		16	5/25	9	19.2		2		.1	.3	3100	80		6			94		1750		9	12½	11982	13120	103																								
6-7	0500	4500	8.9	36		6		14	6/20	9	20		2		.1	.4	2800	80		6			94		1800		10	12½	13120	13843	100½																								
	50% returns while circulating 13 3/8" casing																																																						
6-8	0500	Running casing and nipple up BOP																																											11	12½	13843	14500	68						
6-9	0500	same																																														12	8-3/8	14500	14836	31½			
6-10	0500	same																																																13	8-3/8	14836	15080	33	
6-11	0500	same																																																	14	8-3/8	15080	15166	8½
6-12	0500	5009	9.0	39		5		17	8/14	11.3	24		2		.4	.5	2600	180		5			95		1600		15	8-3/8	15166	15259	7																								
6-13	0500	6466	9.0	41		6		10	10/26	11.0	22		2		.3	.6	2800	180		5			95		1680		16	8-3/8	15259	15317	13																								

Mud Technician Denver Wallace Business Address Lafayette, Louisiana Page 1 of 10

MUD RECAP

CONTRACTOR Merit Drilling Company OPERATOR Technadril-Fenix & Scisson/DOE LEGAL SUR. SEC 27 - T 15 S - R 5 W

RIG NO. 4 WELL NAME T-F&S/DOE Gladys McCall No. 1 COUNTY/PARISH Cameron STATE Louisiana

Date 19	Time	Depth (ft.)	Wt. lb./gal.	Funnel Viscosity (sec./qt.)		Plastic Viscosity		Yield Point lb./100 ft.2	Gels lb./100 ft.2 0/10	pH	Filtrate (ml/30 min.)			Cake 32nd in.	Alkalinity			Cl— (ppm)	Ca + + (ppm)	Sand % by Vol.	Solids % by Vol.	Oil % by Vol.	Water % by Vol.	MBT mc/ml Mud	Circ. Volume (bb)	Hrs. Ran Centri- fuge	BIT DATA																							
				API	@*F	CP	@*F				API	HTMP	*F		Pm	Pl	Ml										Bit No.	Bit Size	Depth In	Depth Out	Hrs. Ran																			
6-14	0500	7076	9.1	41		7		11	7/27	10.5	22			2		.6	1.0	2600	TR		5		95		1700		178-3/8	15317	15348	31																				
6-15	0500	7817	9.0	40		8		10	3/19	8.5	19.2			2		TR		2500	TR		6		94		1820		188-3/8	15348	15375	1																				
6-16	0500	8550	9.0	41		9		13	2/24	8.5	19.8			2		TR		2600	TR		6		94		1900		178-3/8	15375	15508	41																				
		Mud consultant on job this day.																									198-3/8	15518	15659	66																				
6-17	0500	8754	9.0	39		7		12	2/21	8.0	18.2			2				1900	TR		6		94		1960		208-3/8	15659	284' ream	31																				
6-18	0500	9275	9.0	40		8		15	3/25	9.0	16.8			2		.05	.8	2200	TR		6		94		2000		218-3/8	15385	reaming																					
6-19	0500	9891	9.1	40		9		10	2/13	9.5	14.2			2		.2	.5	2300	40		6		94		2100		228-3/8	15533	reaming																					
		Started light treatment of Lignite this day.																																				238-3/8	reaming	15533	165½									
6-20	0500	10400	9.0	38		7		9	2/12	9.5	10.6			2		.2	.5	2100	TR		6		94		2180		248-3/8	reaming	15580	8½																				
6-21	0500	10805	9.0	38		8		10	2/10	10.0	8.9			2		.4	.6	2000	40	TR	6		94		2230		258-3/8	reaming	15659	34																				
6-22	0500	10866	9.0	38		7		9	1/8	10.0	9.8			2		.4	.8	2000	TR	TR	6		94		2300		268-3/8	15659	15730	20½																				
6-23	0500	11264	9.0	39		8		10	1/11	10.0	9.7			2		.5	.7	2100	40	TR	6		94		2400		278-3/8	15730	16510	75½																				
6-24	0500	11528	9.2	38		9		12	1/9	10.0	10.3			2		.5	.8	1900	40	TR	7		93		2480																									
6-25	0500	11812	9.2	38		10		9	1/10	10.0	9.5			2		.5	.8	2000	TR	TR	7		93		2500																									
6-26	0500	11987	9.2	39		10		8	1/7	10.0	9.2			2		.6	.9	2100	40	TR	7		93		2550																									
6-27	0500	12203	10.5	40		16		10	1/8	10.0	9.2			2		.5	.7	1900	40	TR	14		86		2670																									
		Drig. break @ 12005 - 630 units gas at btm. up. Gas cont. to hang in mud. Raised wt to 9.5 ppg. Raised wt. to 10.2 then 10.5 ppg																																																
		due to gas at shaker 800 to 1000 units.																																																
6-28	0500	12550	10.5	39		15		9	1/6	10.0	8.9			2		.6	.9	2000	40	TR	14		86		2530																									
6-29	0500	12827	10.5	38		13		8	1/5	10.0	8.5			2		.6	.9	1900	40	TR	13		87		2630																									
6-30	0500	13022	10.5	43		17		12	1/4	10.0	8.0			2		.5	.8	2000	40	TR	14		86		2710																									
7-1	0500	13120	10.5	38		14		8	1/6	10.0	8.2			2		.5	.8	2100	40	TR	13		87		2700																									

Mud Technician Denver Wallace Business Address Lafayette, Louisiana Page 2 of 10

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MUD RECAP

CONTRACTOR Merit Drilling Company OPERATOR Technadrill-Fenix & Scisson/DOE LEGAL SUR. SEC 27 - T 15 S - R 5 W
 RIG NO. 4 WELL NAME T-F&S/DOE Gladys McCall No. 1 COUNTY/PARISH Cameron STATE Louisiana

Date 19	Time	Depth (ft.)	Wt. lb./gal.	Funnel Viscosity (sec./qt.)		Plastic Viscosity		Yield Point lb./100 ft. 2	Gels lb./100 ft. 2 0/10	pH	Filtrate (ml/30 min.)			Cake 32nd in.	Alkalinity			Cl— (ppm)	Ca++ (ppm)	Sand % by Vol.	Solids % by Vol.	Oil % by Vol.	Water % by Vol.	MBT mc/ml Mud	Circ. Volume (hb)	Hrs. Ran Centri- fuge	BIT DATA					
				API	@*F	CP	@*F				API	HTHP	*F		Pm	Pf	Mf										Bit No.	Bit Size	Depth In	Depth Out	Hrs. Ran	
7-2	0500	13188	10.5	39		16		9	1/6	10.07.2			2		.5	1.0	2200	TR	TR	14		86		2800								
7-3	0500	13370	10.8	38		17		10	1/5	10.06.1			2		.5	1.0	2200	40	TR	15		85		2730								
		Raised mud wt due to penetration increase.																														
7-4	0500	13597	11.0	41		18		9	1/5	10.05.8			2		.5	.9	2200	TR	TR	15		85		2690								
		Drlg. break @ 13505' & 13527'. Raised wt to 11.0 ppg. 235 units gas cut mud to 10.3 ppg.																														
7-5	0500	13697	11.5	40		18		10	1/5	10.05.7			2		.6	1.1	2300	TR	TR	16		84		2710								
		Raised wt to 11.5 ppg in accordance to the drilling program.																														
7-6	0500	13843	11.8	41		20		8	1/6	10.05.5	13.2	250	2		.6	1.0	2300	TR	TR	17		83		2690								
		Raised mud wt to 11.8 ppg in accordance to the drilling program.																														
7-7	0500	13900	12.2	38		19		8	0/5	10.06.3	14.2	250	2		.4	.9	2100	TR	TR	18		82		2750								
		Hole took 76 bbls on trip - circ with full rtns. Raised wt to 12.2 ppg while drlg to have 12.5 by 1400'																														
7-8	0500	14140	12.5	41		22		7	1/6	10.05.2	13.8	250	2		.6	1.1	2400	40	TR	20		80		2770								
7-9	0500	14411	12.5	39		24		5	0/5	10.55.2	13.6	250	2		.8	1.3	2200	TR	TR	18		82		2760								
7-10	0500	14500	12.5	37		20		4	0/4	10.54.9	13.2	250	2		.7	1.1	2300	TR	TR	18		82		2750								
		POOH to run "E" logs																														
7-11	0500	Same logging																														
7-12	0500	same logging																														
7-13	2100	14500	12.5	38		21		8	0/6	10.05.6			2		.6	1.2	2200	TR	TR	18		82		2700								
		Circ to run 9-5/8" csg. Max gas @ 8tm up after logging, 40 units. No Cl ⁻ increase																														
7-14	0500	14500	Running casing																													
7-15	0500	14500	While running 9-5/8" casing hole took app. 100 bbl mud																													
7-16			Running casing																													

Mud Technician Denver Wallace Business Address Lafayette, Louisiana Page 3 of 10

MUD RECAP

CONTRACTOR Merit Drilling Company OPERATOR TechnadriL-Fenix & Scisson/DOE LEGAL SUR. SEC 27 - T 15 S - R 5 W

RIG NO. 4 WELL NAME T-F&S/DOE Gladys McCall No. 1 COUNTY/PARISH Cameron STATE Louisiana

Date 1981	Time	Depth (ft.)	Wt. lb./gal.	Funnel Viscosity (sec./qt.)		Plastic Viscosity		Yield Point lb./100 ft.2	Gels lb./100 ft.2 0/10	pH	Filtrate (ml/30 min.)			Cake 32nd in.	Alkalinity			Cl— (ppm)	Ca++ (ppm)	Sand % by Vol.	Solids % by Vol.	Oil % by Vol.	Water % by Vol.	MBT mc/ml Mud	Circ. Volume (bb)	Hrs. Ran Centri- fuge	BIT DATA				
				API	@*F	CP	@*F				API	HTHP	*F		Pm	PI	MI										Bit No.	Bit. Size	Depth In	Depth Out	Hrs. Ran
7-17		Casing	stuck @ 14482'			dir																									
7-18		Cement	casing.			Had to dump																									
7-19		Nipple	up BOP and test			same																									
7-20		Same																													
7-21		Repairing	choke line																												
7-22		Same																													
7-23	0500	14541	14.5	44		29		7	0/6	10.0	5.4	14.2	300	2	.8	.5	.9	2300	80	TR	26		74		1600	16					
			Raised mud weight to 14.5	ppg	before drilling	cement in casing.																									
7-24	0500	14714	16.8	47		39		10	1/5	10.5	5.2	13.4	300	2	.8	.7	1.0	2300	60	TR	33		67		1610	15					
			Raising mud weight to 15.0 then 15.8	ppg	due to penetration	increase and gas @ shaker (1700 units)																									
			Drilling to 14714. Well flowing, 700	psi	on DP and 1050	psi on casing. Raised weight to 16.8																									
			CL increase to 21000	ppm	and cut to 9.2	with bottoms up from kick.																									
7-25	0500	14796	17.0	46		35		9	0/4	10.0	6.4	14.2	300	2	.5	.5	.8	6500	40	TR	34		66		1650						
7-26	0500	14836	17.0	46		37		8	0/5	10.5	4.8	11.8	300	2	.9	.8	1.1	3600	40	TR	34		66		1670						
7-27	0500	14836	17.0	46		35		10	0/6	10.5	4.1	11.6	300	2	.8	.7	1.1	3800	40	TR	34		66		1620						
7-28	0500	15032	17.0	47		39		11	1/8	10.0	4.4	12.2	300	2	.7	.6	1.0	3600	40	TR	35		65		1680						
7-29	0500	15080	17.0	46		37		11	0/5	10.0	3.8	12.0	300	2	.6	.5	.9	3800	40	TR	34		66		1620						
7-30	0500	15080	17.0	47		37		12	1/6	10.0	3.7	11.8	300	2	.6	.6	1.0	3900	40	TR	34		66		1670						
			Fish for 1 cone	off bit																											
7-31	0500	15166	17.0	47		33		10	0/5	10.5	3.4	11.2	300	2	.8	.7	1.2	4000	40	TR	35		65		1700						
			Ran "E" log for	correlation																											
8-1	0500	15178	17.0	47		35		12	1/5	10.0	3.2	11.2	300	2	.7	.6	1.0	4000	40	TR	34		66		1690						

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MUD RECAP

CONTRACTOR Merit Drilling Company OPERATOR Technadril-Fenix & Scisson/DOE LEGAL SUR. SEC 27 - T 15 S - R 5 W

RIG NO. 4 WELL NAME T-F&S/DOE Gladys McCall No. 1 COUNTY/PARISH Cameron STATE Louisiana

Date 19	Time	Depth (ft)	Wt. lb /gal	Funnel Viscosity (sec./qt.)		Plastic Viscosity		Yield Point lb./100 ft.2	Gels lb./100 ft.2 0/10	pH	Filtrate (ml/30 min.)			Cake 32nd in.	Alkalinity			Cl— (ppm)	Ca++ (ppm)	Sand % by Vol.	Solids % by Vol.	Oil % by Vol.	Water % by Vol.	MBT mc/ml Mud	Circ. Volume (bb)	Hrs. Ran Centri- fuge	BIT DATA				
				API	@°F	CP	@°F				API	HTHP	°F		Pm	Pl	Mf										Bit No.	Bit Size	Depth In	Depth Out	Hrs. Ran
8-1	Cont.	Coring 10' and jammed.						Core #2 15178 to 15197			15197	15197	15197	15197	15197	15197	15197	15197	15197	15197	15197	15197	15197	15197	15197						
8-2	0500	15197	17.0	46		36		10	0/5	10.0	3.0	10.8	300	2	.7	.6	.9	4000	40	TR	34		66		1600						
8-3	0500	15256	17.0	47		35		12	1/6	10.0	2.8	10.6	300	2	.6	.5	1.0	4000	40	TR	35		65		1620						
		Core barrel wash out. POOH and picked up bit. Ream from 15197' to 15256'																													
8-4	0500	15266	17.0	49		37		9	1/7	10.5	2.8	10.6	300	2	.8	.7	1.1	4000	40	TR	35		65		1700						
8-5	0500	15289	17.0	46		33		9	0/5	10.5	3.3	11.2	300	2	.7	.6	.9	3900	40	TR	35		65		1720						
		Excess torque while reaming with packed bottom hole assembly. 400-450 amps torque. Bit under gauge 1/2' from reaming.																													
8-6	0500	15317	17.0	52		36		12	1/8	10.5	3.0	11.0	300	2	.7	.6	.8	4100	40	TR	35		65		1710						
		Took wt. 30,000 lbs @ 15288' with stiff bottom hole assembly. Torque still 400 to 450 amps.																													
		While reaming and drilling added 3#/bbl gel. Did not reduce torque.																													
8-7	0500	15317	17	52		36		12	1/8	11	3	11	500	2	.6	.6	.8	4100	40	TR	35		65		Torque 450-500 amps						
8-8	0500	15317	16.9	54		36		15	1/9	10	2.8	11.6	300	2	.6	.6	1.1	4100	40	TR	36		66		1600						
8-9	1700	15350	17	51		36		10	1/6	10.5	2.9	11.2	300	2	.8	.7	1.3	4100	TR	TR	35		65		1650						
8-10	0500	15375	17	49		38		7	0/5	10.5	2.8	11.4	300	2	.7	.6	1.3	3900	TR	TR	35		65		1650						
8-11	0500	15375	16.9	52		39		11	1/8	10.0	3.1	11.6	300	2	.5	.4	1.1	4000	TR	TR	35		65		1650						
8-12	1500	15375	17	54		43		12	1/9	10	2.9	11.6	300	2	.5	.4	2.3	3800	TR	TR	35		65		1650						
8-14	0500	15362	17	56		48		17	0/5	10.5	3.0	11.0	300	2	.5	1.0		4400	TR	TR	35		65		2200						
8-15	0500	15394	17	51		40		15	0/3	10.5	2.6	11.6	300	2		1.0		3500	40	TR	34		66		2200						
8-16	0500	15476	17	51		43		6	0/3	10.5	2.6	13.8	300	2		1.1		3300	40	TR	35		65								
8-17	2400	15502	17	51		39		6	0/2	10.5	2.8	14.0	300	2		1.0		3500	40	TR	35		65								
8-18	0500	15370	17	60	90	47	115	7	0/5	10.5	2.6	14.2	300	2		.9		3500	40	TR	35		65		2200						
		Extreme torque - stuck pipe while attempting to drill - jars failed to go off. Spotted 100 bbls Black Magic - pipe free in 2 hours.																													

Torque (400-500 amps) adding EP bit lube + 3% diesel.

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MUD RECAP

CONTRACTOR Merit Drilling Company OPERATOR Technadril-Fenix & Scisson/DOE LEGAL SUR. SEC 27 - T 15 S - R 5 W

RIG NO. 4 WELL NAME T-F&S/DOE Gladys McCall No. 1 COUNTY/PARISH Cameron STATE Louisiana

Date 19	Time	Depth (ft.)	Wt. lb./gal.	Funnel Viscosity (sec./qt.)		Plastic Viscosity		Yield Point lb./100 R.Z.	Gels lb./100 R.Z. 0/10	pH	Filtrate (ml/30 min.)			Cake 32nd in.	Alkalinity			Cl— (ppm)	Ca + + (ppm)	Sand % by Vol.	Solids % by Vol.	Oil % by Vol.	Water % by Vol.	MBT mc/ml Mud	Circ. Volume (bb)	Hrs. Ran Centri- fuge	BIT DATA				
				API	@*F	CP	@*F				API	HTHP	*F		Pm	PI	MI										Bit No.	Bit Size	Depth In	Depth Out	Hrs. Ran
8/19	2400	15509	17	54		50	10	10	0/5	10.5	2.4	14.5	300	2		1.4		3500	40	TR	35	3	52		2100						
8/20	0500	15584	17	54		47	115	12	0/5	10.5	1.8	12.8	300	2		1.1		3500	40	TR	36	3	61		2100						
8-21	0500	15601	17	53		50		12	0/5	10.0	1.8	13.8	300	2		.5		3000	40	TR	36	3	61		2100						
8-22	0500	15655	17.5	48		48		12	0/4	10.5	1.7	13.8	300	2		.8		3500	40	TR	36	3½	61		2100						
8-23	2400	15662	17	51		45		6	0/5	10.5	1.6	10.8	300	2		.7		3300	40	TR	36	3½	60½		2100						
		Twisted off 8/22/81 POH inspected stabilizers - wear of ¼" to ½" with plugs missing - TIH w/8" over shot attempted to wash down to fish w/excess torque and failed - trip for taper tap - TIH w/same.																													
8-24	0400	15662	17	51		42		6	0/4	10.5	1.4	14.5	300	2		1.0		3300	TR	TR	36	3	61		2100						
8-25	1200	15662	17	56		42		10	1/8	10.5	1.6	14.4	300	2	.7	.6	2.3	3400	TR	TR	36	3	61		1500						
		Latched onto fish and could not circulate. Fish failed to come free when jarred on. POOH.																													
8-26		Same - checking casing. Seemed to be oblong @ surface. Nipple down BOP																													
8-27	0530	15662	17	56		47		12	1/10	10.0	2.0	14.4	300	2	.5	.4	2.5	3200	TR	TR	36	3	61		1400						
		In hole reaming to top of fish. Hole tight while reaming @ 15220'.																													
8-28	0500	15662	17	52		42		8	0/8	10.0	0.9	10.2	300	2	.6	.5	2.3	3400	TR	TR	36	3	61		1800						
		Added soltex to help lower wt. F.L. & reduce torque while reaming																													
8-29	1500	15662	17	50		38		9	0/6	10.0	1.1	10.4	300	2	.6	.5	2.1	3500	TR	TR	36	3	61		1750						
		Reamed to 15550' and POOH to set cement plug. Found hole to be off 90° @ 15620'																													
8-30	0500	15662	17	54		41		10	0/6	10.0	1.4	10.4	300	2	.6	.5	2.4	3300	TR	TR	36	3	61		1780						
		Water line broke in tank on trip. Cut wt. to 14.0ppg. Built same back to 17.0 ppg. Set cement plug from 15620' to 14815' and POOH to wt. 2400'.																													
8-31	0500	15662	17.0	52		40		9	0/5	10.0	1.2	11.2	300	2	.6	.4	2.1	3500	TR	TR	36	3	61		1800						
		Cement failed to harden. Reamed out cement & set 2nd plug.																													

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CONTRACTOR Merit Drilling Company OPERATOR Technadril-Fenix & Scisson/DOE LEGAL SUR. SEC 27 - T 15 S - R 5 W

RIG NO. 4 WELL NAME T-F&S/DOE Gladys McCall No. 1 COUNTY/PARISH Cameron STATE Louisiana

Date 1981	Time	Depth (ft.)	Wt. lb./gal.	Funnel Viscosity (sec./qt.)		Plastic Viscosity		Yield Point lb./100 ft.2	Gels lb./100 ft.2 0/10	pH	Filtrate (ml/30 min.)			Cake 32nd in.	Alkalinity			Cl— (ppm)	Ca++ (ppm)	Sand % by Vol.	Solids % by Vol.	Oil % by Vol.	Water % by Vol.	MBT mc/ml Mud	Circ. Volume (bb)	Hrs. Ran Centri- fuge	BIT DATA				
				API	@*F	CP	@*F				API	HTHP	*F		Pm	Pi	Mf										Bit No.	Bit Size	Depth In	Depth Out	Hrs. Ran
9-1	0500	15662	16.9	50		41		9	0/6	11.5	1.6	10.8	300	2	3.1	1.8	2.6	3200	60	TR	36	2	62		1750	8					
9-2	0400	14887	17	50		45		6	0/5	11.5	2.2	11.8	300	2	4.4	3.0	4.6	3000	60	TR	36	2	62								
		Drilled extremely soft cement from 14681 to 14887 and stuck pipe. Spotted 40 bbls around BHA - pipe free in 9 hours																													
9-3	0100	14887	17	52		45		6	0/6	11.5	2.5	14.2	300	2		3		3500	40	TR	36	2	62								
9-4	0200	15000	17	52		45		6	0/5	11.5	2.5	14.2	300	2	3.0	3.0		3500	40	TR	36	2	62								
9-5	0100	15530	17	54		47		7	0/5	11.5	2.6	10.6	300	2	4.5	2.8		3500	40	TR	36	2	62								
		Washed and reamed soft cement to 15530+ - trip to set another plug																													
9-6	0500	15530	17	54		50		9	0/6	11.5	2.8	10.8	300	2	4.0	2.0		3300	60	TR	36	2	62								
		TIH w/Demco scratchers - scraped casing & hole to 15502 - set cement plug																													
9-7	0100	15530	17	54		50		9	0/6	11.5	2.8	10.8	300	2	4.0	2.0		3300		W. O. C.											
9-8	2400	14757	17	53		45		8	0/4	11.5	3.4	9.8	300	2	5.9	3.6		3000	160	TR	35	2	63								
		Reamed & washed cement to 14767' - 30 ft. WOC 5 hours and washed to 14820. TIH washed and reamed - cement soft -																													
		Cleaning out hole to set another plug.																													
9-9	0500	15188	17	51		46		6	0/6	11.5	3.0	9.6	300		6	3.0	4.1	2800	160	TR	35	2	63								
		Reaming out cement																													
9-10	0500	15295	17.2	55		45		7	1/6	11.0	2.8	9.0	300		1.8	1.8	TR	3000	100	TR	36	1½	62½		1720						
9-11	0500	15310	17.3	55		39	120	8	0/5	11.0	2.7	9.4	300		1.7	1.7	TR	2800	100	TR	37	1	62		1750						
9-12	0500	15338	17.3	55		43	120	10	1/6	11.0	2.8	9.8	300		1.4	1.4	TR	2800	80	TR	38	1½	61½		1800						
9-13	0500	15344	17.3	55		42	120	7	0/4	11.0	2.6	9.8	300		1.2	1.2	TR	2700	80	TR	37	1	62		1800						
9-14	0500	15359	17.3	52		42	120	10	0/6	11.0	2.4	9.2	300		1.1	1.1		2800	80	TR	37	1	62		1780						

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CONTRACTOR Merit Drilling Company OPERATOR Technadril-Fenix & Scisson/DOE LEGAL SUR. SEC 27 - T 15 S - R 5 W

RIG NO. 4 WELL NAME T-F&S/DOE Gladys McCall No. 1 COUNTY/PARISH Cameron STATE Louisiana

Date 19 81	Time	Depth (ft.)	Wt. lb./gal.	Funnel Viscosity (sec./qt.)		Plastic Viscosity		Yield Point lb./100 ft.2	Gels lb./100 ft.2 0/10	pH	Filtrate (ml/30 min.)			Cake 32nd in.	Alkalinity			Cl— (ppm)	Ca++ (ppm)	Sand % by Vol.	Solids % by Vol.	Oil % by Vol.	Water % by Vol.	MBT mc/ml Mud	Circ. Volume (bb)	Hrs. Ran Centri- fuge	BIT DATA					
				API	@°F	CP	@°F				API	HTHP	°F		Pm	Pt	MI										Bit No.	Bit Size	Depth In	Depth Out	Hrs. Ran	
9-15	0500	15378	17.3	54	100	39	120	10	0/7	11.0	2.4	9.4	300	2	4.1	1.1		2600	80	TR	38	1	61		1800	6						
		Continued drilling with "Nava drill" having trouble with electric shorts in tool & line.																														
9-16	0500	15385	17.3	55		40	120	10	0/7	11.0	2.4	9.4	300	2	4.6	1.1		2700	80	TR	38	1	61		1760	3						
9-17	0500	15385	17.3	52	100	37	120	8	0/5	11.0	2.0	9.4	300	2	3.8	1.2		2600	60	TR	37	3/4	62½		1780							
		TIH with hole opener after "Nava drill" run. Excess torque when stabilizer going through side track point @ 15305'.																														
		Stuck D.P. @ 1576' spotted 80 bbls 17.5 ppg Black Magic; jarring on D.P.																														
9-18	0500	15385	17.3	55		41		10	1/6	11.0	2.2	9.6	300	2	2.9	1.0		2600	60	TR	37	1	62		1800							
9-19	0500	15385	17.3	54		37		8	0/5	11.0	2.0	9.4	300	2	2.8	1.0		2600	60	TR	37	3/4	62½		1820							
9-20	0500	15385	17.3	51		37		8	0/4	11.0	2.7	8.4	300	2	2.6	1.1		2500	60	TR	37	2½	61½		1840							
		Spotted 100 bbls of fresh Black Magic 17.3 ppg.																														
9-21	0500	15385	17.5	51		37		8	0/4	11.0	2.7	8.4	300	2	2.9	1.1		2500	60	TR	37	2½	61½		1890							
		Jarring on stuck D.P.																														
9-22	0500	15385	17.3	51		37		8	0/4	11.0	2.7	8.4	300	2	3.0	1.0		2500	60	TR	37	2½	61½		1830							
9-23	0500	15385	17.3	56		41		10	0/6	11.0	2.7	8.6	300	2	3.1	1.0		2400	60	TR	37	2½	61½		1820							
9-24	0500	15385	17.3	55		40		8	0/5	11.0	2.2	8.6	300	2	3.0	.9		2400	60	TR	38	4	58		1810							
		Fish came loose @ 0530 hours this day. POOH with same.																														
9-25	0500	15385	17.3	54		39		9	0/4	11.0	2.0	8.2	300	2	2.9	1.0		2500	60	TR	38	4½	57½		1860							
9-26	0500	15421	17.3	55		40		8	0/5	11.0	1.9	8.0	300	2	2.4	.9		2500	40	TR	39	4	57		1880							
		Reamed to 15385 & drilling ahead																														
9-27	0500	15464	17.3	55		42		10	0/6	10.5	1.9	8.4	300	2	2.5	.8		2500	40	TR	38	3½	58½		1890							
9-28	0500	15464	17.3	55		42		10	0/6	10.5	1.9	8.4	300	2	2.5	.8		2500	40	TR	38	3½	58½		1890							
9-29	0500	15464	17.3	56		43		10	1/7	11.0	2.3	8.4	300	2	2.2	.9	1.1	2500	40	TR	38	3			1890							

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 RIG NO. 4 WELL NAME T-F&S/DOE Gladys McCall No. 1 COUNTY/PARISH Cameron STATE Louisiana

Date 1981	Time	Depth (ft.)	Wt. lb./gal.	Funnel Viscosity (sec./qt.)		Plastic Viscosity		Yield Point lb./100 ft.2	Gels lb./100 ft.2 0/10	pH	Filtrate (ml/30 min.)			Cake 32nd in.	Alkalinity			Cl— (ppm)	Ca++ (ppm)	Sand % by Vol.	Solids % by Vol.	Oil % by Vol.	Water % by Vol.	MBT mc/ml Mud	Circ. Volume (bb)	Hrs. Ran Centri- fuge	BIT DATA				
				API	@*F	CP	@*F				API	HTHP	*F		Pm	Pl	Mf										Bit No.	Bit Size	Depth In	Depth Out	Hrs. Ran
9-30	0600	15464	17.3	54		40		9	0/6	11.0	2.3	8.4	300	2	2	1.1	1.1	2500	60	TR	37	3	60		1860						
10-1	0500	15481	17.3	53		38		10	0/5	11.0	2.8	8.6	300	2	2	1.8	.9	2500	40	TR	37	3	60		1860						
10-2	0600	15528	17.3	55		44		10	1/6	10.5	1.9	8.6	300	2	1.6	.8	1	2500	TR	TR	38	4			1860						
10-3	0600	15528	17.3	55		41		9	1/5	10.5	2.4	8.4	300	1.5	.8	1.0	1.0	2500	40	TR	38	4	60		1870						
10-4	0500	15579	17.3	52		39		8	0/4	11.0	2.3	8.6	300	2	1.6	.9	.9	2800	40	TR	37	4	59		1850						
10-5	0500	15636	17.3	51		39		10	0/5	10.5	2.4	8.0	300	2	1.5	.9	.9	2500	40	TR	37	4	59		1850						
10-6	1900	15657	17.3	51		41		9	0/6	10.5	2.2	8.2	300	2	1.5	.8	1.0	2700	40	TR	37	3	60		1860						
10-7	0600	15663	17.3	55		44		12	1/8	10.5	2.5	8.6	300	2	1.4	.7	1.3	2700	TR	TR	38	3	59		1850						
10-8	0500	15730	17.3	50		38		7	0/2	10.5	2.4	9.8	300	2	1.6	8	1.5	2100	TR	TR	36	3	61		1810						
10-9	0500	15782	17.2	50		42		9	0/6	10.5	2.5	10	300	2	1.6	8	1.5	2000	40	TR	36	3	61		1810						
10-10	0500	15947	17.1	53		45		8	1/7	10.5	3.5	9.8	300	2	1.8	.9	1.2	2000	40	TR	36	3	61		1860						
		Reduced M/W to 17.1 as per drilling engineers orders.																													
10-11	0500	16161	17.5	54		50		12	2/10	10.5	3.0	9.8	300	2	1.7	.8	1.3	2000	40	TR	37	4	59		1850						
		Increased Protectomagic to 4-6% due to excess torque @ 16004'																													
10-12	0500	16397	17.1	53		42		10	1/7	10.5	2.6	9.6	300	2	1.5	.7	1.1	2300	40	TR	37	3	60		1760						
10-13	1200	16510	17.3	54		42		7	0/6	11.0	2.3	9.2	300	2	1.1	.9	1.3	2500	40	TR	38	4	58		1760						
10-14		Logging																													
10-15	0500	16500	17.3	54		44		7	0/7	10.5	2.4	9.6	300	2	1.8	.9	1.0	2500	40	TR	38	4	58		1660						
		Circulate and condition hole to run 7" liner. POOH to run same.																													
10-16	1030	16500	17.3	54		42		6	0/5	10.5	2.5	9.6	300	2	1.5	.8	1.3	2500	TR	TR	36	5	59		1650						
10-17	0530	16500	17.3	54		44		6	0/6	10.0	2.6	9.0	300	2	1.1	.6	.9	2300	TR	TR	37	5½	57½		1650						
		Stuck liner @ 15982 + - spotted 80 bbls Black Magic - jarring & working same																													

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CONTRACTOR Merit Drilling Company OPERATOR Technadril-Fenix & Scisson/DOE LEGAL SUR. SEC 27 - T 15 S - R 5 W
RIG NO. 4 WELL NAME T-F&S/DOE Gladys McCall No. 1 COUNTY/PARISH Cameron STATE Louisiana

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Appendix K

TUBULAR INSTALLATIONS SUMMARY

TUBULAR INSTALLATIONS SUMMARY
T-F&S/DOE GLADYS McCALL NO. 1

DESCRIPTION	SETTING DEPTH, FEET	NUMBER JOINTS	WT./FT. LBS.	GRADE	THREADS	RANGE	I.D. INCHES	DRIFT INCHES	COLLAPSE PSI	BURST PSI	TENSILE YIELD, 1000 LBS.	CAPACITY BBLs./FT.
30" Drive Pipe (Structural Csg.) (Driven)	222	5	309	B	Welded	3	28.00	-	-	-		0.7616
20" Conductor Casing (Cemented to Surface)	869	22	133	K-55	Buttress	3	18.730	18.542	1,500	3,060	2,123	0.3407
13-5/8" Surface Casing (Cemented to Surface)	4,490	• 81	68	K-55	Buttress	3	12.415	12.259	1,950	3,450	1,069	0.1497
		** 29	72	L-80	Buttress	3	12.347	12.191	2,670	5,380	1,661	0.1481
9-5/8" Intermediate Casing (Cemented to Surface)	14,426		53.50	P-110	Buttress	3	8.535	8.379	7,930	10,900	1,710	0.0708
7" Liner, Production Casing (Cemented 15,958' to 12,616')	15,958	79	38	AR-95	Buttress	3	5.920	5.795	13,420	10,050	920	0.0340
7" Tie-Back, Production Casing (Cemented 12,616' to + 6,000')	12,616	• 278	38	P-110	Buttress	3	5.920	5.975	15,110	11,640	1,096	0.0340
		** 23	38	N-80	X-Line	3	5.920	5.795	11,390	8,460	877	0.0340
5" Tubing assembly:												
8-5/8" OD x 5", Gray Tool, Hanger	1.66	1	-	-	AB-TC-4S	-	4.276	4.276	-	-		
1-5" x 14.10' Pup Joint	15.76	1	18	P-110	AB-TC-4S	-	4.276					0.0178
1-5" x 5.42' Pup Joint	21.18	1	18	P-110	AB-TC-4S	-	4.276					0.0178
5" Tubing	5,025.66	128	18	P-110	AB-TC-4S	3	4.276	4.151	13,450	13,940	580	0.0178
5" Otis Flow Coupling	5,026.52	1	-	-	AB-TC-4S	-	3.875	3.875				
5" Otis Type-X Landing Nipple	5,033.54	1	-	-	AB-TC-4S	-	3.688	3.688				
5" Tubing	13,903.59	226	18	P-110	AB-TC-4S	3	4.276	4.151	13,450	13,940	580	0.0178
TIW 5" Seal Assembly												
Fishing Neck, 5-1/2" O.D.	13,904.58						4-5/16	4-5/16				
Locator Sub, 5-11/16" O.D.	13,905.08						4-5/16	4-5/16				
Blank Extension, 5" O.D.	13,923.98						4-5/16	4-5/16				
6 Sections of Seals, 5-1/2" O.D.	13,932.55						4-5/16	4-5/16				
Nose Piece, 5-15/32" O.D.	13,932.93						4-1/4	4-1/4				

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• Top of Casing String
** Bottom of Casing String